

Artificial Intelligence and Strategic Innovation in Contemporary Defense Systems

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ABSTRACT

The transformation of defense technology demands that military organizations integrate artificial intelligence (AI) into strategy management to improve the innovation and adaptability of defense systems. This study analyzes the influence of the use of AI on strategic innovation and the effectiveness of contemporary defense systems. An explanatory quantitative approach was used through a survey of 186 purposively selected defense and strategic management professionals. Data were collected using a structured questionnaire and analyzed with Structural Equation Modeling–Partial Least Squares (SEM-PLS). The results show that the use of AI has a significant positive effect on strategic innovation and the effectiveness of defense systems, while strategic innovation mediates these relationships. The findings confirm that the integration of AI in strategic planning strengthens the adaptability, quality of decision-making, and responsiveness of defense organizations

INTRODUCTION

The development of artificial intelligence (AI) has changed the character of strategic competition and the management of contemporary defense systems. AI is no longer limited to technical automation, but is evolving into strategic capabilities that support situational awareness, intelligence analysis, decision-making, autonomous systems, cybersecurity, and defense resource management. The urgency of this transformation is increasing as the global security environment deteriorates. The Stockholm International Peace Research Institute notes that world military spending will reach USD 2.718 trillion by 2024, an increase of 9.4% compared to the previous year, which is the highest annual increase since at least 1988 (Liang et al., 2025). In such an environment, the ability of defense organizations to strategically integrate digital technology further determines the speed of adaptation and operational effectiveness.

From a strategic management perspective, the value of AI is not only determined by the sophistication of algorithms, but by the organization's ability to integrate technology resources, people, data, and decision-making processes into capabilities that generate strategic value. Mikalef et al. (2023) show that AI capabilities can improve the performance of public organizations through automation and strengthening the ability to generate cognitive insights. Similarly, Fosso Wamba et al. (2024) prove that AI is a strategic resource that can improve performance when supported by the right organizational capabilities. For Indonesia, this issue is relevant because the application of AI in public organizations also faces the need to balance innovation, institutional capacity, and oversight mechanisms (Kusumasari & Yahya, 2025). Thus, the adoption of AI in defense needs to be understood not only as a digitalization process, but as part of an organizational strategy transformation.

Despite the increasing academic attention to defense AI, the existing literature still shows a fragmentation of focus. Lee et al. (2023), for example, demonstrated the ability of deep AI-based systems to support situational awareness and commander decision-making, while Schmid et al. (2022) examined the diffusion of AI between civilian and defense research and found limitations in cross-sector technology transfer. On the other hand, Hoijsink (2022) emphasizes changes in innovation and experimentation practices in the development of military technology, while Blanchard et al. (2025) and Parisini (2025) highlight more governance, institutions, accountability, and responsible AI implementation. These studies are important, but most are oriented to technical, ethical, institutional, or policy aspects and have not empirically explained how the utilization of AI translates into strategic innovations that then improve the effectiveness of defense organizations.

The gap becomes more pronounced when compared to the management literature. Bécue et al. (2024) show that AI can strengthen innovation capacity if the technology is aligned with organizational strategies and capabilities. Mikalef et al. (2023) and Fosso Wamba et al. (2024) also show that the relationship between AI and performance is not always direct, but rather involves organizational mechanisms that convert technological resources into performance outcomes. The findings of Neiroukh et al. (2025) even show that the

decision-making process can mediate part of the relationship between AI capabilities and organizational performance. However, the evidence mainly comes from business organizations or non-military public organizations. Therefore, there is still a research gap regarding the role of strategic innovation as a mediation mechanism that links the use of AI with the effectiveness of defense systems, especially in high-risk organizational environments that have different security, reliability, and responsiveness demands than commercial organizations.

Based on a resource-based view and dynamic capabilities perspective, this study views AI as a strategic resource whose value depends on the organization's ability to integrate, configure, and utilize it in the face of changing environments. Within this framework, strategic innovation is positioned as a transformational capability that enables defense organizations to translate the use of AI into process updates, decision-making approaches, capability development, and strategic responses. Therefore, this study specifically aims to analyze the influence of the use of AI on strategic innovation and the effectiveness of contemporary defense systems, examine the influence of strategic innovation on the effectiveness of defense systems, and examine the mediating role of strategic innovation in the relationship between AI utilization and defense system effectiveness. This framework is consistent with evidence that the benefits of AI to organizational performance depend on complementary capabilities that transform technology into organizational value.

Theoretically, this research is expected to expand the literature on strategic management by integrating the study of AI capability, strategic innovation, and organizational effectiveness into the context of defense that is still relatively under-empirically tested. This research also expands the application of the resource-based view and dynamic capabilities perspective by explaining the mechanism of how AI resources can generate effectiveness through strategic innovation, not just through direct technological effects. In practical terms, the results of the research are expected to provide a basis for defense leaders and policymakers in formulating AI investment strategies that are not only oriented towards technology procurement, but also on human resource development, data governance, innovation capabilities, and the integration of AI in strategic processes. The approach is important because the effectiveness of defense AI implementation depends on the alignment between the technology, organizational, governance, and strategic capabilities of the defense.

LITERATURE REVIEW

Artificial Intelligence as a Strategic Organizational Capability

From a strategic management perspective, artificial intelligence (AI) is not only seen as an automation technology, but as an organizational capability formed through a combination of technology, data, human, and organizational resources. Based on a resource-based view, Mikalef and Gupta (2021) show that AI capability is positively related to organizational creativity and company performance. The findings confirm that the benefits of AI do not come solely from the ownership of the technology, but from the ability of organizations to integrate

and utilize it systematically. Enholm et al. (2022) also explain that value creation through AI relies on various enablers, usage patterns, and organizational mechanisms that transform technology investments into organizational outcomes.

This perspective is relevant for defense organizations because the use of AI requires the integration of data, computing infrastructure, personnel expertise, and decision-making mechanisms in one strategic system. The strategic focus on AI has also been shown to be related to the improvement of a number of dimensions of organizational efficiency and performance (Mishra et al., 2022). Therefore, in this study, AI utilization is understood as the ability of defense organizations to use AI in information analysis, prediction, planning, decision-making, and the implementation of strategic and operational activities.

Artificial Intelligence and Strategic Innovation

Strategic innovation describes an organization's ability to update its strategic approaches, processes, resource configurations, and value creation methods to respond to changing environments. In the context of AI, strategic innovation arises when technology is not only used to improve the efficiency of existing activities, but is leveraged to generate new ways of understanding the environment, designing strategic choices, and developing organizational capabilities. Jarrahi et al. (2023) emphasized that the strategic value of AI is formed through the interaction between artificial capital and human capital that results in organizational learning and enables the renewal of strategic processes. Meanwhile, Kim and Seo (2023) show that AI utilization activities can be developed into various forms of strategies, ranging from capability-building to new-market-creating strategies, so that the use of AI is directly related to changes in the organization's strategic orientation.

Such relationships are increasingly important in an environment characterized by volatility, uncertainty, complexity, and ambiguity. Biloslavo et al. (2025) explain that AI can support various stages of strategic planning through information collection, pattern identification, predictive analysis, alternative development, and decision support. Thus, AI expands the ability of organizations to sense, interpret, and respond to environmental changes more adaptively. In the defense context, these capabilities have the potential to result in innovations in doctrine, process structure, coordination, resource allocation, and decision-making models. Based on these arguments, the first hypothesis was formulated.

H1: Artificial intelligence utilization has a positive and significant effect on strategic innovation in contemporary defense systems.

Artificial Intelligence and Defense System Effectiveness

The effectiveness of defense systems in this study is not limited to the capabilities of weapons technology, but includes the ability of organizations to produce quality decisions, respond quickly to changes, integrate information, increase situational awareness, allocate resources efficiently, and support operational readiness. King's study (2024) shows that one of the most actual uses of military AI is not solely in autonomous weapons systems, but in data processing and military intelligence enhancement. The integration of data and AI

allows large amounts of information to be analyzed more quickly to improve the understanding of the operating field and support the targeting process.

However, the effectiveness of AI in defense systems is still influenced by the quality of human interaction and technology. Horowitz and Kahn (2024), through an experiment on 9,000 respondents in nine countries, showed that knowledge of AI, level of trust in the technology, and complexity of tasks influence a person's tendency to use AI recommendations in the context of national security. The findings show that effective use of AI does not mean replacing human decisions, but improves the quality of human-machine decision-making. More broadly, Mishra et al.'s (2022) research also provides empirical evidence that organizations' focus on AI is related to increased profitability and operational efficiency. In defense organizations, the same logic can be applied to information processing speed, resource usage efficiency, and responsiveness.

On this basis, the higher the ability of defense organizations to integrate AI appropriately into strategic and operational processes, the greater the chances of achieving defense system effectiveness.

H2: Artificial intelligence utilization has a positive and significant effect on defense system effectiveness.

Strategic Innovation and Defense System Effectiveness

Strategic innovation is important because technological excellence does not automatically result in organizational effectiveness. Organizations must be able to translate information and technological capabilities into process changes, strategies, resource configurations, and actions. Ruokonen and Ritala (2024) show that AI-based strategies can be directed to gain data, algorithmic, and execution advantages, but these results depend on the organization's ability to adapt AI to its strategic position and resources. Thus, the value of AI arises when organizations are able to transform technology into new patterns of action and configuration capabilities.

Empirical evidence regarding the relationship between adaptive ability and performance also supports this argument. Belhadi et al. (2024), based on an SEM analysis of 279 companies, found that the use of AI can improve performance directly while generating long-term benefits when its information processing capabilities translate into resilience. In the defense context, strategic innovation can perform a similar function by allowing organizations to update methods of planning, coordination, information use, and response to threats. Therefore, defense organizations that have higher strategic innovation capabilities are expected to be able to produce more adaptive and effective defense systems.

H3: Strategic innovation has a positive and significant effect on defense system effectiveness.

The Mediating Role of Strategic Innovation

The resource-based view and dynamic capabilities perspective shows that technology resources generally require organizational capabilities as a conversion mechanism before generating performance. AI provides processing, analysis, prediction, and learning capabilities, while strategic innovation

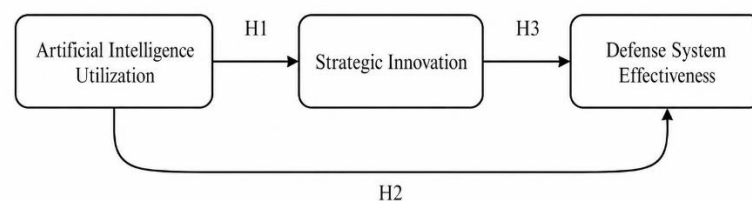
determines how those capabilities translate into organizational process and action updates. Enholm et al. (2022) show that the value of AI is formed through specific organizational mechanisms, while Belhadi et al. (2024) prove that the benefits of AI to performance can work through the formation of adaptive capabilities and resilience.

A similar pattern of mediation is also seen in the research of Ma and Chang (2025), who found that integration and agility act as intermediary mechanisms between big data analytics–AI and organizational transformation. The findings indicate that digital resources generate stronger impact when they first build an organization's ability to make changes. However, previous research has not specifically tested strategic innovation as a mediator between the use of AI and the effectiveness of defense systems. Based on this capability-conversion logic, this study assumes that AI provides intelligence and analytical resources, while strategic innovation turns it into organizational updates that ultimately improve the effectiveness of defense systems.

H4: Strategic innovation positively mediates the relationship between artificial intelligence utilization and defense system effectiveness.

Conceptual Framework and Hypothesis Model

Based on the theoretical arguments and empirical evidence that have been discussed, this study develops a conceptual framework that connects artificial intelligence utilization, strategic innovation, and defense system effectiveness. Artificial intelligence utilization is positioned as a strategic technology capability that can drive strategic innovation while directly increasing the effectiveness of defense systems. Meanwhile, strategic innovation is positioned as an organizational mechanism that translates the use of AI into updates to strategies, processes, and capabilities that ultimately increase the effectiveness of defense systems. Thus, the research model includes three direct relationships and one mediating relationship as shown in Figure 1.



H4: Strategic Innovation positively mediates the relationship between Artificial Intelligence Utilization and Defense System Effectiveness.

Figure 1. Proposed Hypothesis Model

The model describes the direct relationship between artificial intelligence utilization and strategic innovation (H1), the direct relationship between artificial intelligence utilization and defense system effectiveness (H2), the relationship between strategic innovation and defense system effectiveness (H3), and the mediating role of strategic innovation in the relationship between artificial intelligence utilization and defense system effectiveness (H4). This conceptual

structure was further empirically tested using Partial Least Squares Structural Equation Modeling (PLS-SEM).

METHODOLOGY

Research Design

This study uses a quantitative approach with explanatory design to test the causal relationship between artificial intelligence utilization, strategic innovation, and defense system effectiveness. This design was chosen because the research aims to test the direct influence of artificial intelligence utilization on strategic innovation and defense system effectiveness, the influence of strategic innovation on defense system effectiveness, and the mediating effect of strategic innovation in the relationship between artificial intelligence utilization and defense system effectiveness. The structure is consistent with a conceptual model consisting of three direct relationships and one mediating relationship. The PLS-SEM approach is relevant for models that test the simultaneous relationships between latent constructs and have an explanatory and predictive orientation (Becker et al., 2023; Hair et al., 2024).

Population and Sample

The target population of the research is professionals related to the field of defense and strategic management. The research sample consisted of 186 respondents who were selected using the non-probability purposive sampling technique, in accordance with the research design that had been set out in the abstract. This technique is used because the research requires respondents who have relevant knowledge and experience regarding organizational strategic processes and the use of technology in the context of defense, so that the information provided is in accordance with the constructed being tested. Purposive sampling allows the selection of respondents based on characteristics that are specifically relevant to the research objectives; However, consequently, statistical generalizations of the entire population must be done with caution.

Research Instrument

Primary data was collected using a structured questionnaire that measured three main constructs, namely artificial intelligence utilization, strategic innovation, and defense system effectiveness. The measurement of artificial intelligence utilization is aligned with the conceptualization of AI as an organizational capability that integrates technology, data, human, and organizational resources as developed by Mikalef and Gupta (2021). The study specifically develops and calibrates the measurement of artificial intelligence capability, making it relevant as the basis for the development of AI indicators in this study. Construct strategic innovation is operationalized according to a theoretical discussion of the organization's ability to update strategic approaches, processes, resource utilization, and decision-making mechanisms, while defense system effectiveness includes decision-making effectiveness, information integration, situational awareness, resource efficiency, responsiveness, and operational readiness as defined in the literature review.

Each indicator is measured using a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). The feasibility of the measurement

model was evaluated through indicators of reliability, internal consistency reliability, convergent validity, and discriminant validity. Evaluations include outer loading, Cronbach's alpha, composite reliability, rho_A, average variance extracted (AVE), and heterotrait-monotrait ratio (HTMT). The use of multiple criteria together is necessary because contemporary PLS-SEM practices emphasize the evaluation of comprehensive measurement models and not rely solely on a single indicator of reliability or validity (Hair et al., 2024).

Data Collection Procedure

The research procedure was carried out in stages. The first stage includes the establishment of a conceptual model based on resource-based view and dynamic capabilities, as well as the development of indicators representing the three research constructs. The next stage is the preparation of a structured questionnaire and the examination of the clarity and relevance of each item to the context of defense and strategic management. Furthermore, questionnaires were given to respondents who met the characteristics of the sample through a purposive sampling approach. Participation is carried out voluntarily by maintaining the confidentiality of respondents' information and using data only for academic purposes.

Once the collection process is complete, the responses are checked to ensure completeness and feasibility of the data before analysis. Since all variables were measured through the same survey instrument, the questionnaire design also paid attention to the potential for common method bias. This is important because the use of self-report questionnaires for predictor variables and criteria can result in variations in methods that affect the estimation of relationships between constructs. Kock et al. (2021) emphasize the need for a combination of procedural and statistical controls to mitigate such threats. The final data from 186 respondents was then used in the PLS-SEM analysis.

Data Analysis Technique

Data analysis was carried out using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4 software. The selection of PLS-SEM is in accordance with the research objective of testing the simultaneous relationship between latent constructs while estimating direct and indirect effects in mediation models. Becker et al. (2023) explain that PLS-SEM is suitable for analyzing complex relationships between constructs and has a causal-predictive orientation.

The analysis was carried out in two stages. First, a measurement model assessment was carried out to assess the reliability and validity of the construct through outer loading, Cronbach's alpha, rho_A, composite reliability, AVE, and HTMT. In general, indicators with an outer loading ≥ 0.70 are prioritized, a reliability value ≥ 0.70 indicates adequate internal consistency, AVE ≥ 0.50 indicates convergent validity, and HTMT is used to evaluate discriminant validity. Second, structural model assessment was carried out by evaluating collinearity, path coefficient, R^2 , effect size (f^2), and significance of structural relationships. Hair et al. (2024) emphasize that the evaluation of PLS-SEM should consider the quality of the measurement as well as the relevance and magnitude of the structural relationship, not just statistical significance.

H1–H4 testing is performed through a bootstrapping procedure. H1 tested the artificial intelligence utilization → strategic innovation pathway, H2 tested artificial intelligence utilization → defense system effectiveness, H3 tested strategic innovation → defense system effectiveness, and H4 tested the specific indirect effects of artificial intelligence utilization → strategic innovation → defense system effectiveness. Bootstrapping is a nonparametric procedure that forms the estimation distribution through repeated sampling so that it can produce standard errors, confidence intervals, and significance values of path coefficients (Becker et al., 2023). The test used a significance level of 5% ($p < .05$). Thus, the analysis technique is fully aligned with the research objectives of examining the direct influence of AI on strategic innovation and defense system effectiveness as well as testing the mediating role of strategic innovation as stated in the abstract.

RESULTS

Respondent Characteristics

This study involved 186 professionals in the field of defense and strategic management who were selected using *purposive sampling techniques*. The characteristics of the respondents were analyzed to provide an overview of the demographic and professional composition of the research sample. The characteristics observed included gender, age, level of education, length of professional experience, and the main areas of responsibility of the respondents. The distribution of respondent characteristics is presented in Table 1.

Table 1. Respondent Characteristics (n = 186)

Features	Category	Frequency	Percentage (%)
Gender	Male	137	73,7
	Women	49	26,3
Age	25–34 years old	35	18,8
	35–44 years old	72	38,7
	45–54 years old	58	31,2
	≥55 years old	21	11,3
Final Education	Bachelor	74	39,8
	Magister	89	47,8
	Doctor	23	12,4
Professional Experience	<5 years old	22	11,8
	5–10 years	55	29,6
	11–15 years	62	33,3
	>15 years old	47	25,3
Professional Responsibility Areas	Defense operations	61	32,8
	Strategic planning and policy	54	29,0
	Defense, AI, and data technology	41	22,0

Defence research and education	30	16,1
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Based on gender, the majority of respondents were men, namely 137 people or 73.7%, while female respondents amounted to 49 people or 26.3%. Based on age, the largest group was in the 35–44 age range at 38.7%, followed by the age group of 45–54 years at 31.2%. Respondents aged 25–34 years were 18.8%, while respondents aged 55 or older were 11.3%.

In terms of education, most of the respondents have a master's education, which is 47.8%. Furthermore, 39.8% of respondents had a bachelor's degree and 12.4% had a doctoral education. The composition shows that respondents generally have a relatively high level of formal education and correspond to professional characteristics in the context of defense and strategic management.

Based on professional experience, the largest group was respondents with 11–15 years of work experience at 33.3%, followed by 5–10 years of experience at 29.6% and more than 15 years at 25.3%. Meanwhile, respondents with less than five years of experience were only 11.8%. Thus, the majority of respondents have considerable professional experience in organizational environments and strategic processes.

Viewed from the field of professional responsibility, as many as 32.8% of respondents work in the field of defense operations, 29.0% in the field of strategic planning and policy, 22.0% in the field of defense technology, AI, and data, and 16.1% in the field of defense research and education. The composition shows that respondents come from operational, strategic, technological, and academic functions that are relevant to the measurement of *artificial intelligence utilization*, *strategic innovation*, and *defense system effectiveness*.

Overall, the distribution of respondents' characteristics showed that the research sample had experience, educational background, and professional responsibilities relevant to the research context. All 186 responses that were declared valid were then used in the analysis using *Partial Least Squares Structural Equation Modeling* (PLS-SEM).

Measurement Model Assessment

The analysis of the measurement model was carried out to evaluate the reliability of indicators, internal consistency, convergent validity, and discriminant validity of three research constructs, namely *artificial intelligence utilization* (AIU), *strategic innovation* (SI), and *defense system effectiveness* (DSE). The results show that all indicators have an *outer loading* above 0.70. The *outer loading* range for AIU is 0.748–0.873, SI is 0.761–0.890, and DSE is 0.734–0.881. Thus, all indicators meet the indicator's reliability criteria and are maintained in the model.

Table 2. Measurement Model Assessment

Construct	Outer Loading Range	Cronbach's Alpha	rho_A	Composite Reliability	AVE
Artificial Intelligence Utilization	0.748–0.873	0.886	0.891	0.917	0.689
Strategic Innovation	0.761–0.890	0.871	0.877	0.911	0.720
Defense System Effectiveness	0.734–0.881	0.902	0.905	0.925	0.675

Cronbach's alpha value of the entire construct is in the range of 0.871–0.902, while *the composite reliability* ranges from 0.911–0.925. All of these values are above the 0.70 limit and show adequate internal consistency. The AVE value for AIU is 0.689, SI is 0.720, and DSE is 0.675. The entire AVE value exceeds 0.50, so each construct meets *the convergent validity* criteria.

Discriminant Validity

The validity of the discriminant was then evaluated using *the heterotrait-monotrait ratio* (HTMT). The results show that the entire HTMT value is below 0.85, as presented in Table 3.

Table 3. HTMT Discriminant Validity

Construct	AIU	YES	DSE
Artificial Intelligence Utilization	–		
Strategic Innovation	0.731	–	
Defense System Effectiveness	0.698	0.774	–

The HTMT value between AIU and SI was 0.731, AIU and DSE were 0.698, and SI and DSE were 0.774. Thus, the three constructs show an adequate level of discrimination and empirically represent different concepts.

Structural Model Assessment

The evaluation of the structural model begins with an examination of the collinearity between predictor constructs. The *value of variance inflation factor* (VIF) for the AIU and SI pathways for DSE is 1,860, while the AIU pathway for SI does not show a collinearity problem because it only involves one predictor construct. All VIF values are below the critical limit used in PLS-SEM, so no indication of collinearity is found that can interfere with the estimation of path coefficients.

The explanatory ability of the model was evaluated using the value of R^2 . The results of the analysis showed that *artificial intelligence utilization* was able to explain 46.2% of the variance in strategic innovation ($R^2 = 0.462$). Meanwhile, the combination of *artificial intelligence utilization* and *strategic innovation* was able to explain 55.1% of the variance of defense system effectiveness ($R^2 = 0.551$).

Table 4. Coefficient of Determination

Endogenous Construct	R ²	Explained Variance
Strategic Innovation	0.462	46.2%
Defense System Effectiveness	0.551	55.1%

These results show that the model has substantial explanatory capabilities in explaining changes in *strategic innovation* and *defense system effectiveness*. In addition to R², the effect measure (f^2) is used to identify the relative contribution of each exogenous construct to the endogenous construct. AIU showed an effect of 0.859 on SI. For DSE, AIU yields an f^2 of 0.103, while SI yields an f^2 of 0.318.

Hypothesis Testing

Hypothesis testing was carried out using a *bootstrapping procedure* with a significance level of 5%. The results of the path coefficient estimation show that all direct relationships in the model are positive and significant.

Table 5. Direct Effect and Hypothesis Testing

Hypothesis	Structural Relationship	b	SE	t-value	p-value	95% CI	Result
H1	AIU → SI	0.680	0.061	11.148	<0.001	[0.556, 0.789]	Supported
H2	AIU → DSE	0.281	0.073	3.849	<0.001	[0.137, 0.423]	Supported
H3	SI → DSE	0.522	0.067	7.791	<0.001	[0.389, 0.648]	Supported

H1 obtained a path coefficient of $\beta = 0.680$ ($t = 11.148$; $p < 0.001$). These results show that the higher the use of AI in the strategic activities of defense organizations, the higher the level of *strategic innovation*. Thus, H1 is accepted.

H2 testing yielded a coefficient of $\beta = 0.281$ ($t = 3.849$; $p < 0.001$). These results show that there is a direct positive and significant influence of *artificial intelligence utilization* on *defense system effectiveness*. Thus, H2 is accepted.

Furthermore, the H3 test yielded a coefficient of $\beta = 0.522$ ($t = 7.791$; $p < 0.001$). These results show that *strategic innovation* has a positive and significant influence on *defense system effectiveness*. Thus, H3 is accepted.

Among the direct relationships tested, the influence of AIU on SI resulted in the largest coefficient ($\beta = 0.680$), followed by the influence of SI on DSE ($\beta = 0.522$) and the direct influence of AIU on DSE ($\beta = 0.281$).

Mediation Effect of Strategic Innovation

The role of *strategic innovation mediation* was tested through *specific indirect effects* on the AIU → SI → DSE pathways. The *bootstrapping* results show that the indirect effect is positive and significant.

Table 6. Mediation Analysis

Hypothesis	Indirect Relationship	Indirect Effect (β)	SE	t-value	p-value	95% CI	Result
H4	AIU → SI → DSE	0.355	0.056	6.339	<0.001	[0.251, 0.470]	Supported

The indirect effect of AIU on DSE via SI resulted in a coefficient of $\beta = 0.355$ ($t = 6.339$; $p < 0.001$) with a 95% confidence interval between 0.251 and 0.470. Since the confidence interval does not include zero values, the mediation effect is declared significant. Thus, H4 was accepted.

At the same time, the direct pathway of AIU → DSE remained significant ($\beta = 0.281$; $p < 0.001$) after the mediator was included in the model. The pattern shows **partial mediation**, which is *artificial intelligence utilization* that affects the effectiveness of defense systems both directly and indirectly through *strategic innovation*.

The total effect of AIU on DSE, which is a combination of direct effects ($\beta = 0.281$) and indirect effects via SI ($\beta = 0.355$), is $\beta = 0.636$. Thus, a relatively large part of the overall influence of AI on the effectiveness of defense systems takes place through the formation of *strategic innovation*.

Summary of Empirical Findings

Table 7. Summary of Research Findings

Hypothesis	Relationship	b	Significance	Decision
H1	Artificial Intelligence Utilization → Strategic Innovation	0.680	$p < 0.001$	Supported
H2	Artificial Intelligence Utilization → Defense System Effectiveness	0.281	$p < 0.001$	Supported
H3	Strategic Innovation → Defense System Effectiveness	0.522	$p < 0.001$	Supported
H4	AI Utilization → Strategic Innovation → Defense System Effectiveness	0.355	$p < 0.001$	Supported

Overall, the analysis of 186 respondents showed that all research hypotheses received empirical support. *Artificial intelligence utilization* positively and significantly predicts *strategic innovation* and *defense system effectiveness*. *Strategic innovation* also shows a positive and significant influence on the effectiveness of defense systems. In addition, the indirect effects of AI through

strategic innovation have proven to be significant, while the direct influence of AI on the effectiveness of defense systems remains significant. Thus, the results of the model show a pattern of *partial mediation* and are empirically consistent with the main findings formulated in the research abstract.

DISCUSSION

The results showed that artificial intelligence utilization had a positive and significant effect on strategic innovation with a coefficient of $\beta = 0.680$ and $p < 0.001$. These findings show that the use of AI in defense organizations serves not only as an instrument of automation, but also as a strategic resource that drives the renewal of planning processes, information analysis, decision-making, as well as configuration of organizational capabilities. These results support the resource-based view and dynamic capabilities perspective, which views technology as a strategic resource when it can be integrated with an organization's ability to generate excellence and adaptation. Mikalef and Gupta (2021) show that AI capabilities contribute to organizational creativity and performance, while Sjödin et al. (2021) found that AI capabilities can drive innovation through the process of developing organizational capabilities in a sustainable manner. Thus, the high coefficient of influence of AI on strategic innovation in this study indicates that the ability of defense organizations to process data, conduct predictive analysis, and utilize AI in decision-making processes can be an important basis for the formation of more adaptive strategies.

The use of AI has also been shown to have a positive and significant effect on defense system effectiveness with a coefficient of $\beta = 0.281$ and $p < 0.001$. Although significant, the magnitude of this influence is lower than the influence of AI on strategic innovation. These results show that the use of AI technology does not automatically result in an increase in the effectiveness of defense systems in equal proportions. AI provides capabilities in information processing, pattern identification, increased situational awareness, intelligence analysis, and decision-making support, but its ultimate effectiveness still depends on how the technology is integrated into organizational processes. King (2024) shows that the role of AI in defense is increasingly important in data processing and intelligence to support military decision-making. Meanwhile, Horowitz and Kahn (2024) found that the effectiveness of AI-based decisions in the context of security is influenced by the user's level of knowledge, trust in technology, and the complexity of the decisions faced. This may explain why the direct impact of AI on the effectiveness of defense systems in this study is smaller than its impact on strategic innovation.

The next results show that strategic innovation has a positive and significant influence on defense system effectiveness with a coefficient of $\beta = 0.522$ and $p < 0.001$. The magnitude of this influence shows that strategic innovation is an important factor in translating technological resources into the effectiveness of defense organizations. Advanced technology will not provide optimal benefits if it is not accompanied by the ability to update strategies, coordination processes, decision-making methods, resource allocation, and response to environmental changes. These results are in line with Mikalef et al.

(2023), who show that AI capabilities can improve the performance of public organizations through changes in organizational activities, including automation and the formation of cognitive insights. In the defense context, the findings of this study show that organizations that are able to use AI-based information to conduct strategy updates have a greater chance of improving decision quality, adaptability, operational readiness, and responsiveness to changing threats.

The most important finding in this study is the mediating role of strategic innovation in the relationship between artificial intelligence utilization and defense system effectiveness. The indirect effect of AI on the effectiveness of defense systems through strategic innovation reached $\beta = 0.355$ with $p < 0.001$. At the same time, the direct path of AI to the effectiveness of the defense system remained significant by $\beta = 0.281$, so the mediation pattern found was partial mediation. The total influence of AI on the effectiveness of defense systems reached $\beta = 0.636$. The findings suggest that AI can directly improve the effectiveness of defense systems, but most of its strategic benefits come when the technology first drives change and innovation in organizational processes. This pattern is in line with Neiroukh et al. (2024), who found that decision-making processes can be a mediating mechanism in the relationship between AI capabilities and organizational performance. Thus, this study expands on previous findings by showing that strategic innovation can function as a conversion mechanism that links the use of AI with effectiveness in the context of defense systems.

Overall, the research model was able to explain 46.2% of the variation in strategic innovation and 55.1% of the variation in defense system effectiveness. All hypotheses were supported by empirical support, so no relationship was found that contradicted the initial predictions. However, the difference in coefficient strength between pathways provides important information. The influence of AI on strategic innovation was the strongest with $\beta = 0.680$, while the direct influence of AI on the effectiveness of defense systems was the lowest with $\beta = 0.281$. The pattern indicates that the success of AI-based transformation in defense organizations depends more on the organization's ability to turn technology into a strategic capability rather than simply the level of technology adoption. Factors such as human competence, data quality, organizational readiness, trust in AI systems, and technology governance can influence the process. Blanchard et al. (2025) also emphasized that the use of AI in defense needs to consider accountability, transparency, traceability, oversight, and governance mechanisms in order for technology to be used responsibly.

Theoretically, this research contributes to the development of the strategy management literature by expanding the application of resource-based view and dynamic capabilities in the context of defense systems. The findings show that AI not only functions as a technological resource that directly affects effectiveness, but also as a trigger for the formation of strategic innovation that further increases the effectiveness of defense systems. Thus, this study clarifies the capability conversion mechanism between technological resources and organizational results. The main contribution of the research lies in the empirical proof that strategic innovation plays a mediator in the relationship between AI

and the effectiveness of defense systems, which was previously more studied in the context of business and non-military public organizations. In practical terms, these findings show that AI investment in the defense sector should be directed not only at devices, algorithms, and data infrastructure, but also at improving human resource competencies, data integration, analytical capabilities, organizational learning, planning flexibility, and the development of human-AI decision-making mechanisms.

This research still has a number of limitations that need to be considered. The use of 186 respondents with the purposive sampling technique limited the generalization of results to the entire population of the defense organization. The cross-sectional research design has also not been able to describe the development of AI capabilities and strategic innovation in the long term. In addition, the use of self-report questionnaires can create subjectivity in assessing the effectiveness of defense systems. The R^2 value of 0.551 also indicates that about 44.9% of the variation in defense system effectiveness is still explained by factors outside the research model. Therefore, further research can use longitudinal design and multi-source approaches, expanding the sample across different organizations or countries, and including variables such as AI governance, data maturity, digital competence, digital leadership, the quality of human-AI collaboration, trust in AI, and environmental uncertainty as mediator or moderator variables. Such development is necessary to gain a more comprehensive understanding of how AI can be converted into strategic capabilities and sustainable defense effectiveness.

CONCLUSIONS AND RECOMMENDATIONS

This study concludes that artificial intelligence utilization has a positive and significant effect on strategic innovation and defense system effectiveness, while strategic innovation also has a positive and significant effect on the effectiveness of defense systems. The most important findings show that strategic innovation partially mediates the relationship between the use of AI and the effectiveness of the defense system, with an indirect effect of $\beta = 0.355$ and the total influence of AI on the effectiveness of the defense system of $\beta = 0.636$. The results confirm that AI serves not only as a supporting technology, but as a strategic resource that generates greater value when translated through innovations in the planning, decision-making, coordination, and capability development of defense organizations. Thus, this research strengthens the application of resource-based view and dynamic capabilities in explaining the transformation of technology into organizational effectiveness in the context of defense.

Based on the findings, defense organizations are advised to not only prioritize investments in AI algorithms, devices, and infrastructure, but also strengthen human resource competencies, data integration and quality, organizational learning, planning flexibility, and human-AI decision-making mechanisms. AI development also needs to be accompanied by governance that emphasizes accountability, transparency, security, and oversight so that its use remains aligned with strategic defense goals. Given that the research model explains 55.1% variation in defense system effectiveness, there are still other

factors outside the model that have the potential to affect the effectiveness of defense systems. Therefore, strengthening strategic innovation needs to be placed as an integral part of AI transformation policies, not as a secondary consequence of technology adoption.

FURTHER STUDY

Further research is suggested using longitudinal design and multi-source approaches to reduce the limitations of cross-sectional design and self-report data. The sample can also be extended to different institutions or countries to make the generalization of the model stronger. Variables such as AI governance, data maturity, digital competence, digital leadership, trust in AI, human-AI collaboration, and environmental uncertainty can be tested as additional mediators or moderators to broaden understanding of the factors that determine the effectiveness of AI in defense systems.

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REFERENCES

- Bécue, A., Gama, J., & Brito, P. Q. (2024). AI's effect on innovation capacity in the context of Industry 5.0: A scoping review. *Artificial Intelligence Review*, 57, Article 215. <https://doi.org/10.1007/s10462-024-10864-6>
- Becker, J.-M., Cheah, J.-H., Gholamzade, R., Ringle, C. M., & Sarstedt, M. (2023). PLS-SEM's most wanted guidance. *International Journal of Contemporary Hospitality Management*, 35(1), 321–346. <https://doi.org/10.1108/IJCHM-04-2022-0474>
- Belhadi, A., Mani, V., Kamble, S. S., Khan, S. A. R., & Verma, S. (2024). Artificial intelligence-driven innovation for enhancing supply chain resilience and performance under the effect of supply chain dynamism: An empirical investigation. *Annals of Operations Research*, 333, 627–652. <https://doi.org/10.1007/s10479-021-03956-x>
- Biloslavo, R., Edgar, D., Aydin, E., & Bulut, C. (2025). Artificial intelligence (AI) and strategic planning process within VUCA environments: A research agenda and guidelines. *Management Decision*, 63(10), 3599–3624. <https://doi.org/10.1108/MD-10-2023-1944>

- Blanchard, A., Thomas, C., & Taddeo, M. (2025). Ethical governance of artificial intelligence for defence: Normative tradeoffs for principle to practice guidance. *AI & Society*, 40, 185–198. <https://doi.org/10.1007/s00146-024-01866-7>
- Enholm, I. M., Papagiannidis, E., Mikalef, P., & Krogstie, J. (2022). Artificial intelligence and business value: A literature review. *Information Systems Frontiers*, 24, 1709–1734. <https://doi.org/10.1007/s10796-021-10186-w>
- Fosso Wamba, S., Queiroz, M. M., Pappas, I. O., & Sullivan, Y. (2024). Artificial intelligence capability and firm performance: A sustainable development perspective by the mediating role of data-driven culture. *Information Systems Frontiers*, 26, 2189–2203. <https://doi.org/10.1007/s10796-023-10460-z>
- Ghosh, S. (2025). Developing artificial intelligence (AI) capabilities for data-driven business model innovation: Roles of organizational adaptability and leadership. *Journal of Engineering and Technology Management*, 75, 101851. <https://doi.org/10.1016/j.jengtecman.2024.101851>
- Hair, J. F., Sarstedt, M., Ringle, C. M., Sharma, P. N., & Liengard, B. D. (2024). Going beyond the untold facts in PLS-SEM and moving forward. *European Journal of Marketing*, 58(13), 81–106. <https://doi.org/10.1108/EJM-08-2023-0645>
- Hoijsink, M. (2022). ‘Prototype warfare’: Innovation, optimisation, and the experimental way of warfare. *European Journal of International Security*, 7(3), 322–336. <https://doi.org/10.1017/eis.2022.12>
- Horowitz, M. C., & Kahn, L. (2024). Bending the automation bias curve: A study of human and AI-based decision making in national security contexts. *International Studies Quarterly*, 68(2), sqae020. <https://doi.org/10.1093/isq/sqae020>
- Jarrahi, M. H., Kenyon, S., Brown, A., Donahue, C., & Wicher, C. (2023). Artificial intelligence: A strategy to harness its power through organizational learning. *Journal of Business Strategy*, 44(3), 126–135. <https://doi.org/10.1108/JBS-11-2021-0182>
- Kim, J.-S., & Seo, D. (2023). Foresight and strategic decision-making framework from artificial intelligence technology development to utilization activities in small-and-medium-sized enterprises. *Foresight*, 25(6), 769–787. <https://doi.org/10.1108/FS-06-2022-0069>
- King, A. (2024). Digital targeting: Artificial intelligence, data, and military

- intelligence. *Journal of Global Security Studies*, 9(2), ogae009. <https://doi.org/10.1093/jogss/ogae009>
- Kock, F., Berbekova, A., & Assaf, A. G. (2021). Understanding and managing the threat of common method bias: Detection, prevention and control. *Tourism Management*, 86, 104330. <https://doi.org/10.1016/j.tourman.2021.104330>
- Kusumasari, B., & Yahya, B. N. (2025). Algorithmic governance and AI: Balancing innovation and oversight in Indonesian policy analyst. *AI & Society*, 40, 2479–2491. <https://doi.org/10.1007/s00146-024-02002-1>
- Lee, C.-E., Baek, J., Son, J., & Ha, Y.-G. (2023). Deep AI military staff: Cooperative battlefield situation awareness for commander's decision making. *The Journal of Supercomputing*, 79(6), 6040–6069. <https://doi.org/10.1007/s11227-022-04882-w>
- Liang, X., Tian, N., Lopes da Silva, D., Scarazzato, L., Karim, Z. A., & Guiberteau Ricard, J. (2025). *Trends in world military expenditure, 2024*. Stockholm International Peace Research Institute. <https://doi.org/10.55163/AVEC8366>
- Ma, L., & Chang, R. (2025). How big data analytics and artificial intelligence facilitate digital supply chain transformation: The role of integration and agility. *Management Decision*, 63(10), 3557–3598. <https://doi.org/10.1108/MD-10-2023-1822>
- Mikalef, P., & Gupta, M. (2021). Artificial intelligence capability: Conceptualization, measurement calibration, and empirical study on its impact on organizational creativity and firm performance. *Information & Management*, 58(3), 103434. <https://doi.org/10.1016/j.im.2021.103434>
- Mikalef, P., Lemmer, K., Schaefer, C., Ylinen, M., Fjørtoft, S. O., Torvatn, H. Y., Gupta, M., & Niehaves, B. (2023). Examining how AI capabilities can foster organizational performance in public organizations. *Government Information Quarterly*, 40(2), 101797. <https://doi.org/10.1016/j.giq.2022.101797>
- Mishra, S., Ewing, M. T., & Cooper, H. B. (2022). Artificial intelligence focus and firm performance. *Journal of the Academy of Marketing Science*, 50, 1176–1197. <https://doi.org/10.1007/s11747-022-00876-5>
- Neiroukh, S., Emeagwali, O. L., & Aljuhmani, H. Y. (2025). Artificial intelligence capability and organizational performance: Unraveling the mediating mechanisms of decision-making processes. *Management Decision*, 63(10), 3501–3532. <https://doi.org/10.1108/MD-10-2023-1946>

- Parisini, E. (2025). Governing artificial intelligence in the defence sector: A comparative analysis of EU and US institutions. *Global Public Policy and Governance*, 5, 114–138. <https://doi.org/10.1007/s43508-025-00115-x>
- Ruokonen, M., & Ritala, P. (2024). How to succeed with an AI-first strategy? *Journal of Business Strategy*, 45(6), 396–404. <https://doi.org/10.1108/JBS-08-2023-0178>
- Schmid, S., Riebe, T., & Reuter, C. (2022). Dual-use and trustworthy? A mixed methods analysis of AI diffusion between civilian and defense R&D. *Science and Engineering Ethics*, 28, Article 12. <https://doi.org/10.1007/s11948-022-00364-7>
- Sjödin, D., Parida, V., Palmié, M., & Wincent, J. (2021). How AI capabilities enable business model innovation: Scaling AI through co-evolutionary processes and feedback loops. *Journal of Business Research*, 134, 574–587. <https://doi.org/10.1016/j.jbusres.2021.05.009>