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TECHNOLOGY ADAPTATION AS A DECISION-MAKING PRIORITY IN RESPONDING TO THE REVOLUTION IN MILITARY AFFAIRS FOR NATIONAL DEFENSE

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Abstract

This research formulates decision-making strategies to address the Revolution in Military Affairs (RMA) that affects the People's Total Defense and Security System in Indonesia. The research aims to provide recommendations to stakeholders, such as the Ministry of Defense and the House of Representatives, while also enhancing the public's role in strengthening the national defense system. The methodology used is qualitative analysis with NVivo and quantitative analysis with the Analytic Hierarchy Process (AHP). The research sample involved defense technology experts, Ministry of Defense employees, military personnel, and public administration practitioners. The research results indicate that the main priority in facing RMA is the adaptation and strengthening of technology (0.299), followed by military-civil collaboration (0.253), national defense training (0.239), and RMA socialization (0.209). These findings emphasize the importance of technology integration in the defense system, policy support from stakeholders, and public participation. Recommendations include increasing public awareness, strengthening the defense budget to above 1% of GDP, and utilizing advanced technology for defense. This research provides strategic insights for decision-making in facing global challenges, emphasizing the importance of collaboration between technology, policy, and society to create an adaptive and resilient national defense system.

Keywords: Adaptation of Technology, Strategic Decisions, Military, Defense, Public

INTRODUCTION

Revolution in Military Affairs (RMA) is a concept that describes fundamental changes in the way military operations are conducted, triggered by technological advancements, innovations in military doctrine, and organizational transformations. These changes include the adoption of information technology, precision weapon systems, and the integration of advanced communication networks, which significantly enhance the efficiency and effectiveness of military operations. RMA has become the focus of attention for many countries, including Indonesia, in their efforts to strengthen their defense posture (Luthfi, 2012). Studies on the modernization of Indonesia's defense often focus on technological aspects and the procurement of main weapon system tools (alutsista), but this does not mean that human resource (HR) aspects or strategic policy-making are completely overlooked. However, there is a tendency that attention to human

resources (HR) and strategic policy is not as great as the focus on the modernization of military equipment.

The urgency of implementing RMA in national defense lies in its ability to address increasingly complex and dynamic modern threats. By implementing RMA, a country can enhance its military capabilities through the modernization of equipment, improvement of human resource quality, and the development of doctrines and strategies that are adaptive to technological advancements. This enables a faster and more precise response to various threats, whether from state or non-state actors, thereby ensuring the preservation of national sovereignty and security (Hidayat, 2015).

Moreover, the implementation of RMA also implies changes in the military organizational structure. This transformation demands a more flexible and adaptive reorganization, enabling more effective coordination between various units and commands. Thus, the military can respond to rapidly changing situations quickly and efficiently, enhancing overall operational capabilities.

However, the implementation of RMA is not without challenges. Countries must consider factors such as costs, personnel training, and the integration of new technology into existing systems. Therefore, careful planning and strong commitment are necessary to ensure that this transformation can proceed successfully and provide maximum benefits for the country's defense.

The adoption of technology in the national defense system faces various complex challenges. One of the main issues is the budget constraints that hinder the development and acquisition of advanced military technology. The high cost of acquiring modern weapon systems, such as autonomous drones and artificial intelligence (AI), poses a significant obstacle for many developing countries. For example, the development of drones for border patrol requires significant investment in research and development, as well as supporting infrastructure (kemenhan.go.id, 2024).

Moreover, dependence on foreign technology has become a crucial issue. Many developing countries have to import major weapon systems from developed countries, which can pose strategic and political risks. This dependence can reduce independence in defense decision-making and increase vulnerability to embargoes or restrictions from supplier countries. Therefore, the development of the domestic defense industry becomes important to reduce this dependency (KKIP.GO.ID, 2023).

The readiness of human resources (HR) also poses a challenge in the adoption of defense technology. The implementation of advanced technology requires trained and competent personnel to operate and maintain the system. The lack of adequate education and training facilities can hinder the development of human resources capable of mastering modern defense technology. For

example, the mastery of defense technology by Indonesian human resources still requires improvement through appropriate education and training (Anwar, 2015).

This research aims to identify and analyze the issues faced in the adoption of technology in the national defense system. By understanding these constraints, this research is expected to provide strategic recommendations to enhance the effectiveness of technology implementation in defense. The benefit of this research is to provide insights for policymakers in formulating appropriate strategies to overcome obstacles in technology adoption, as well as to encourage the development of the domestic defense industry and the enhancement of competent human resources in the field of military technology.

LITERATURE REVIEW

Revolution in Military Affairs (RMA)

Revolution in Military Affairs (RMA) is a concept in military theory that describes fundamental changes in the way war is conducted, caused by technological innovations, changes in doctrine, and reorganization of military structures. These changes not only include the development of new weapons but also the transformation of military strategies and tactics that significantly alter the dynamics of warfare. According to Nordal, the concept of RMA is rooted in Soviet military thinking in the 1960s, which later evolved into the information revolution in the field of defense known as the Military-Technical Revolution (MTR) in the early 1980s (Nordal, 2013).

One of the main characteristics of RMA is the integration of information and communication technology into military operations. This enables improved situational awareness, better coordination between units, and the use of precision weapons. For example, the use of advanced intelligence, surveillance, and reconnaissance (ISR) systems allows the military to detect and target enemies with unprecedented accuracy. Additionally, the development of secure and reliable communication networks enables real-time information exchange between command and units in the field, enhancing the responsiveness and effectiveness of military operations (Tilford & Institute, 1995).

Another characteristic of RMA is the change in organizational structure and military doctrine. This transformation involves a shift from traditional hierarchical structures to more flexible and adaptive organizations. This approach allows military units to operate independently yet remain coordinated, known as "network-centric warfare." This doctrine emphasizes the importance of information networks and collaboration between units to achieve superiority on the battlefield (Krepinevich, 2008).

In addition, RMA is also marked by the development and implementation of autonomous and robotic weapon systems. The use of unmanned aerial vehicles (UAVs), bomb disposal robots, and other automated weapon systems has

transformed the way military operations are conducted, reducing risks for personnel and increasing efficiency. However, the adoption of this technology also poses ethical and operational challenges, such as issues in autonomous decision-making and vulnerability to cyber attacks (Black, 2009).

Change in Defense Paradigm

The development of information and communication technology has driven significant changes in the defense paradigm, shifting from a conventional approach to a digital one. In the conventional paradigm, national defense focuses on physical strength and territorial control through land, sea, and air forces. However, with technological advancements, threats to national security now encompass the cyber domain, which requires different defense strategies. According to Sarjito, the evolution of technology and the increasing dependence on the internet and digital infrastructure have given rise to new threats to national security, such as cyber warfare (Sarjito, 2023).

This change demands adaptation in military doctrine and strategy. The traditional approach that emphasizes territorial defense must now be balanced with the ability to face unconventional threats that are asymmetric and unpredictable. Indrawan states that the non-conventional threats emerging today make a country's defense spectrum no longer partial, thus requiring a paradigm shift in defense (Indrawan, 2015).

In addition, the transformation towards digital defense also affects the defense industry. The globalization of the defense industry has changed the dynamics of weapon procurement from being independent to interdependent, with intensive cooperation and collaboration in weapon production. Danugroho (2021) highlights that the globalization of the defense industry has brought changes in the dynamics of weapon procurement, which now emphasizes cooperation and collaboration (Mahdidah et al., 2023).

However, the shift towards a digital defense paradigm also presents new challenges, particularly related to data protection and information security. In the conventional paradigm, national defense and security efforts are defined as attempts to protect and defend the country on land, at sea, and in the air. However, currently, that paradigm has changed along with the development of information and telecommunications technology, which demands more attention to the aspect of cybersecurity.

Technology in RMA

Revolution in Military Affairs (RMA) has undergone significant transformation with the integration of advanced technologies such as artificial intelligence (AI), cyber warfare, drones, and big data analytics. These

technologies not only change the way military operations are conducted but also redefine the concept of modern warfare.

AI plays a crucial role in contemporary military operations. With the ability to analyze large amounts of data in real-time, AI enhances strategic and tactical decision-making. For example, AI systems can predict enemy movements based on previous data patterns, allowing for quicker and more accurate responses. Additionally, AI is used in the development of autonomous weapons and defense systems capable of operating without human intervention, increasing efficiency and reducing risks for military personnel (Glonek, 2024).

With the increasing dependence on digital technology, cyber warfare has become an integral component of modern military strategy. Cyberattacks can target critical infrastructure, communication systems, and enemy command networks, weakening their operational capabilities without the need for physical confrontation. Additionally, defensive cyber operations are crucial for protecting digital assets and ensuring the integrity of military information. The use of AI in cyber warfare enables faster threat detection and a more adaptive response to evolving attacks (Glonek, 2024).

The use of drones has revolutionized reconnaissance and precision strikes in military operations. Drones offer the ability to conduct continuous surveillance in high-risk areas without endangering personnel. In the latest conflict, drones were used to destroy enemy assets at a much lower cost compared to traditional platforms. For example, in the conflict in Ukraine, modified commercial drones have been used to attack enemy tanks, demonstrating the effectiveness and cost-efficiency of this technology (Atkinson, 2023).

Big data analytics enables the military to process and analyze vast volumes of data from various sources, such as signal intelligence, satellite imagery, and field reports. By leveraging big data analytics, the military can identify trends, predict threats, and optimize logistics and mission planning. The integration of big data analytics with AI further enhances these capabilities, enabling faster and more accurate information-based decision-making. The integration of these technologies in RMA demonstrates how innovation continues to reshape the landscape of warfare, demanding the adaptation of military doctrines and strategies to address emerging challenges and opportunities.

Global Case Study

Revolution in Military Affairs (RMA) is a concept that describes a fundamental transformation in military strategy, doctrine, and technology. Various countries have implemented RMA according to their respective needs and contexts. The United States became a pioneer in the implementation of RMA, particularly through the document "Joint Vision 2010," which emphasized the importance of information dominance, precision maneuver, and focused logistics.

This implementation was clearly evident in the Iraq Liberation Operation in 2003, where advanced technology and new strategies were used to achieve military superiority.

In Southeast Asia, Singapore has adopted the RMA concept to address its strategic limitations. Through the acquisition of cutting-edge weaponry technology and changes in military doctrine and organization, the Singapore Armed Forces have successfully transformed themselves into a respected military power in the region (Triantama & Pangestu, 2020). Indonesia, although not officially adopting RMA, has shown indications moving in that direction. Through the development of the Minimum Essential Force, Indonesia is striving to enhance its defense capabilities by integrating modern technology and implementing reforms within the Indonesian National Armed Forces.

METHOD

The mixed-methods approach in research on technology adaptation as a priority in decision-making in response to the military affairs revolution combines qualitative and quantitative methods to provide a more comprehensive analysis. Qualitative methods are used to explore strategic factors in defense technology adaptation, such as national policies, changes in military doctrine, and insights from experts and stakeholders (Creswell & Clark, 2017). Meanwhile, quantitative methods help in measuring the level of technological readiness, implementation effectiveness, and economic impact of adopting new technologies in the national defense system (Tashakkori, 2010).

This approach allows for the integration of statistical analysis with phenomenological interpretation, resulting in a richer understanding in defense decision-making. Quantitative data obtained from surveys, trend analysis, or defense technology simulations can be validated and clarified through in-depth interviews, case studies, or policy document analysis (Johnson et al., 2007). By combining these two methods, the research is not only able to identify effective technology adoption patterns but also understand the structural barriers that may occur in the defense transformation process.

Moreover, the mixed-methods approach supports the development of more accurate evidence-based decision-making models in response to the military affairs revolution. The results of quantitative analysis can be used to predict the long-term impact of new technology integration, while qualitative methods provide insights into how military policymakers can adjust strategies and regulations based on geopolitical dynamics and defense technology innovations (Bryman, 2006). Thus, this approach provides an advantage in formulating more responsive and data-driven technology adaptation policies.

Data Analysis

Qualitative Quantitative Data Analysis with NVivo Tools

In this research, data analysis was conducted using NVivo software to process qualitative and quantitative data related to the Revolution in Military Affairs (RMA) and military-civilian cooperation patterns. NVivo was used to identify key themes, code data, and visualize the analysis results to achieve a more systematic and in-depth understanding. The use of NVivo in this research helps in identifying key patterns, finding relationships between variables, and presenting data in a more understandable form. Thus, this research can provide deep insights into how countries can effectively adopt RMA and strengthen collaboration between the military and civilian sectors to enhance the national defense system (Allsop et al., 2022).

Quantitative Data Analysis Analytic Hierarchy Process

The quantitative data analysis in this study uses the Analytic Hierarchy Process (AHP) method, as explained by (Yu et al., 2021) and first introduced by Thomas L. Saaty (1980). AHP is a multi-criteria decision-making method that is effective in determining solution priorities based on pairwise comparisons between various factors influencing the Revolution in Military Affairs (RMA).

Table 1. Scale Thomas L. Saaty

Intensity of Interest	Definition
1	Equally important compared to others
3	A little more important than the others
5	Quite important compared to others
7	Very important compared to others
2,4,6,8	The value between two close assessments
Reciprocal	If element 1 has one of the numbers above compared to element j, then j has the opposite value. When compared to i
Consistency Ratio CR <= 0,1	The equivalence of weight values assigned among the criteria

This process ensures that decisions made with the Analytical Hierarchy Process tools are based on valid and reliable comparisons (Yadav, 2021). In this study, the Analytical Hierarchy Process (AHP) is used to evaluate and prioritize factors that influence strategic decision-making, so it can serve as a guideline in enhancing the role of the community in the national defense system (Emrouznejad & Marra, 2017). Data collection through focus group discussion (Dyson, 2020).

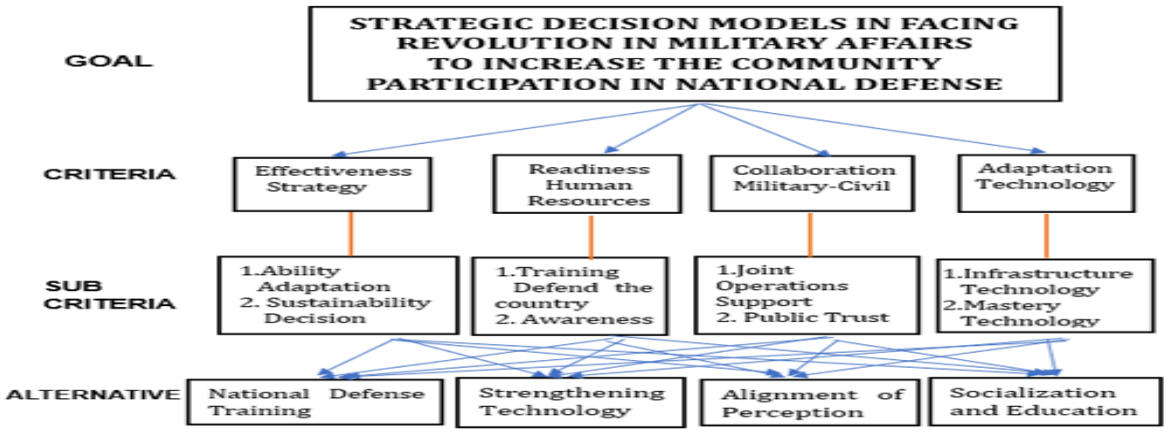

Figure 1. Hierarchical structure

RESULTS AND DISCUSSION

Qualitative data analysis NVivo

Picture 2. Word Cloud

In figure 2, the Word Cloud above, the main themes are military logistics and Revolution in Military Affairs, technology adaptation, defense budget, society, and decision. These themes serve as key elements to illustrate the current state of technology adaptation for the military. Through structured text analysis, NVivo identifies how each theme interacts within the context of technology adaptation to strengthen Indonesia's military superiority and enhance the nation's defense system. Military logistics emerges as an important theme related to the efficiency and operational readiness of the Indonesian military.

The adaptation of technology in military logistics systems can enhance the Indonesian military's capability to face threats and the continuously evolving global dynamics. The analysis results found that the importance of the latest technology in logistics management, such as the use of information systems and advanced devices, enables faster and more efficient mobilization and distribution of resources. This analysis is in line with the research of Cîrdei & Metea and Ahmed, which emphasizes the importance of developing and integrating new

technologies to maintain military superiority in order to ensure security in an ever-evolving world (Zhou et al., 2024).

Defense budget "The Defense Resource Management Theory" by Schilling and Frazier, emphasizes the importance of adequate budget allocation to support the sustainability of technology in defense systems. This theory states that to maintain strategic superiority, a country must allocate sufficient budget for research and development of defense technology, as well as strengthen military logistics infrastructure, which in turn will enhance operational readiness and response to global threats (Seki, 2019).

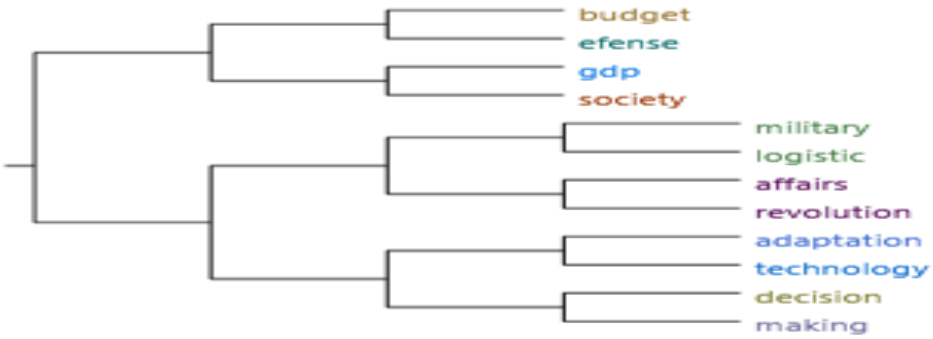

Figure 3. Cluster analysis

By using NVivo cluster analysis, similar patterns or groups of data were found in certain topics, such as military logistics, technology adaptation, defense budgets, community roles, and decision-making. The analysis results for this research show that these factors are closely related to each other. For example, strategic decisions made by relevant parties (such as the government and defense agencies) greatly influence the adaptation of technology in military logistics, which in turn depends on proper budget allocation. Moreover, it is clear that society plays a crucial role in supporting government policies related to new technologies; this indicates that public awareness of the importance of technology for defense is essential for the successful implementation of these policies (Xia et al., 2024).

Previous research studies such as Cîrdei & Metea emphasize the importance of technology integration to maintain military superiority in a rapidly evolving world. The Technology Adaptation Theory and Role Theory used in this research also underscore the importance of cooperation between society and the military in responding to the challenges of the Revolution in Military Affairs (Ramdhani et al., 2017).

Quantitative data analysis.

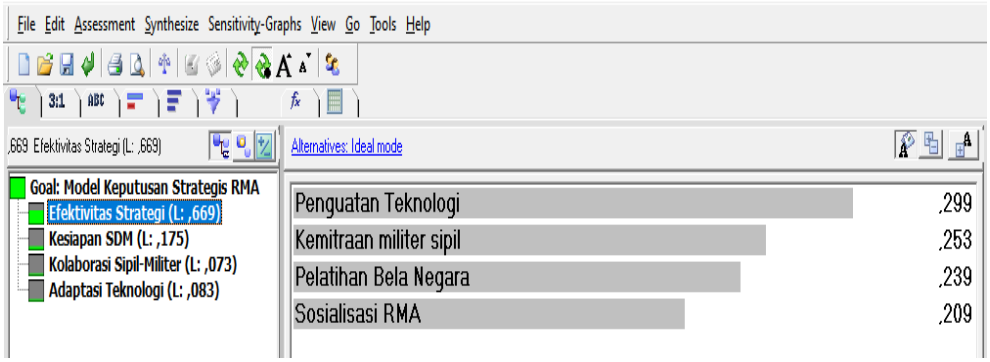

Figure 4. Strategic Effectiveness Model

In the above figure 4, the main goal being evaluated is the Effectiveness of Strategy with an overall priority of 0.669, indicating that this is a focal point in strategic decision-making. Revolution in Military Affairs. There are three main criteria that influence the effectiveness of the strategy, namely Human resource readiness with a weight of 0.175, highlighting the significant role of human resources in supporting the strategy. Civil-Military Collaboration with a Weight of 0.073, meaning the importance of cross-sector cooperation, Technology Adaptation with a Weight of 0.083, illustrating the crucial role of technology in supporting the strategy (Hedlund & Alvinius, 2024).

In the Revolution in Military Affairs, the use of technology becomes crucial to maintaining strategic superiority and national defense readiness. According to previous research, technological advancements such as AI, information systems, and weapon technology can accelerate the transition and success of contemporary military strategies.

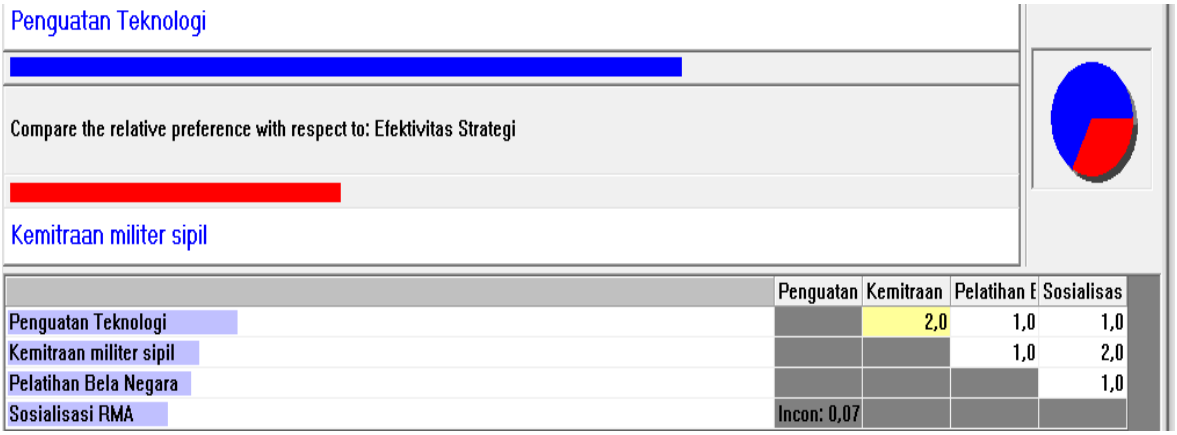

Figure 5. Inconsistency ratio value

In figure 5 above, the inconsistency ratio (Incon) value as listed is 0.07. Based on the Analytic Hierarchy Process (AHP), the generally accepted inconsistency value is ≤ 0.1 (Yadav, 2021). Therefore, since the value of 0.07 is less than 0.1, the data processing is considered consistent and valid for further

interpretation. From the bar chart and table, it can be seen that the Technology Strengthening alternative receives the highest priority compared to other alternatives, followed by Civil-Military Collaboration, National Defense Training, and the Socialization of Revolution in Military Affairs. This supports the notion that strategic focus should be directed towards mastering technology. In the Comparison table, it is evident that Technology Strengthening has a higher weight compared to other elements (for example, its value is 2 against Civil-Military Partnerships), and Civil-Military Partnerships have a balanced weight (value 2) compared to National Defense Training (Shahin & Mahbod, 2007).

Previous research shows that technology adaptation has become an important element in the formulation of national defense strategies when the military industry undergoes revolutionary changes (Bolatan et al., 2022) .Artificial intelligence-based defense systems, faster communication networks, and advanced sensors can provide the military with an advantage on the battlefield by accelerating military responses to new threats. This is consistent with the table results showing that technological reinforcement has the greatest influence on the strategic decision-making process. According to the "military transformation" theory, a country's military capabilities will lag behind if it lacks technology, making it less effective in facing new and complex threats (Das et al., 2020).

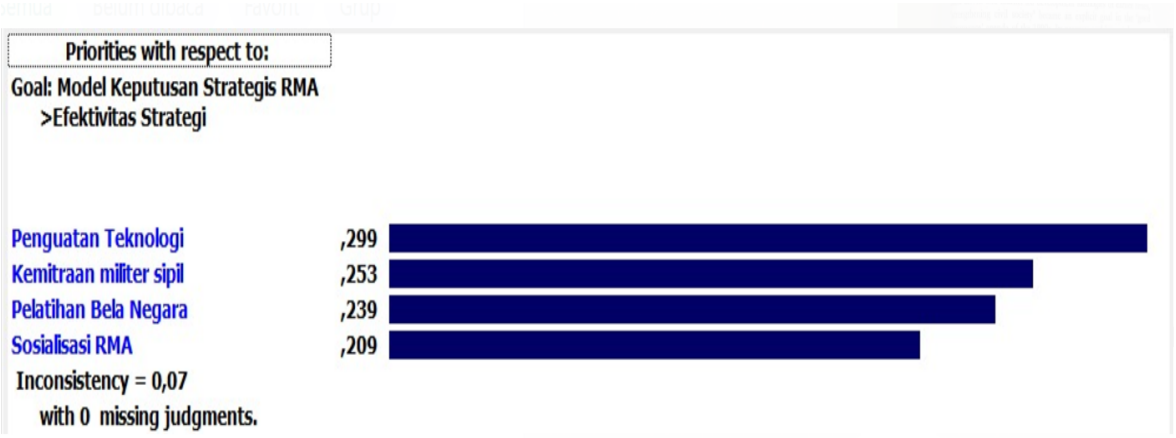

Figure 6. Priorities With Respect

In Figure 6 above, the research shows that the adaptation and strengthening of technology with a weight of 0.299 is the top priority, illustrating the importance of technology in national defense strategy during the Revolution in Military Affairs. Modern technology enables smarter and more precise weapons as well as more efficient communication, which in turn enhances national defense. Moreover, the emphasis on military-civilian collaboration with a weight of 0.253 indicates that cross-sector cooperation is crucial for supporting the implementation of effective military strategies and technologies (Kee & Rubel, 2021).

CONCLUSION

This study successfully identified technology adaptation strategies as the top priority with the highest score (0.299) using the Analytical Hierarchy Process (AHP) method. The research highlights the importance of strengthening military technology, military-civil collaboration, national defense training, and the socialization of the Revolution in Military Affairs (RMA) as strategic steps in facing global geopolitical dynamics. These findings align with the research of Cîrdei & Metea and Ahmed, which emphasize the importance of integrating new technologies to maintain military superiority. The implementation of advanced technologies such as Artificial Intelligence (AI) and blockchain in military logistics has proven to enhance distribution efficiency, supply chain security, and inventory management. Insights from countries such as the United States, China, and Russia highlight the important role of technology in maintaining operational superiority. This research also supports the Dynamic Capabilities theory, which states that an organization's ability to adapt quickly is key to facing a dynamic environment. The contribution of this research lies in emphasizing the integration of technology, military strategy, and public support as the foundation of national defense. The collaboration between advanced technology and the People's Defense and Security System can enhance national resilience. Future research is recommended to explore the implementation of technology in developing countries and to deepen military-civilian collaboration to ensure the sustainability of the national defense system in the era of technological disruption.

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