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Human Resource Development Strategy at Muljono Air Base in Facing Data Security Challenges in the Era of Technology 5.0

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Abstract: Digital transformation in the Society 5.0 era has created new challenges in data security, particularly in the military environment. This study aims to analyze human resource (HR) development strategies at Muljono Air Base in responding to cybersecurity threats. Using a qualitative approach with a case study method, data was obtained through in-depth interviews, participant observation, and documentation studies. The results indicate that strengthening digital literacy, cybersecurity training, and collaboration with external institutions are essential pillars in building military data resilience. The main obstacles faced include budget limitations, infrastructure limitations, and personnel digital skill gaps. Therefore, HR development strategies need to be systematically designed through a technology-based training roadmap and policies that adapt to the dynamics of digital threats. The findings of this study provide practical contributions to the formulation of military HR development policies that are more responsive to technological challenges. Furthermore, the proposed strategy can serve as an implementation model for other military bases in enhancing national digital defense readiness.

Keyword: Human Resource Development, Data Security, Technology 5.0, Digital Literacy, Military Air Base.

INTRODUCTION

The development of information technology has entered a new era known as Society 5.0, where humans and technology interact more deeply to solve social problems through an integrated approach (Farid, 2023). In this era, technologies such as artificial intelligence, the Internet of Things (IoT), big data, and cyber systems have become key components in supporting modern society, including in the defense and national security sector (Carolina Narvaez Rojas, 2021). Strategic institutions such as military air bases are now required not only to have physical resilience and conventional weapons, but also to be ready to face complex, invisible, yet highly destructive digital threats (Almubaroq et al., 2025).

Digital transformation has significantly changed work patterns and data management systems in the military (Muncahyo, 2024). Strategic information is now stored and managed digitally, making it vulnerable to various cyberattacks (Pakarti et al., 2025). Therefore, human

resource (HR) readiness is key in addressing data security risks. HR without adequate digital literacy can create a security loophole that poses a high risk to national defense (Setyawan, 2023). Furthermore, digital transformation demands the renewal of HR capacity through continuous cybersecurity training, emphasizing mastery of technical skills as well as an understanding of digital ethics and risk management in cyberspace (Siagian, 2024). Digital literacy is not only crucial for ensuring the efficiency of military tasks but also serves as a foundation for preventing data leak incidents and protecting strategic infrastructure (Suryana, 2024).

Muljono Air Base, as a key military installation, has a significant responsibility to ensure that all personnel understand and are able to effectively manage digital risks (Sarjito et al., 2024). According to (Galih Pintonugroho, 2024), strengthening human resource capacity in the military environment is highly effective when developed through technological approaches such as IoT and expert systems, which can increase work effectiveness and accelerate data-driven decision-making processes. The application of these technologies also enables real-time monitoring of security and operational systems, allowing potential threats to be identified and proactively addressed (Amanda et al., 2025). Thus, the integration of IoT and expert systems not only supports the improvement of human resource competency but also strengthens Muljono Air Base's digital resilience in the face of increasingly complex and rapidly changing cyberattacks. This effort will strengthen national defense readiness while ensuring the continuity of strategic missions in the military environment (Purwantoro, 2023).

On the other hand, the literature also emphasizes the importance of integrating technical training with the development of digital threat awareness (Tarom, 2025). Karlina Karadila Yustisia (2023) states that digital literacy education must begin early and be designed in stages to create personnel who are not only technically competent but also possess a work culture that is adaptive to cyber threats. Awan (2020) adds that digital literacy efforts should be packaged in intensive, applicable, and sustainable training, particularly in the military environment.

However, most previous studies have focused on the technological or hardware aspects of security, and few have comprehensively examined human resource development strategies within the Indonesian military to address the challenges of the Technology 5.0 era (Duarte et al., 2024). This is where the research gap lies: the need to delve deeper into how human resource development strategies can be designed systematically and adaptively, particularly at Muljono Air Base, as a concrete response to data security threats in the digital age.

This study aims to analyze human resource development strategies at Muljono Air Base in addressing data security challenges in the Technology 5.0 era. It also evaluates the extent to which current human resource development policies and practices are able to respond to the ever-evolving dynamics of cyber threats and provides recommendations for more innovative and applicable strategies to strengthen digital resilience in the military environment.

Muljono Air Base personnel's understanding and digital literacy regarding data security threats in the digital era remains diverse, with unequal awareness of the risks of cyberattacks. To improve human resource capacity, the base has conducted regular training and collaborated with relevant institutions, but the training materials remain predominantly basic and lack continuity. Human resource development faces major obstacles such as budget constraints, a lack of experts, and differences in personnel's basic skills, which hinder the optimal implementation of technology. In terms of technical and organizational readiness, security protocols are in place, but cyber incident management, early threat detection, and rapid response teams still need to be strengthened through more integrated and ongoing training.

METHOD

Types of Research

This research uses a qualitative approach with a case study method, as the primary focus of the research is to deeply understand the human resource (HR) development strategy at

Muljono Air Base in addressing data security challenges in the era of technology 5.0. This approach allows researchers to comprehensively explore the context, experiences, and actual practices within the military environment.

Location and Research Subjects

The research object was Muljono Air Base, chosen because of its role as one of Indonesia's strategic military installations. Informants consisted of key personnel, including policymakers, HR technical implementers, and operational personnel directly involved in data security systems.

Data Collection Techbique

Data collection was carried out using several main techniques, namely:

1. In-depth Interviews:
   Interviews were conducted with several key personnel at Muljono Air Base, including the Base Commander, the officer responsible for HR training, and personnel directly involved in data management and cybersecurity. The interviews aimed to gain insight into their understanding of the policies and practices implemented in HR development and to identify challenges faced in ensuring data security.
2. Participant Observation:
   Researchers observed training activities and human resource development programs taking place at Muljono Air Base, particularly those related to data security and information technology. These observations aimed to gain a deeper understanding of the implementation of policies that have been implemented in human resource development.
3. Documentary Study:
   The documents analyzed included internal policies, annual reports, and training guides related to digital security.

Data Analysis

Data obtained from interviews, observations, and documentation studies will be analyzed using thematic analysis. In thematic analysis, researchers identify key themes emerging from the collected data and group the data into relevant categories. This process involves three main stages:

1. Data Collection Phase: In this phase, the researcher will collect interview transcripts, observation notes, and relevant documents, and organize the data in a form that is easy to analyze.
2. Data Coding Phase: Researchers will code the data obtained to identify patterns or themes that emerge from the interviews and observations. Coding is done by labeling sections of the data relevant to the topics of human resource development and data security.
3. Withdrawal and Conclusion Phase: At this stage, researchers will analyze themes emerging from the collected data and draw conclusions regarding effective HR development strategies to address data security challenges in the 5.0 technology era. This analysis will also examine factors influencing the success or failure of these strategies.

This analysis will be used to provide a comprehensive overview of the policies and practices implemented at Muljono Air Base in an effort to develop competent human resources in the field of technology and data security.

RESULTS AND DISCUSSION

Table 1. Interview Results

No.	Interview Topic	Main Question	Main Answer	Interview Conclusion
1	HR understanding of data security threats	To what extent do personnel understand data security risks and threats in today's digital era?	Some personnel already understand the importance of data protection, especially sensitive military data. However, not all have digital literacy or a high level of awareness of the dangers of cyberattacks or strategic data leaks.	It is necessary to increase digital literacy and data security awareness for all personnel as part of the agency's cyber resilience.
2	Efforts to increase human resource capacity in the technology sector	What strategies are being implemented to improve personnel competency in mastering 5.0 technology?	Routine training is adapted to technological advances, including introduction to information security systems, smart device operation, and collaboration with Indonesian Air Force institutions and external parties in providing the latest technology education.	Human resource development is directed at improving competencies based on cutting-edge technology and understanding of digital security systems.
3	Strategies for dealing with cyber attacks	What form of base preparedness is taken to face potential cyber attacks and data leaks?	Information security protocols and cyberattack mitigation procedures are in place, but there is still a need to improve the technical capabilities of human resources in managing cyber incidents and early detection of complex digital threats.	Technical readiness needs to be complemented by the formation of a data security rapid response team and ongoing incident handling training.
4	Obstacles in developing data security-based human resources	What are the obstacles faced in improving the quality of human resources to handle data security issues?	The main obstacles include limited budgets for advanced technology training, limited expertise in the field of data security, and differences in personnel's basic abilities in understanding complex digital systems.	Synergy between budget, expert human resources, and adaptive training systems is needed to overcome competency disparities and lack of resources.
5	Strategic plan for human resource development in the era of technology 5.0	What is the long-term plan for human resource development in responding to data security challenges?	A digitalization and data security training roadmap will be developed, aligned with developments in military technology. Increasing external collaboration with national technology institutions is also being considered to accelerate personnel competency.	An integrated long-term strategic policy is needed, based on a competency roadmap and collaboration with external partners in the field of technology and data security.

Field Findings Based on Interviews

This research reveals five main focuses based on interviews with ten personnel at Muljono Air Base, which illustrate the real challenges in developing human resources in the Technology 5.0 era.

1. **Digital Literacy and Cyber Threat Awareness**
   Most personnel are aware that military data is highly sensitive and at high risk if leaked. However, understanding of cyberattacks such as phishing, malware, or social engineering remains limited. This indicates a gap between awareness and technical capacity. In the context of Society 5.0, cyber awareness is not solely the responsibility of technology units, but of all personnel. This reinforces the argument (Karlina Karadila Yustisia, 2023) that digital literacy should be a mandatory, tiered, and applicable curriculum.
2. **Training is Still Basic and Not Sustainable**
   Although routine training is conducted, much of it is introductory or basic. There is no advanced training on digital risk analysis, cyber forensics, or strategic information systems management. In other words, learning does not occur as a learning continuum. According to Kenyon (2020), digital learning must be continuous, supported by technology such as an LMS that allows personnel to learn independently in a flexible and scalable manner.
3. **Limited Technological Infrastructure**
   Much of the hardware used in training is outdated, and communication networks are not yet fully encrypted. This poses a significant obstacle to implementing simulations or real-time digital training. Without infrastructure support, digital strategies remain mere talk without adequate execution. Similarly, (Dr. Didit Darmawan, 2023) emphasizes the importance of synergy between technology and institutional policies.
4. **The Lack of A Strate Digital HR Policy**
   No internal policy documents were found that prioritize digital HR transformation as an institutional priority. Consequently, HR development is carried out sectorally and is not integrated into the performance measurement system. Within the framework of Strategic Human Resource Management (SHRM), this constitutes a structural weakness because competency development is not oriented towards the organization's long-term goals (Ni Kadek Yuliandari, 2024).
5. **Lack of External Collaboration and Lack of Incentives**
   Collaboration with universities, research institutions, or technology vendors remains very limited. This lack of partnerships slows down knowledge transfer and innovation. Furthermore, the lack of incentives for personnel involved in technology leads to low motivation. Yet, a reward system is a crucial driver in creating an innovative and adaptive organizational culture.

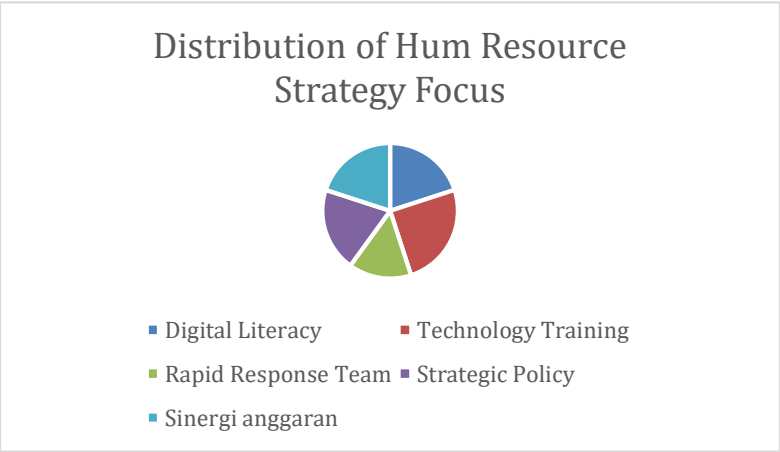

Figure 1. Distributionn of Hum Resource Strategy Focus

Based on the diagram above, the distribution of the focus of digital literacy HR strategies is 20%, technology training 25%, rapid response teams 15%, strategic policies 20%, and budget synergy 20%.

Strategic Analysis and Implications

From the five findings above, it can be concluded that human resource development at Muljono Air Base is still in a transitional stage. Referring to the Capacity Development model (Chairul Anwar, 2025), the base still focuses on individual development without strengthening the institutional system and supporting environment. This means there needs to be an integrated strategy from three perspectives: the individual (competence), the organization (structure and policies), and the enabling environment (collaboration and regulations).

Furthermore, this situation also demonstrates the urgent need for targeted reskilling and upskilling. Military personnel must be trained not only in discipline and physical skills, but also in mastering cutting-edge technology. This strategy aligns with the Digital Competence Framework for the Military approach developed in Europe, which requires each defense member to master specific digital dimensions, depending on their position and function.

Relevance of Findings In A Broader Context

Although the research focuses on a single location, the findings are transferable to other military bases in Indonesia. Challenges such as budget constraints, unequal digital literacy, and policy misalignment are common issues faced by many military institutions in developing countries. Therefore, the strategies recommended here can be adopted or contextually adapted by other agencies, both within the Indonesian Air Force and other defense sectors.

CONCLUSION

This study concludes that the human resource development strategy at Muljono Air Base is a crucial element in building data security resilience in the era of technology 5.0. Efforts such as digital training, improving cyber literacy, and external collaboration have been initiated, but still face various obstacles, such as limited infrastructure, disparities in personnel digital capabilities, and the lack of a comprehensive strategic policy.

To address these challenges, a systemic approach is needed through strengthening technology-based training, developing digital learning systems, adopting adaptive leadership, providing incentives, and expanding external collaboration. Human resource development cannot be done in isolation; it must address the individual, the organization, and the supporting environment.

The policy implications of these findings point to the need for internal military regulations that support the ongoing digitalization of human resources, as well as the allocation of adequate resources to support the modernization of personnel competencies.

Further research directions can be focused on measuring the effectiveness of digital training in the military environment, developing a digital competency model based on military positions, and comparative studies between military bases in Indonesia in implementing digital HR transformation.

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