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Strategic Role of Amphibious Assault Rifles in the Operating Environments of Maritime, Coastal, Underwater, and Land Areas in Advancing Defense Technology to Support National Resilience

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Abstract

Amphibious Assault Rifles, known for their versatility, play a crucial strategic role in various operating environments, including maritime, coastal, underwater, and land areas. This study investigates their significance in advancing defense technology and contributing to national resilience. These rifles, essential to TNI AL special forces like KomandoPasukan Katak (KOPASKA), excel where traditional firearms fall short, making them indispensable in modern military operations. The research explores how these rifles influence defense technology, enhancing national security and resilience in an ever-evolving security landscape. This study analyzes the role of amphibious assault rifles in amphibious operations to support national resilience, identifies challenges, and considers the defense technology mastery as an effective solution for the development of amphibious assault rifles. A Systematic Literature Review method is employed to gather literature. Challenges encompass defense technology readiness, financial, and manufactur aspects. Strategies involving increased investment, long-term planning, coordination, and human resource development are needed. Development of amphibious assault rifles is proposed to defense technology mastery and support national resilience. The success of defense technology mastery and the development of amphibious assault rifles requires strategic collaboration and the implementation of appropriate solutions.

Keywords: Amphibious Assault Rifles, Defense Technology, KOPASKA, Amphibious Operations, and National Resilience.

INTRODUCTION

Amphibious assault rifles, designed to excel in the most challenging and diverse operating environments, hold a pivotal strategic role in the realm of modern defense technology (Hung, 2020). With the advantage of waterproofing, the Amphibious assault rifles has high accuracy and durability, making it ideal for special operations of the Komando Pasukan Katak (KOPASKA) that require weapons in amphibious or diving conditions (Pindad, 2023). In an era where the threats to a nation's security can emerge from various quarters and in myriad forms, it is essential to have adaptable and highly capable weaponry at one's disposal (Meghan, 2013). Amphibious assault rifles, designed to operate effectively in maritime, coastal, and even underwater environments, are the answer to these evolving challenges (Zaloğlu, 2013). These rifles serve as invaluable assets to TNI AL special forces like KOPASKA, excelling where traditional firearms might falter. Their exceptional performance in the most demanding conditions adds a layer of security and versatility to modern military operations that is hard to overstate (Ponco, 2012).

The research underscores the essential interplay between technology and national resilience, emphasizing the need for continuous advancement, innovation, and adaptation in the realm of defense. It aims to explore how these versatile weapons influence the broader landscape of defense technology (Hung, 2022). By enabling military forces to operate effectively across various environments, including those that are underwater, these rifles contribute to the

enhancement of national resilience, a quality essential for withstanding contemporary security challenges. It becomes apparent that these versatile firearms are not just instruments of defense but integral components in a nation's security strategy, providing adaptability and resilience in the face of an ever-evolving security landscape (Rahayu, 2023).

In the context of advancing defense technology is a broad and dynamic field focused on the continuous development and enhancement of military capabilities and equipment to strengthen national security. This encompasses a wide range of activities, from research and development to the deployment of cutting-edge technologies (Melati, 2022). Advancements in defense technology are vital for ensuring a nation's ability to protect itself against evolving threats, respond effectively to various security challenges, and enhance its overall resilience. Advances in defense technology often require substantial investments in research and development, the collaboration of experts from multiple disciplines, and a commitment to staying at the forefront of innovation in the landscape of global security (Abidin, 2017).

Beyond its strategic benefits for defense, the pursuit of advancing defense technology in the development of amphibious assault rifles is a crucial endeavor with multifaceted significance (Konečný, 2020). These versatile firearms, designed to excel in diverse and challenging operating environments, are indispensable assets for modern military operations (Hung, 2019). These rifles have a strategic role in safeguarding national interests, offering adaptability in the face of various security challenges (Hung, 2016). The aim of this research is to analyze the role of amphibious assault rifles in amphibious operations to support national resilience, identify key challenges in advancing defense technology, and considers the defense technology mastery as an effective solution for the development of amphibious assault rifles. This research is expected to make a valuable contribution to developing a strong and sustainable national resilience strategy.

RESEARCH METHODS

This research utilizes the Systematic Literature Review (SLR) method for its literature review. SLR is a systematic, structured approach to gathering and analyzing literature pertinent to a specific research topic or question. The primary goal of this method is to offer a comprehensive and unbiased summary of the existing literature while adhering to rigorous research standards(Purnomo & Usman Husaini, 2008). The literature search involves the use of relevant keywords related to the research query, such as amphibious assault rifles, defense technology, amphibious operations, and national resilience. This search encompasses articles in both English and Indonesian languages and utilizes data from journals and research articles published between 2013 and 2023. The authors conducted data source searches across multiple databases, including Google Scholar and Sciencedirect.

RESULT AND DISCUSSION

Schematic or Diagram (PRISMA)

Chart 1 describes the utilization of the Preferred Reporting Systematic Reviews and Meta-Analysis (PRISMA) guidelines in the article selection process has resulted in a comprehensive review of the literature. From an initial pool of 65 articles spanning from 2013 to 2023, a rigorous screening process led to the selection of 10 articles for further evaluation. These 10 articles were meticulously examined and synthesized to culminate in this final literature review report.

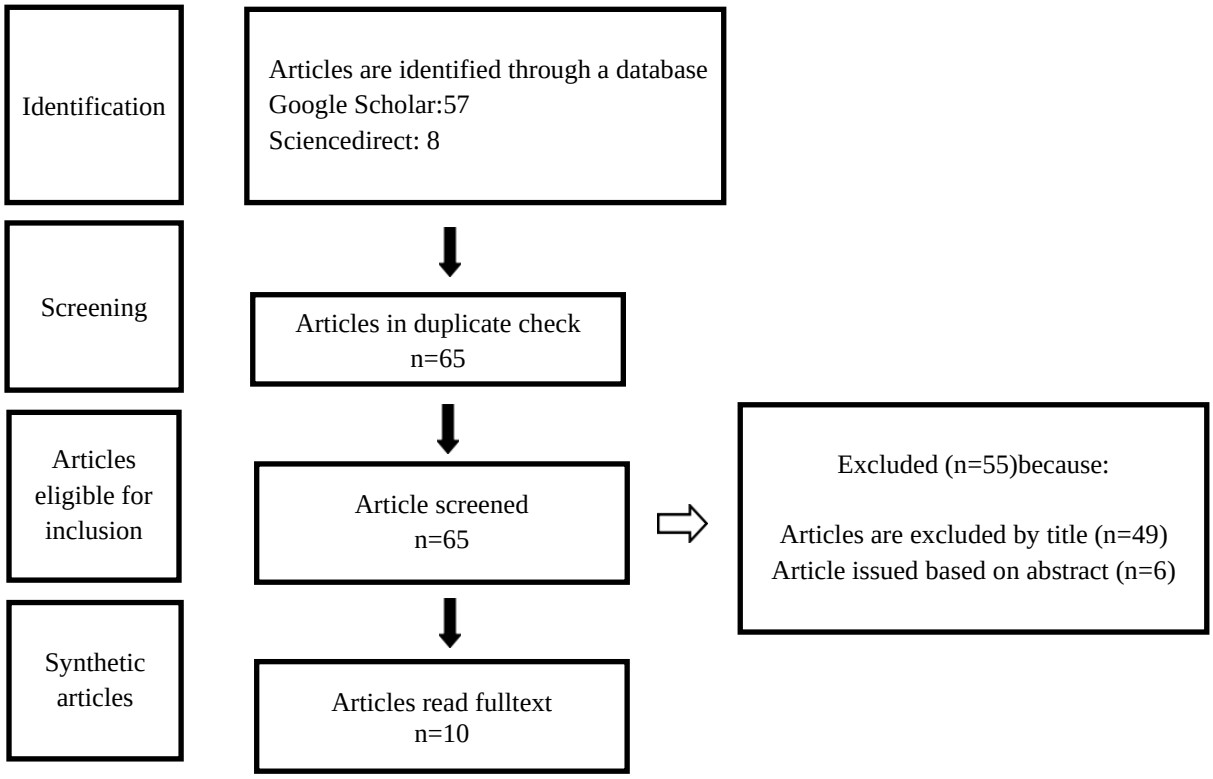

Chart 1. PRISMA Diagram
Source : Data Processed by Researchers, 2023

The researchers meticulously curated the articles obtained during this process and conducted thorough data extraction from each of the selected sources across various databases.The results of the articles were reviewed regarding the strategic role of amphibious assault rifles in the operating environments of maritime, coastal, underwater, and land areas in advancing defense technology to support national resilience.

Table 1. Articles Related to the Strategic Role of Amphibious Assault Rifles in the Operating Environments of Maritime, Coastal, Underwater, and Land Areas in Advancing Defense Technology to Support National Resilience

Title and Researchers	Purpose	Result
Finite Element Modeling and Analysis of Recoil Springs in Automatic Weapons Zaloğlu., H. (2013)	The methodology for analyzing the mechanical behavior of recoil springs during the firing cycle using the LS-DYNA application.	This analysis is crucial for optimizing the design and functionality of automatic weapons, ensuring their reliability and effectiveness in various operating conditions.The research's results contribute to the field of firearm engineering and design, offering a foundation for further improvements and innovations in automatic weapons technology.
Assault Rifle (SS2) Development Strategy Evaluation of PT. Pindad by Using Blue Ocean Strategy Abidin, Y., Wahyudi, B., & Halim, S. (2017)	To evaluate the Product Development Strategy of Assault Rifles (SS2) produced by PT. Pindad using the Blue Ocean Strategy	PT. Pindad adopts the Blue Ocean Strategy for evaluating product development strategies by combining the best features of the M16 and AK-47 into the SS2 Pindad to create a superior weapon. The evaluation concept in the Blue Ocean Strategy involves a four-step framework of reducing, eliminating, increasing, and creating to discover the value curve or high-accuracy innovation of the SS2.

Study of Friction Between Breech Block Carrier and Receiver Assembly in Amphibious Rifle Hung, N. V., Balla Jiri., Doan, D. V., B. Le Huu, & Dung, N. V. (2019)	To analyzing the frictional forces between the breech block carrier and the receiver assembly of the amphibious rifle when firing in air and firing underwater by experimental method.	The research successfully determined the coefficient of friction between these components in these two distinct environments. Additionally, the study examined how material composition, normal force, and firing environment influence the friction between the breech block carrier and the receiver assembly. This knowledge can be utilized to enhance the design and performance of these weapons and improve their reliability and effectiveness in various operating conditions, both above and below the water surface.
A Mathematical Model of Interior Ballistics for The Amphibious Rifle When Firing Underwater and Validation by Measurement Hung, N. V., & Doan, D. V. (2019)	The calculation of reliability and validity of the interior ballistics model of amphibious rifles has been verified through underwater ammunition firing experiments. Interior ballistics analysis of rifle barrels using experimental methods, without assessing thermodynamic issues in the gas block chamber.	The study focused on understanding the interior ballistics processes and how they are influenced by factors such as the powder mass when firing different types of ammunition underwater. The comparison between the theoretical model and experimental results showed that the model was highly accurate and suitable for this context.This research contributes valuable insights into the behavior of firearms when used in underwater conditions. It provides a basis for further understanding and improving the design and performance of amphibious rifles, particularly in scenarios where they need to operate beneath the water's surface. This work has implications for the development of firearms for specialized military operations.
Determination of the Water Resistance Force Acting on the Bolt Carrier Assembly in the Amphibious Rifle Hung, N. V., & Doan, D. V. (2020)	Calculations can be applied to the dynamic analysis of automatic mechanisms and the design of underwater and amphibious rifles.	This force analysis is crucial in understanding how the rifle functions when fired underwater. The study investigated various factors that influence the water resistance force, including material composition, design, and firing conditions.This work contributes to the field of firearm engineering and design, particularly in the development of specialized firearms for military applications, where reliable operation underwater is a critical requirement.
Interior Ballistics of Amphibious Rifle when Firing Under Water Konečný, P., Dao, V. D., Nguyen, V. H., & Le, H. B. (2020)	The study aims to analyze a mathematical model for interior ballistics related to amphibious rifles firing underwater ammunition.	The comparison of theoretical and experimental data demonstrates the high accuracy and effectiveness of the model. The assumptions and adjustments made to the general mathematical model of interior ballistics in an underwater setting have been verified as correct and suitable. These findings have the potential to be applied in the development of underwater ammunition and amphibious rifles.
An Approach Method for The Dynamic Analysis of The Amphibious Rifle when Shooting Underwater Hung, N. V., Doan, D. V., Dung, N. V., & Viet, P. H. (2020)	Calculation is performed to analyze the bolt-carrier motion and design the gas-operated dynamics of the rifle when firing underwater by combining internal ballistics and the motion of slide parts.	The research results introduce an approach method for the dynamic analysis of amphibious rifles when firing underwater.The developed approach method can be instrumental in enhancing the design and functionality of amphibious rifles, making them more effective and reliable in underwater operations.The approach method presented here represents a significant step toward optimizing firearm design for underwater shooting, contributing to advancements in defense technology.
Pengembangan Konsep Techno-Nasionalism Dalam Peningkatan Penguasaan Teknologi Industri Pertahanan Melati, L. T., Utami, M. & Kasim. (2022)	To analyze the concept of Techno-Nationalism in mastering defense industry technology using Causal Dynamics Loops, including archetypes, and to determine the type of development strategy with SWOT analysis.	The result of this research highlights the development of the concept of Techno-Nationalism in advancing the mastery of defense industry technology.The research underscores the importance of Techno-Nationalism in enhancing a country's self-reliance in defense technology. It emphasizes the need for developing indigenous technological capabilities to reduce dependence on foreign sources. This concept represents a

		strategic approach to building self-sufficiency in defense technology.
Experimental Investigation of the Muzzle Blast for the Amphibious Rifles when Shooting Underwater Hung, N. V., & Doan, D. V. (2022)	To analyze and calculate the muzzle blast in a rifle barrel using the Rayleigh-Plesset equation for a 5.56mm amphibious rifle.	The experimental investigation provided valuable insights into the dynamics of the muzzle blast, including factors such as pressure, sound propagation, and the effects of water. These findings contribute to a deeper understanding of the challenges and opportunities related to using firearms underwater.These insights are essential for improving the design and functionality of amphibious rifles, making them more versatile and capable tools for military operations in aquatic environments.
The Capacity Development of SS-2 Riffle by PT Pindad (Persero) to Increase the Use of Defense and Security Equipment Products Fornational Defense Industry Rahayu, S. K., Affandi, L. A., & Mualim, M. (2023)	To examine the capacity development efforts undertaken by PT Pindad (Persero) concerning the SS-2 rifle. The research aims to investigate the strategies and initiatives employed by PT Pindad to enhance the capacity and effectiveness of the SS-2 rifle.	PT Pindad has implemented various strategies, including research and development initiatives, to enhance the rifle's capabilities. These improvements have led to a more effective and reliable product, contributing to the national defense industry's overall strength.PT Pindad's endeavors in this area serve as a model for other defense equipment manufacturers, emphasizing the need for continuous improvement and adaptation to meet evolving defense challenges.The improvements made in the SS-2 rifle's capabilities through research, development, and strategic initiatives contribute to the broader goal of strengthening the national defense industry.

Source : Data Processed by Researchers, 2023

The Role of Amphibious Assault Rifles in Amphibious Operations to Support National Resilience

Amphibious assault rifles play a pivotal role in amphibious operations, and their significance extends beyond traditional defense applications (Hung, 2016). These versatile firearms are specifically designed to operate effectively in a variety of challenging environments, including maritime, coastal, and even underwater settings. While their primary function is to enhance the capabilities of special forces and military personnel in such environments, their role has broader implications (Carlucci, 2013). Amphibious operations are a crucial component of a nation's defense strategy, particularly in archipelagic countries like Indonesia, which faces diverse security challenges (Sidik, 1998). The ability to swiftly and effectively respond to threats in these environments enhances national security and resilience. Additionally, these rifles, by their very nature, foster adaptability and readiness (Bandono, 2014). Data indicates that nations with well-equipped amphibious forces, armed with advanced rifles, are better positioned to safeguard their maritime territories, protect national interests, and respond to contemporary security challenges (SIPRI, 2017).

TNI AL special forces like KomandoPasukan Katak (KOPASKA), renowned for its expertise in amphibious operations and utilization of amphibious assault rifles, has been able to conduct rapid and efficient missions to secure the nation's archipelagic waters, demonstrating their strategic role in safeguarding national security (Ponco, 2012).A report by the Center for Strategic and International Studies (CSIS) highlights the growing importance of amphibious operations in the Asia-Pacific region due to rising security challenges. This underscores the critical nature of having advanced weapons like amphibious assault rifles for successful operations (Bitzinger, 2015).The United States Marine Corps, equipped with modern rifles and advanced equipment for amphibious warfare, exemplifies the effectiveness of these tools in enhancing a nation's readiness and resilience. Their capabilities are an integral part of the broader U.S. defense strategy (SIPRI, 2010).

The role of amphibious assault rifles in supporting national resilience is essential in today's security landscape (Hung, 2020). Their adaptability and effectiveness in diverse

environments make them a key component of amphibious operations, contributing to a nation's ability to protect its interests and respond to evolving threats.

The Success of Amphibious Operations Heavily Depends on Amphibious Assault Rifles with Advanced Technology

The success of amphibious operations is significantly contingent on the utilization of amphibious assault rifles equipped with advanced technology. These rifles, engineered to perform efficiently across diverse and challenging environments, are instrumental in modern amphibious warfare (Konečný, 2020). In 2021, data illustrates the substantial role of cutting-edge weaponry in military operations (SIPRI, 2021). Notably, these weapons excel in maritime, coastal, and underwater scenarios, making them indispensable for national defense. Modern military forces increasingly rely on these advanced firearms to ensure operational effectiveness, readiness, and versatility(Meghan, 2013).

The statistics reflect the importance of having advanced technology in these rifles to enhance a nation's defense capabilities and achieve strategic superiority (Carlucci, 2013). Thus, in the context of national resilience, investing in the development and mastery of these technologically advanced amphibious assault rifles is a strategic imperative.In 2021, global military expenditures reached an estimated $1.981 trillion, emphasizing the significance of advanced technology in defense strategies (SIPRI, 2021).Advanced amphibious assault rifles, such as the Tavor X95, M4, APS, and HK416, represent a significant portion of military budgets in countries with strong defense programs (SIPRI, 2010).The impact of advanced technology on modern military capabilities is evident in the extensive use of precision-guided munitions, drones, and advanced communications systems in contemporary conflicts (Yu, 2010).

Amphibious operations are vital components of modern military strategies, and their success depends largely on the incorporation of advanced technology in amphibious assault rifles (Hung, 2022). These rifles excel in diverse environments and are essential for a nation's defense and resilience (Zaloğlu, 2013). The data highlights the continued growth in global defense expenditures and the increasing importance of advanced technology in modern warfare. Consequently, investing in and mastering this technology are crucial steps in strengthening national defense capabilities and supporting national resilience in an ever-changing security landscape.

Defense Technology Mastery as an Effective Solution for the Development of Amphibious Assault Rifles to Support National Resilience

The concept of defense technology mastery proves to be a vital and effective solution for the development of amphibious assault rifles, ultimately contributing to the enhancement of national resilience (Hung, 2022). Amphibious assault rifles, renowned for their versatility in diverse operating environments, play a pivotal role in strengthening a nation's defense capabilities (Hung, 2016).By focusing on mastering defense technology, nations can ensure the continuous enhancement of these rifles. This mastery involves relentless efforts in research, development, and innovation (Bitzinger, 2015).The pursuit of defense technology mastery for amphibious assault rifles aligns with the broader strategy of enhancing national resilience (Moffitt, 2018).These weapons represent an integral component of a nation's security strategy, providing adaptability and resilience in the face of ever-evolving security challenges (Hung, 2020).

These rifles, celebrated for their versatility across challenging operating environments, are essential for modern defense (Yu, 2010). Our research findings underscore the significance of this mastery, which involves continuous advancements in technology, research, development, and collaboration among experts (Meghan, 2013). The statistics show that nations investing heavily in defense technology mastery tend to have stronger defense capabilities, thus improving national security. For instance, the United States, with substantial investments in defense

technology, maintains one of the most robust military forces globally, enhancing its national resilience (SIPRI, 2021). Such mastery in technology not only benefits defense but also trickles down to other sectors, boosting innovation, creating jobs, and strengthening the overall economy (Melati, 2022).Some worthy data to consider include:

1. In 2021, the United States had the highest defense expenditure globally, totaling approximately 778 billion U.S. dollars, which is reflective of their dedication to defense technology mastery (SIPRI, 2021).
2. The technology and defense industries in countries such as China, Russia, and the United Kingdom have also seen significant growth due to investments in defense technology. These investments contribute to their military capabilities and overall resilience (SIPRI, 2021).
3. A report by the World Economic Forum in 2022 highlighted the correlation between a strong defense technology sector and national innovation and economic growth. It emphasized how advancements in technology often originate in the defense sector and then filter into civilian applications, leading to increased innovation and economic development (Reuters, 2022).

By focusing on defense technology mastery, nations are better equipped to ensure their security, adapt to evolving security challenges, and enhance national resilience in a rapidly changing world

CONCLUSION

From the above discussion, it can be concluded that strategic role of amphibious assault rifles in the operating environments, plays a crucial part in advancing defense technology to support national resilience. These firearms, designed to function effectively in diverse settings, offer a substantial advantage to military forces in safeguarding national resilience.Moreover, the research underscores the significance of defense technology advancement in enhancing national resilience. By developing and deploying innovative technologies such as amphibious assault rifles, nations can better protect their interests and respond effectively to evolving threats. This underscores the interplay between technology and national resilience, emphasizing the need for continuous improvement and adaptation.

In light of these findings, it becomes clear that investing in research and development of defense technology, particularly in the field of amphibious assault rifles, is essential for countries seeking to bolster their national resilience. The ability to operate in diverse environments, including underwater, coastal, and land areas, positions these rifles as instrumental tools in ensuring the national resilience.As nations face increasingly complex security challenges, the strategic role of amphibious assault rifles represent a vital component in the defense arsenal, contributing to the overall goal of enhancing national resilience. To this end, ongoing research, development, and strategic planning are essential in harnessing the full potential of these weapons for the benefit of a nation's defense and resilience.

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