Barriers and opportunities to innovation in the Malaysian Army: a multilevel approach

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https://doi.org/10.5937/vojtehg73-57765

FIELD: military science
ARTICLE TYPE: review paper

Abstract:

Introduction/Purpose: This study is to explore the barriers and opportunities to innovation within the Malaysian Army at the individual, team, and organizational levels, addressing a critical gap in military innovation research.

Methods: An interpretative phenomenological approach is employed with qualitative data derived from 15 in-depth interviews with military officers and other ranks who have consistently contributed to innovation efforts within the Malaysian Armed Forces.

Results: The results revealed that innovation barriers exist across three levels: seven themes were identified at the individual level, six at the team level, and four at the organizational level. These findings underscore the multifaceted nature of innovation challenges in structured military environments.

Conclusions: The paper highlights the interconnectivity of these barriers and the necessity of a holistic understanding to foster innovation effectively within the Malaysian Army.

Key words: innovation, barriers to innovation, ecosystem, armed forces, military, Malaysian army

Introduction

Innovation is pertinent to all organisations, and through innovation, creative thinking and new ideas can be introduced to solve issues in organisations. This can be seen from various security aspects in several issues such as national security and advanced military technology. Thus, strategies are essential to protect a nation's sovereignty and deter potential threats. Innovation ensures that a country's military can effectively respond to evolving threats and maintain a strategic advantage over adversaries.

Military innovation is closely tied to a country's security development, with organisations like the North Atlantic Treaty Organisation (NATO) that have supported science and innovation for more than 70 years. Major powers such as the United States and China have heavily invested in science and technology. For instance, the U.S. National Security Commission's 2023 report the highlights of the growing role of artificial intelligence (AI) across various domains, particularly in space, cyber, and information operations, where AI helps manage and analyse large amounts of data. AI enhances situational awareness, predicts outcomes, and supports military planning by simulating scenarios. As new threats like cyber warfare, drone attacks, and asymmetric warfare emerge, military forces must innovate continuously to develop both defensive and offensive capabilities. AI also transforms threats, creating new ones and enabling adversaries to exploit vulnerabilities (Dale F. Reding Álvaro Martín Blanco Angelo De Lucia Col Laura A. Regan, USAF, 2023)

Additionally, the military has been an early adopter of virtual reality (VR) technology, using it to address traditional training challenges such as high costs and the disparity between training environments and actual battlefields (Khaled Osmani and Detlef Schulz, 2024). VR provides an immersive and realistic experience, replicating stimuli that are difficult to recreate in real life while offering a safe training space that reduces the risk of injury and equipment damage. Similarly, unmanned aerial vehicles (UAVs) are increasingly used in modern defence strategies for roles such as intelligence, surveillance, reconnaissance (ISR), target acquisition, and combat strikes, offering remote operations in high-risk environments and minimizing human risk through advanced avionics and autonomous capabilities(Khaled Osmani and Detlef Schulz, 2024). Technological superiority also drives military innovation and technological advancements that can be adapted for civilian use. Technologies such as the internet, GPS, and radar were initially developed for military purposes and later revolutionized civilian life (Bidwell and Macdonald, 2018)

Barriers to innovation in the military

Scholars have shown a growing interest in barriers to innovation growth. For example, an empirical study by Gogoi (2021) found the importance of addressing issues about emotional blocks, such as fear of making mistakes and lack of trust, and structural blocks (associated with an individual's preferences for physical surroundings, dealing with distractions, use of personal space, and need for privacy). More importantly, studies have approached barriers to innovation growth in various ways, employing different concepts with similar meanings. For example, innovation barriers are associated with specific constraints such as institutional constraints (Hartono & Kusumawardhani, 2019), and leadership (Yusof et al., 2022).

Few studies, however, have explored barriers related to multiple levels of barriers and how the dynamics of these barriers inhibit innovation. To improve innovation, it is crucial to explore the full spectrum of barriers experienced by the Malaysian Armed Forces (MAF) innovators from the Malaysian Army. Given the innovation ecosystem weaknesses the defence industry faces in developing countries, studies of innovation barriers to growth may yield important insights, as advocated by scholars (Ismail & Johnson, 2021). Various strategies at the sectoral level will be implemented to strengthen the ecosystem to increase productivity, including uplifting research, development, commercialization and innovation (R&D&C&I) in new technology and improving access to financing in supporting innovation and skills development (The Government of Malaysia, 2021). Thus, we seek to address the central research question: What hinders the innovation growth of the armed forces in a developing country?

This study was conducted in Malaysia, an ideal context for the Malaysian Army (MA) as one of the branches services in the Malaysian Armed Forces (MAF). The MAF is a military institution in Malaysia that is responsible for protecting and defending the sovereignty and security of national interests in all domains. The MA is responsible for land forces domain security and consists of 16 Corps and Regiments that play a role in combat, combat support and combat service support. Every corps has its primary role and task to ensure that military operations are successfully executed. Based on Rusu (2023), in the military organization context, its culture is shaped by the unique requirements and needs of military operations as well as the history, traditions and values of military institutions. Yusof *et al.* (2022) stated two specific external and internal barriers and challenges to public sector innovation in Malaysia.

Building upon the organisational psychology field of research, a multilevel framework is foundational to understanding how individuals behave within complex organisations. Applying a multilevel framework to innovation growth in military institutions could provide important insights into the barriers experienced by Malaysian Army innovators. The multilevel framework maintains that individual, team and organisational factors influence innovative behaviours. A qualitative research design was used, namely, interpretative phenomenology analysis (IPA). IPA is useful for topics with limited research and less explored variables. IPA is a qualitative analysis technique that uses phenomenology, hermeneutics and ideography to explore a concept by attending to individuals' unique experiences (Smith and Osborn, 2008). To obtain rich data from different perspectives, we conducted interviews with MA officers and other ranks who have experience with consistent roles as innovators for the MA. The present study is divided into five sections: introduction, literature review, methodology, results, discussion, and conclusions.

Methodology

Ijebor (2019) and Rosen (1991) emphasize the importance of innovation for military organizations to address evolving threats and challenges, driving advancements in weapons, communications, and surveillance technologies. Weiss (2018) demonstrates some examples of the development of military innovation in the 20th century, such as intercontinental ballistic missiles, robots and drones to enhance operational efficiency. Thus, based on several crucial factors in military innovation, a qualitative method is employed to obtain detailed descriptions of the barriers and potential opportunities for innovation. The interviews were conducted with innovators who are experienced in innovative activities and have been involved in military innovation competitions.

These informants come from MA or land forces officers and other ranks. In-depth semi-structured interviews were conducted to gain insights into the lived experiences of MA innovators. The semi-structured interviews took place in person using an interview protocol. Morse *et al.* (2002) stated that the sample for a qualitative study is at least 6 and Creswell (2024) suggested that the sample size should be between 5 to 25 participants. For this research, we identified 15 interviewees, and we maintained the privacy and safety of the informants during all interviews. Despite reaching saturation at a small sample size, the study's sample size enabled it to explore the research issues in-depth as the researchers

believe that the selected participants are the true representation or the reflection of the study's entire population due to the common characteristics of the informants - participants. We tend to employ non-probability sampling as carefully chosen informants will generate robust and in-depth information (Smith, Flowers and Larkin, 2009). In capturing a phenomenon, information-rich cases are significant for deriving detailed information (Patton, 2002) from the selected participants; therefore, the purposive sampling technique has been used to explore military innovation behaviour in the MA.

Table 1: Interview questions

No	Questions
1.	*Do you do any innovation? (Rosen,1991; Ijebor, 2019; Wies, 2018)*
2.	*What are the barriers to your innovation? (Scaliza et al., 2022)*
3.	*Do you think military culture helps or hinders you from doing innovation? (Rusu, 2023)*
4.	*What are other factors that impact you in innovating? (Scaliza et al., 2022)*
5.	*How to overcome the barriers to innovation? (Yusof et al., 2022)*

All interviews were audio-recorded and ranged in duration from 30 minutes to 50 minutes. The audio recordings of all interviews were transcribed verbatim and translated into English from the Malay language. The translations were kept as literal as possible, except where minor modifications were necessary to preserve the conversational style and meaning (Nikander, 2008). To increase trustworthiness in data collection and data analysis, we conducted member checking and peer debriefing sessions among the research team members to review the emerging codes and themes.

The data (written accounts and transcripts) was analysed with thematic template analysis (TTA) (Brooks et al., 2015; King, 2012; Langdridge, 2007). TTA is one of the version styles included in the broad category of qualitative approaches to classical theme analysis (Brooks *et al.*, 2015). TTA was used instead of Braun & Clarke (2006) thematic analysis approach due to its usage of a priori themes and emphasis on establishing a balance between adaptability and coding hierarchical structure. The data could reveal meanings or motives from the informants' lived experiences. Prior themes were viewed as preliminary and vulnerable to reinterpretation and removal if they did not fit the informants' experiential assertions. The streamlined-codes-to-theory process by Saldana (2013) guided the data's themes, categories, and coding. The process involved four stages: decontextualising data into meaning units,

compressing meaning units into everyday words, categorising condensed meaning units, and assembling categories into final themes. ATLAS.ti version 24 was utilised to facilitate the procedure.

Results

Table 2 shows the demographic profile of the key informants who belong to military personnel consisting of officers and other ranks with experience in military service or experience as innovators in the MA. There are five officers and ten other ranks, which gives 15 informants. Most of them work in the units in Kuantan, Pahang. The selected officers are very experienced in innovation competitions in the MA, the MAF, the ministries at the national level and currently serve as strategic and innovation directorss. A participant with military experience was identified as whoever from military personnel completed their basic training and specialised training (basic military course and basic corps development course).

The duration of a basic military course is about 1 to 2 years of service in a military organisation. Most of the informants from other ranks hold the Sijil Pelajaran Malaysia (SPM) or the Sijil Kemahiran Malaysia (SKM) education certificate or they graduated from secondary education and vocational institutions, while officers have completed tertiary education to master and PhD levels. Out of the 15 informants, 3 of them received innovation awards in a range of 3 to 31 awards at the ministry level and the national level. Figure 1 resulted from the interview data coding in Table 3**.** The process involved four stages: decontextualising data into meaning units, compressing meaning units into everyday words, categorising condensed meaning units, and assembling categories into final themes. ATLAS.ti software version 24 was utilised to facilitate the procedure.

Individual-level barriers: internal elements

Internal elements in individual-level barriers consist of 4 codes, namely, a comfort zone, which is resistance to change, weak mentality in the innovation process, fear of mistakes in innovation, and lack of new ideas due to the advanced technology required. The personality development of military officers and subordinates is normally based on basic military training that has been outlined by the combat school. They will grow to advance military training suited to their role and task corps where they join in. The military training is to change their mindset and teach them military culture towards being a person who will be responsible for the security and sovereignty of the country.

Table 2: Informants' demographic profile

ID Code	Experience in the Military (Years)	Department	Nature of Position	Education Level	Number of Innovation Awards
A1	28	Army Inspectorate Department	Strategic & Innovation	PhD	10
A2	29	Army Logistics Command HQ – EME Gp	EME Gp	Master	3
A3	38	Veteran Army Officer (2023)	Retired in 2023	SKM	31
A4	11	Bde Wksp	Officer	Degree	-
A5	20	Bde Wksp Officer	Officer	Degree	-
B1	19	Bde Wksp – Armament Wing	Engineering Tech Class 2	SKM	-
B2	20	Bde Wksp – Storage Wing	Logistics	SKM	-
B3	20	Bde Wksp – Electronic Wing	Engineering Tech Class 2	SKM	-
B4	16	Bde Wksp – Armament Wing	Engineering Tech Class 2	SKM	-
B5	10	Bde Wksp – Recovery Wing	Recovery Tech	SPM	-
B6	13	Bde Wksp – Automotive Wing	Tech Class 1	SKM	-
B7	8	Bde Wksp – Automotive Wing	Tech Class 1	SKM	-
B8	4	Bde Wksp – A & G Wing	Welder	SPM	-
B9	1	Bde Wksp – A & G Wing	Welder	SPM	-
B10	1	Bde Wksp – Armament Wing	Armament	SPM	-

They are also trained in referring to the military doctrines on combat matters, technology, intelligence, etc. They are also trained through lessons learned from the history of past successes and defeats to learn war techniques and tactics. This lesson does not happen in a short period but sometimes requires 5 years of staged training. That is why some officers and subordinates have rigid thinking or resistance to change due to worries about facing failure in innovation.

"...After that, resistance to change, we want to train/change to the direction of innovation is difficult because there is still 'old school thinking'."– A2

"…. he is afraid to try something new "Do you want to do something new? It's difficult, sir if you're new"– A3.

"Actually, we work in that organisation (workplace). That is the challenge. Either the head of the organisation or among the staff. That's why when I attend the workshop, I see that a member/team involved, if he is not strong in terms of his mentality or he does not have support, he will withdraw."– A3.

Weak mentality in the innovation process: officers and other ranks have been trained with tough and rugged military training that tested mental and physical endurance, especially in the phase of training which emulates being a prisoner by an enemy. However, the mental strength to prepare innovative work including writing papers and producing innovative products requires a tough mentality due to the process taking up from 6 months to a year to complete. This forces them to use extra time outside their primary work.

Individual-level barriers: external elements

There are 3 codes for external elements - time constraints, a lack of practical training, and a lack of exposure to new technology. In terms of time constraints, both for military officers and other ranks, time to perform the main task is highly necessary. For example, the role of REME Corps in the MA is responsibility for maintenance and repair of all types of equipment and vehicles in MA units. The primary task is maintaining and updating vehicles and equipment documents before and after repair work. At the same time, additional tasks are required to be accomplished, such as auditing matters, admin inspection, organizing meetings, organizing ceremonies, contributing as executors in military exercises or operations, etc. Based on a pack of commitment to various tasks, the need for time to innovate regularly and systematically is not addressed well.

"The third constraint on time was work constraints to other tasks. So, for me, my time is only on Saturdays and Sundays, that's when I want to innovate." – A1.

"….in terms of time (time constraint). Like us as soldiers, again we as technicians and so on. We have our primary work, right? That's why, if you look at it, there are a lot of technical innovations from the technical teams." – A3.

"The challenge for me is time. This innovation is a secondary task. So, even the primary task/duty has become a workload to complete." - B2, B3.

Barriers to innovation

We identified three levels of innovation barriers which ranged from individual to organisational barriers. Table 3 shows the three levels of barriers. Exposure to how the process of innovation occurs both in writing innovation papers and in producing innovation products needs to be explained to every officer and other ranks. Usually, only innovation teams are trained and get actual exposure to innovation due to the replacement of an appointment (posting out) innovation team needed to set up for newcomers to join. However, exposure only applies to those who have been selected for innovation teams, and it is not comprehensive. In the digitalization era, the military is also exposed to emerging technologies with artificial intelligence (AI), big data banks, military Internet of Things, autonomous systems, etc., which requires a deeper knowledge of writing innovation papers.

"Our soldiers are less exposed to advanced technology knowledge. For example, right now, we are moving towards industry 4.0/5.0. So, human tasks want to be transferred to robots and robots control machines. So, we must keep up with the technology and we have to have exposure using AI, using the latest technology in security matters" - A3.

In terms of a lack of generating new ideas, it is a challenge to innovate when the ideas obtained still use mechanical systems and do not involve current technology such as AI, autonomous systems, and the Internet of Things. Ideas that have the 'wow' factor are hard to explore in advanced technology and need group discussion and brainstorming.

"*So far, the challenge is to find new ideas, which is more useful today. Looking for something suitable for current use and in line with IR 5.0." – B2, B3.*

Team-level barriers: internal elements

Internal elements consist of four codes which are: difficulty to find team members interested in innovation, less skilled members, difficulty to get cooperation, and lack of motivation.

"The challenge that I face is to find capable team members. Because now we are towards industry 5.0. When we compare to today's soldiers and soldiers who are at my level age most of them do not know much about robotics and are not exposed. Their times are also different from today's soldiers"-A3.

In the code 'difficulty to get cooperation' while developing an innovation team, there is also 'difficulty in obtaining cooperation' - this is due to several things. Firstly, team members are formed of new members or new soldiers with 5 years of working experience who have no exposure and experience in innovation. They are willing to listen to and follow the instructions first rather than anticipate the project. Secondly, there is a lack of or less interest in innovation due to the need to give more commitment and time to the preparation of innovation projects. Thirdly, cooperation in terms of poor innovation knowledge and fear of trying something new results in being inert to think critically.

"Both in terms of group cooperation. Because everyone has their own primary and secondary tasks/ are busy. So that cooperation is difficult to realize." – A1.

"...I asked other members of the team, but he didn't know what project he was doing. He does not focus on the team's effort and only the team leader innovates and gives the idea and direction." – A3.

The lack of skilled team members meant that most of team members had the same level of knowledge and had never been involved in any innovation project or design project during their service in the army or other institutions and organisations. Knowledge and skill to innovate have a great impact on producing an innovation project, especially when brainstorming, shortening innovation meeting time and preparing innovation papers.

"...Then another thing, we lack skilled team members to develop projects." – A3

A lack of motivation is related to a lack of knowledge and a feeling that innovation is difficult. For example, the preparation of an innovation paper and a product is a long process lasting from 6 months up to a year due to obtaining related documentation. Long duration will affect commitment and pose challenges such as family problems, personal problems, and even financial problems of the project as well. The motivation of group members or individuals can be boosted by giving awards to those team members performing well in team cooperation, by enhancing their innovation knowledge when sending them to innovation courses and by encouraging them to enjoy innovation culture.

"*The factor that I see, from my point in my innovation team is motivation. Motivation to team members. Leadership is not a problem because I am a leader. So, there is no issue. Only the motivation for the team members..." - A2,*

"Innovation is difficult" - B1, B2

As far as innovation team members who have no direct exposure to an innovation process are concerned, they will be surprised by the long duration of an innovation process and will need a lot of patience for the first time of involvement. Some members have no courses or exposure to innovation due to limited course allocations and because an innovation project needs to be completed within a certain period given by superiors. This causes weak motivation due to a lack of knowledge and creates a feeling that innovation is difficult.

"Only motivation for the team members, and I also see that few of the team members do not know innovation."- A2,

Team-level barriers: external elements

The external elements consist of 3 codes: plagiarized innovation products, financial constraints on when to start, and patent innovations.

"But I have seen our project, has been plagiarized by another institution. It was already at the competition or after we were at the national level, I don't remember. But as I told you, this project started before 2010. So, when we go to the roadshow, we bring this thing to the roadshow, that's when people imitate/plagiarize, people take pictures and so on. That's what's important about that patent." – A2.

"The challenge that I faced in innovation was preparing a project paper. We make project paper. Before we create a product, we must create a project paper first and we keep it, when I initially created this work, we didn't have a patent. So, the project has been plagiarized/imitated by others, that's the problem I'm facing, and this is happening in our service (MA)." – A3.

Another external element is the financial constraint in producing a product or a patent. When starting an innovative product, it is necessary to have finances due to the incompleteness of the product to be innovated. Products to be innovated almost from ground zero and from second-hand goods need supporting equipment to be paid for. Sometimes, a new product that needs to be innovated requires minor or major modifications first, before being combined with supporting equipment, which also requires financial funds. Some of used products that have been selected for innovation are worn out and damaged, so the cost of repairing needs to be considered as the first financial challenge before completing an innovative product.

"For me, the main challenge is in terms of financial/money, because this innovation requires money and cannot use used/discarded items because not all discarded items can be used properly. We need to buy quality items to develop, to make projects. In terms of security, it's the

same, if we take discarded items we have no guarantee from a safety point of view, but the items we buy/original are better, more guaranteed, and better quality. So, the challenge is money/finance" -A1.

In terms of financial constraints on patenting, innovations that have won certain awards at an MA organisation, a ministry and at the national level should be patented to avoid any plagiarism from other agencies because the production of innovative products can be sold and used commercially in the market. However, patenting a product is quite expensive. For example, a patent for an innovation paper is about RM 5,000, a patent for a product is RM 10,000 and a patent for a brand is RM 30,000. However, the cost of a particular patent will change from time to time. This is a big challenge in patent finance allocation. Nevertheless, it is beneficial to avoid copying from others or any form of plagiarism.

"But to make a patent, you need money. For all costs, we must see what kind of patent we want to overcome. Otherwise, people will steal our projects, physical projects and so on." - A2.

"Financially, it's a bit lacking, sir. The reason for innovation is to save costs. But if you want to make that product free from plagiarism, you must have a patent as well. It costs money to start." – B2, B3.

Organisational-level barriers

Organisational-level barriers consist of innovation competition issues, innovation exposure not reaching the lower level of subordinates, no support for commercialization, hindrance by military culture, and the application of old tools. There is a need to cultivate innovation in the MA. Although the culture of innovation can produce many innovators, innovation should happen comprehensively for every individual in the organisation because everyone faces problems and challenges in their work that need to be solved with innovation that saves cost, time and energy.

Thus, participating in competitions is not sufficient. All instructions and guidelines to innovate competitively have been issued by superiors. However, there are still barriers to innovating in the MA. MAF's culture of innovation should be parallel with innovation culture at the national level. The cultivation of innovation should be seen from various angles to increase its success.

"The third is a challenge from the superiors. Although superiors are there to give a little encouragement/support, this competition is not a 100% per cent culture for this soldier's work." – A2.

There is no denying that exposure to the innovation work process in the competition is only focused on innovation leaders and team members.

They will be sent to improve their innovation knowledge by attending courses or seminars, through awards if they win and other advantages.

If the encouragement is not comprehensive, only innovation team members will commit themselves to completing papers and producing innovative products while those who are not involved in teams will not participate in the work to gain knowledge. In addition, such work needs to be done outside the main working hours or after the primary task is done. This will create a culture that is not healthy for innovation in the organisation.

"When I ask random questions, I think almost 80 percent of them do not understand what I'm asking. I asked about the competition, they didn't know. I asked why you didn't know. They answered, "I don't know about your innovation", that's his thinking (don't know). We want everyone to know. In the army, our Chief of Army (COA) was issued a directive to encourage innovation. If you look at it, he has outlined innovation, but that thing may not reach the bottom (subordinate). That's what happened in the MA. I emphasized. It's also happened to MAF and the Ministry level as well." – A3.

Thus, this shows that there is less support for commercialization. The requirement for the commercialization of innovations can be considered as: (1) market research, (2) product development, (3) product pricing, (4) marketing plan, (5) distribution, (6) licenses and permits, (7) customer service, (8) financial management, and (9) sales team. This is the challenge in military or public service to work on until achieving commercialization. That is why the process of commercialization needs the attention of the MA.

"Then, the other one that I want to inform is, in terms of continuity challenges. Challenges in terms of the continuity of this product, when we have made innovative product like our product Spider Wheel Carrier until at national level. But there is no end state, it is not commercialized. So, why not commercialise? There is an issue why soldiers don't want to use it for what?" - A2.

The repair tools are still 'old school' and do not follow the latest technology, which may be due to the fact that technology is developing too quickly, or the organisation is still not ready to deal with technological changes. For example, military vehicles have begun to enter military service with various electronic modules and sensors, while the inspection method still uses the old approach of cannibalising or testing with good components borrowed from other vehicles. The way to resolve this is to use a computerized inspection or scan tool to identify the root cause of

Table 3: Identification of multilevel barriers to innovation

Level of Barrier to Innovation	Codes	A1	A2	A3	A4	A5	B1	B2	B3
Individual									
External elements	Time constraint	+		+	+	+	+	+	+
	Lack of practical training			+					
	Lack of advanced technology exposure			+					+
Internal elements	Resistance to change		+	+			+		
	In a comfort zone			+			+		+
	Afraid to make mistakes in innovation			+	+				+
	Lack of new ideas					+	+	+	+
Team									
Internal elements	Lack of interested team members	+		+	+	+			
	Lack of expert and experienced team members		+	+					
	Hard to get cooperation among team members	+		+	+				
External elements	Financial constraints to patent the innovations		+	+					
	Financial constraints to develop innovations	+	+	+	+	+	+		
	Plagiarism on the innovation		+	+					
Organisation	Innovation competitions are not sufficient to cultivate an innovation culture in the military		+	+					
	Innovation exposure does not reach the lower subordinate		+	+					
	No support towards commercialization innovation product		+	+					
	Military culture hinders innovation in the military					+	+		
	Still used old equipment/ technology			+		+	+		

Level of Barrier to Innovation	Codes	B4	B5	B6	B7	B8	B9	B10
Individual								
External elements	Time constraint	+		+	+	+	+	+
	Lack of practical training					+		+
	Lack of advanced technology exposure					+		+
Internal elements	Resistance to change		+					
	In a comfort zone							
	Afraid to make mistakes in innovation			+				
	Lack of new ideas	+	+		+	+		+
Team								
Internal elements	Lack of interested team members							
	Lack of expert and experienced team members		+					
	Difficult to get cooperation among team members	+						
External elements	Financial constraints to patent the innovation		+					
	Financial constraints to develop the innovation	+	+	+				+
	Plagiarism on innovation		+					
Organisation	Innovation competitions are not sufficient to cultivate an innovation culture		+					
	Innovation exposure does not reach the lower subordinate.		+	+				
	No support towards commercialization of the innovation		+					+
	Military culture hinders innovation in the military							
	Still used old equipment/ technology			+				

some damage or malfunction. This situation requires innovative ways for resolving it.

"…the second in terms of equipment. The available equipment is difficult for us to obtain. So, I always think how we want to make the work easier, make it easier for our technicians to carry out the work." – A3.

"Now our soldiers are not directly exposed to innovation and technology towards the outside world and remain with the existing culture." – B2, B5.

Military culture restricts innovation seen in terms of the essential work of the military which requires selflessness. It requires sacrifice and time for which military personnel must always be ready 24 hours a day for the security duty of defending the country. This primary task covers operations, training, administration, logistics, etc. to ensure the smooth running of military operations. They also work with limited human resources; in addition, family management responsibility is important for those who have a family. When added to innovation projects that require preparing paperwork with proofing documents and producing products, it is seen as a military culture that does not support innovation culture even though the instructions and guidelines of innovation competitions have been issued by superiors.

"Hindering sir. Among the barriers is a commitment to primary duty and military activity." – B2, B3.

Discussion

The study reveals that MA innovation in the Malaysian Armed Forces (MAF) aligns with national requirements and promotes a competitive innovation culture at various levels. The government and ministry support in fostering this innovation culture aligns with the industry's needs in the digitalization era. The study explores barriers to innovation in the MA at individual, team, and organizational levels, highlighting that communication, lack of ideas, constraint resources, military culture, etc. (Figure 1) will hinder MA innovation.

Additionally, team-level challenges include concerns about product plagiarism, limitations on available team members, a lack of financial support for initial product development, insufficient innovation knowledge among members, and inadequate teamwork support. These challenges are similar to the challenges from the government study on innovation in the public sector (Srirahayu et al., 2023; Hashim, 2021; Retkoceri & Kurteshi, 2018; Cinar et al., 2019; (Yusof et al., 2022). The same issues persist regarding organizational challenges in competition: there is

insufficient development of an innovation culture, lower level employees are not adequately exposed to innovative practices, support for commercialization is inadequate, military culture impedes innovation, and obsolete equipment remains in use.

The sustainability of innovative behaviours among MA officers can be enhanced by overcoming team-level barriers such as concerns about product plagiarism which restrict the participation of interested team members and impede financial support for initial product development. Furthermore, there is a lack of innovation knowledge among team members, and collaboration is often limited due to the usual structure of MA innovators working as a team. The MA should address barriers to military innovation through open innovation, design thinking, dedicated units, improved communication, resource allocation, and fostering innovation culture by the top-down approach.

Communication: team and organisation level

Military innovation faces communication barriers due to hierarchical structures. Higher-level orders lack context, leading to misunderstandings and disconnected teams. Lower-ranking personnel may hesitate to share ideas due to fear or cultural norms, resulting in missed opportunities.

Military culture: individual, team, and organisation level

Military innovation faces cultural barriers, including individual resistance, rigid hierarchies, and bureaucracy. Malaysia's leadership encourages innovation through competitions despite these challenges, as it encourages creativity and adapts to changing organizational structures, despite the risk-averse mindset prevalent in the military.

Establishment of units' innovation department: team and organisation level

Military units often face barriers to idea development due to rigid hierarchies and discipline, which discourage lower-ranking personnel from voicing new ideas. Establishing innovation departments can foster a culture of creativity by dedicating time and resources to idea development.

Approach to design thinking and open innovation method: team and organisational level

Military innovation can be accelerated by combining open innovation and design thinking. Open innovation involves sharing ideas beyond traditional boundaries, while design thinking involves end users early in

the process. This approach overcomes barriers like hierarchies and risk aversion, fostering a culture of openness and collaboration.

Specific allocation for initial development product from MAF R&D effort: team and organisational level

Financial constraints in early innovation stages can hinder progress, especially in resource-limited organizations. A lack of funding restricts access to resources, skilled personnel, and advanced technologies, leading to project delays and lower-quality outcomes. Allocating specific funding from higher authorities can alleviate financial pressures, enhance patent acquisition likelihood, and strengthen the innovation ecosystem.

CONCLUSION

This is the first qualitative study to explore the barriers and potential interventions or opportunities for innovation in the MAF and subsequently related to the defence industry in Malaysia. A primary strength of the study was the inclusion of both team leaders and members who are currently active in innovation activities and participate in innovation competitions. This allows for a comprehensive understanding of both perspectives. The study highlights that MAF's military innovation aligns with national requirements, but the challenges such as proactivity, collaboration, resource availability, and communication persist. Addressing these can enhance capabilities, particularly in enhancing military equipment and service efficiency in the digital era.

However, the study had some limitations. All informants who participated in the interviews were self-reported. However, member checking was conducted during the data collection. Furthermore, the study informants were limited to those who actively participated in innovation competitions, which potentially excluded non-participants in innovation competitions that might give insights into barriers towards innovation. Future research should include these stakeholders to capture the full spectrum of perspectives better. More importantly, a more in-depth study of this issue is to be carried out concerning innovative work behaviour.

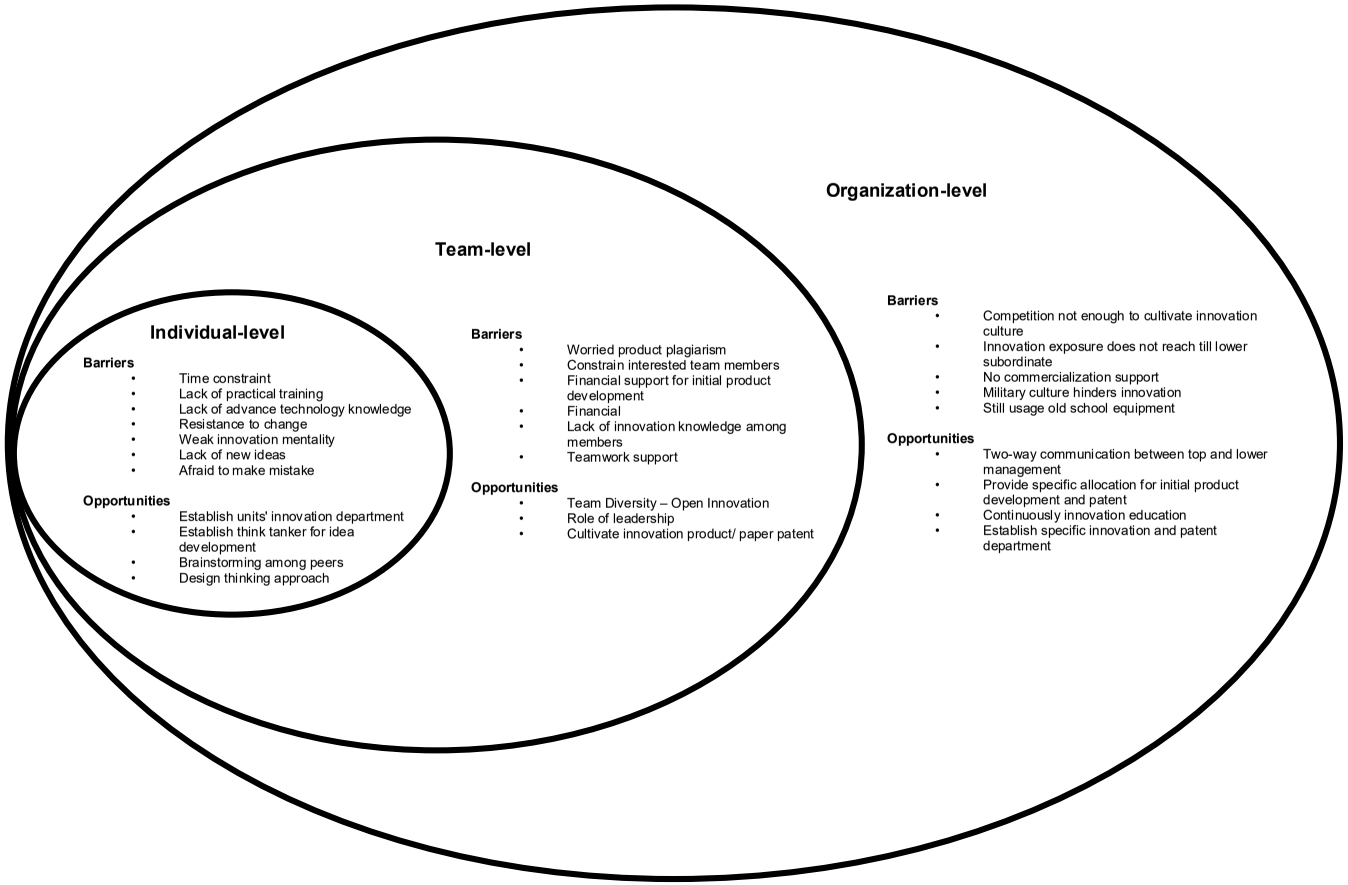

Figure 1 - Overview of individual, team and organisational level barriers and opportunities for innovation

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Препреке и могућности за иновације у малезијској војсци: приступ на више нивоа

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Област: војне науке
Категорија (врста) чланка: прегледни рад

Сажетак:

Увод/циљ: Испитују се препреке, као и могућности за иновације у Војсци Малезије на појединачном, тимском и организационом нивоу, чиме се приступа решавању критичног недостатка истраживања иновација у Војсци.
Методологија: Примењен је интерпретативни феноменолошки приступ уз помоћ квалитативних података добијених из петнаест аналитичких интервјуа са припадницима Војске Мелезије који носе официрске и друге чинове и редовно доприносе раду на иновацијама унутар оружаних снага Малезије.
Резултати: Истраживање је показало да препреке иновацијама постоје на три нивоа; седам тема је идентификовано на појединачном нивоу, шест на нивоу тима и четири на нивоу организације. Овакви налази истичу вишеслојну природу иновационих изазова у структурираним војним срединама.
Закључак: Наглашава се међусобна повезаност препрека иновацијама, као и неопходност холистичког разумевања ради ефикасног афирмисања иновација у Војсци Малезије.

Кључне речи: иновација, препреке иновацијама, екосистем, оружане снаге, војска, Војска Малезије

Paper received on: 22.03.2025.
Manuscript corrections submitted on:11.04.2025.
Paper accepted for publishing on: 27.05.2025.