



เอกสารวิจัยส่วนบุคคล

เรื่อง

CONCEPT FOR THE EFFECTIVENESS ENHANCING OF
“EYES IN THE SKY” OPERATIONS FOR
ROYAL MALAYSIAN AIR FORCE

โดย

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คณะกรรมการเอกสารวิจัยโรงเรียนเสนาธิการทหารอากาศได้ตรวจและรับรองว่า เอกสารวิจัยส่วนบุคคลเรื่อง Concept for the Effectiveness Enhancing of Eyes in the Sky Operations for Royal Malaysian Air Force ของ นาวาอากาศตรี พนม อชวน นายทหารนักเรียน โรงเรียนเสนาธิการทหารอากาศ รุ่นที่ ๖๗ เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรเสนาธิการทหารอากาศ โรงเรียนเสนาธิการทหารอากาศ กรมยุทธศึกษาทหารอากาศ ประจำปีการศึกษา ๒๕๖๖

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บทคัดย่อ

เอกสารวิจัยเรื่อง	การเพิ่มประสิทธิภาพในการปฏิบัติการตรวจการณ์ทางทะเล สำหรับ กองทัพอากาศมาเลเซีย
ชื่อนายทหารนักเรียน	นาวาอากาศตรี พนม อชวณ
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เอกสารนี้ตรวจสอบพัฒนาการและความท้าทายในปฏิบัติการ “Eyes in the Sky” ภายใต้ปฏิบัติการลาดตระเวนช่องแคบมะละกา เพื่อระบุแนวทางปรับปรุงประสิทธิภาพของปฏิบัติการ การดำเนินการเกี่ยวข้องกับสี่รัฐชายฝั่ง ได้แก่ ไทย สิงคโปร์ อินโดนีเซีย และมาเลเซีย ความร่วมมือเกิดขึ้นเนื่องจากตระหนักถึงปัญหาโจรสลัดร่วมกันในช่องแคบมะละกา

เอกสารการวิจัยจะพิจารณาถึงประสิทธิภาพและจุดอ่อนของปฏิบัติการโดยการเปรียบเทียบจำนวนคดีโจรสลัดจนถึงปี ๒๕๖๕ และการวิเคราะห์ปัญหาที่ผู้ปฏิบัติงานพบ ข้อบกพร่องของอุปกรณ์และการปฏิบัติจะถูกเน้นด้วย จะเน้นเป็นพิเศษไปที่ข้อ จำกัด ของสินทรัพย์และการดำเนินงานของการดำเนินงานซึ่งการพัฒนาสินทรัพย์และความพร้อมใช้งานของอุปกรณ์พิเศษสำหรับปฏิบัติการเดินเรือ ด้วยสัญญาณเชิงบวกของการลดลงของจำนวนการโจมตีของโจรสลัดและการพยายามก่อคดีในช่องแคบมะละกา อย่างไรก็ตาม รัฐแถบชายฝั่งยังคงต้องพิจารณามาตรการที่ต้องดำเนินการอย่างจริงจังเพื่อให้มั่นใจถึงประสิทธิผลของปฏิบัติการเสมอที่ ประสิทธิภาพที่ดีที่สุด ปัญหาแพลตฟอร์มและการสื่อสารที่ไม่เหมาะสมระหว่างผู้ปฏิบัติงานเป็นปัญหาที่ต้องได้รับการแก้ไขทันที เนื่องจากจะส่งผลกระทบต่อประสิทธิภาพของการดำเนินการ “Eyes in the Sky” โดยเฉพาะและการดำเนินการของ Malacca Straits Patrol โดยทั่วไป

Abstract

Research Title	Concept for the Effectiveness Enhancing of Eyes in the Sky Operations for Royal Malaysian Air Force
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This paper examines the development and challenges in conducting “Eyes in the Sky” (EiS) under Malacca Straits Patrol Operation to identify ways to improve effectiveness of operation. The operation involves four littoral states which are Thailand, Singapore, Indonesia and Malaysia. The cooperation was made due to the recognition of shared piracy problem in the Straits of Malacca.

My research paper will look into the effectiveness and weaknesses of the operation through comparison of the number of piracy cases until 2022 and analysis on problems encountered by the operator, deficiency on the equipments and conduct will also be highlighted. Special focus will be given to the assets limitation and conduct of the operation where the development of the assets and availability of the special equipment for maritime operation. With the positive sign of the decreasing in the number of piracy attacks and attempted cases in the Straits of Malacca, however the littoral states still need to really look into the measures that have to be taken in order to ensure the effectiveness of the operation always at the best performance. Improper platform and communication problem in between operators are the issues that required resolved immediately because it will affect the effectiveness of the EiS operation specifically and Malacca Straits Patrol (MSP) operation generally.

FOREWORD

It is with great pleasure and a sense of urgency that I present this recommendation to enhance the effectiveness of "Eyes in the Sky" operations for the Royal Malaysian Air Force (RMAF) against piracy. The issue of piracy poses significant challenges to maritime security and demands our utmost attention and collaboration to address it effectively.

I am pleased to note that the RMAF has already demonstrated commendable efforts in countering piracy through the implementation of the "Eyes in the Sky" operations. These operations, which employ aerial surveillance and reconnaissance capabilities, have undoubtedly served as a valuable asset in detecting and deterring piracy incidents in our territorial waters. However, in order to stay ahead of the evolving tactics employed by pirates, it is crucial that we continuously strive to enhance the effectiveness of these operations.

I wholeheartedly support the efforts of the RMAF in its ongoing mission to enhance the effectiveness of "Eyes in the Sky" operations against piracy. May this report serve as a catalyst for positive change, driving us closer to a future where the seas are free from the threat of piracy, and where the economic potential of our maritime domain can flourish unhindered.

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July 2023

ACKNOWLEDGEMENT

I would like to express my deepest gratitude and heartfelt appreciation to the Royal Thai Air Force (RTAF) for granting me the opportunity to participate in the prestigious Air Command and Staff Course. This invaluable experience has been instrumental in shaping my professional development and broadening my knowledge in the field of command and staff duties.

I would like to convey my sincere gratitude and appreciation to my Research Paper Supervisor, Squadron Leader Bunnasin Peampongsarn for his wisdom, guidance, close supervision and commitment through the learning development of this research paper. Furthermore, my sincere appreciation to Brig Gen Samsul Rizal bin Musa, Defense Attaché Embassy of Malaysia and Col Baharin bin Mohamad RMAF, Base Commander, Kuching Air Base for the utmost support in acquiring information and data for the strong justification and reference for the development of this paper of which I really appreciate their effort.

Most significantly I would like to dedicated my incomparable thankfulness to my beloved wife and family who given me the moral support and encouragement together with continuous prayer. Without these the paper will not be achievable. Thank you for being such a great and a wonderful wife and mom to me and our children. In all, am ultimate thanks to my seminar members and everyone who has helped directly or indirectly in the accomplishment of this paper.

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CHAPTER 1

INTRODUCTION

1. Background and Importance of the Research

In early year of 2000, the Strait of Malacca has increasingly become the target of piracy and armed robbery against vessels. The Regional Maritime Security Initiative (RMSI), proposed in 2004 by Admiral Thomas B. Fargo, former commander of the US Pacific Command, is one of the American maritime security programs and initiatives designed to promote regional cooperation and improve maritime security in the East Asia and Pacific region, especially in the straits of Malacca and Singapore. The main goal of RMSI is to develop a partnership of willing nations, working together under international and domestic law, to identify, monitor and intercept transnational maritime threats in particular piracy, armed robbery and terrorist attacks at sea. In year of 2005, to avoid foreign intervention in safeguarding the security of the Strait of Malacca, four littoral states within Malacca Straits which are Thailand, Singapore, Indonesia and Malaysia has developed Malacca Straits Patrol (MSP) operation mainly to curb piracy and armed robbery, and to increase maritime security. Under MSP Operation was Malacca Straits Sea Patrol (MSSP) and "Eyes in the Sky" (EiS).

According to a study by Mahyuddin et al. (2014), the Royal Malaysian Air Force (RMAF) faced several challenges during the "Eyes in the Skies" operation in the Malacca Straits against piracy. One of the main problems was the difficulty in detecting small boats that were used by pirates to approach larger ships unnoticed. These boats were often painted in camouflage colors and had low profiles, making them difficult to spot from the air. Another challenge faced by the RMAF was the lack of real-time information sharing between various agencies involved in the operation. This led to delays in response times and reduced the effectiveness of the operation. Additionally, the RMAF faced challenges in coordinating with other

countries in the region to combat piracy, as there were different laws and regulations governing the operation of military aircraft in different countries. Furthermore, the study identified the need for the RMAF to improve its surveillance capabilities, including the use of more advanced technology such as radar and unmanned aerial vehicles (UAVs). The authors also suggested that the RMAF should increase its training and cooperation with other agencies to enhance its effectiveness in combating piracy.

If we are not prepared to face the new era of piracy technology, the statistics of piracy attacks will increase dramatically in the future and the time to curb it will require a longer period of time. Overall, the consequences of the RMAF's challenges in the Eyes in the Skies operation could have wide-ranging and significant impacts on regional security, Malaysia's reputation, and its economy. Therefore, it is essential for the RMAF and other relevant agencies to address the challenges and implement the lessons learned to improve the operation's effectiveness and enhance regional cooperation in maritime security (Sulaiman, 2019: p. 27). This research will look into effectiveness and weaknesses of EIS operation through comparison of flying sortie conducted and capability of MAP with number of piracy cases before and after EIS conducted. The finding of the research hopefully will trigger the relevant agencies to review the current practice and make appropriate enhancement in the key areas highlighted in this paper.

2. Research Objectives

- 2.1 To identify effectiveness and weaknesses of “Eyes in the Sky” operation.
- 2.2 To purpose ways to improve effectiveness of “Eyes in the Sky” operation.

3. Research Question

How to improve the effectiveness of “Eyes in the Sky” operations for RMAF in Malacca Straits against Piracy Attack?

4. Scope of Research

Special focus will be given to the asset's limitation (MPA aircraft and equipments) and conduct (SOP, operation area and operation time) within Royal Malaysian Air Force responsibility only.

5. Research Method

This research is a "Mixed Methods Documentary research". The materials that have been used in this research consist of scholarly books, journals and articles from Google Scholar, correspondences regarding EIS operation and last but not least the SOP of MSP and after flight report by flying squadron. The data was analyzed to identify ways to further improve the effectiveness of the 'Eyes in the Sky' operation. To strengthen the finding, some clarification confirmed by key personnel in flying squadron which involve directly with EIS operation and have vast knowledge in maritime operation to reveal the problem faced and the suggestion from the operators to make the operation more efficient and effective in combating the maritime piracy.

6. Expected Benefits from Research

- 6.1 Know weaknesses and effectiveness of "Eyes in the Sky".
- 6.2 Know the ways to improve effectiveness "Eyes in the Sky".
- 6.3 Enhance safe passage of the ships within area of operation.

7. Definition of Terminology

Piracy, According International Maritime Bureau's (IMB), piracy is an act of attempting to board a ship with the intent to commit theft or any other crime and with the attempt or capability to use force in furtherance of that act. According to Alamsyah (2020), piracy in Malacca straits was a sea people are those whose lives depend on the sea. The Sea people under certain conditions will become pirates.

Maritime Patrol Aircraft (MPA), also known as a patrol aircraft, maritime reconnaissance aircraft, or by the older American term patrol bomber, is a fixed-wing aircraft designed to operate for long durations over water in maritime patrol roles —

in particular Anti-Submarine Warfare (ASW), Anti-Ship Warfare (AShW), and Search And Rescue (SAR).

Malacca Straits Patrol (MSP) is maritime patrols that are conducted in the Malacca Strait and the Singapore Strait since 2005 to maintain sea security within the area of operations.

'Eyes in the Sky' (EiS) is multinational maritime air-patrol over the Malacca Straits by aircraft under MSP mission. Assigned aircraft from each participating state will conduct maritime air patrols with CMPT embarked within the area of operations.

8. Conceptual Framework

For the research conceptual framework, SWOT/TOWS matrix diagram, to provide actionable links between the different parts and to find out the better solutions for the research objectives.

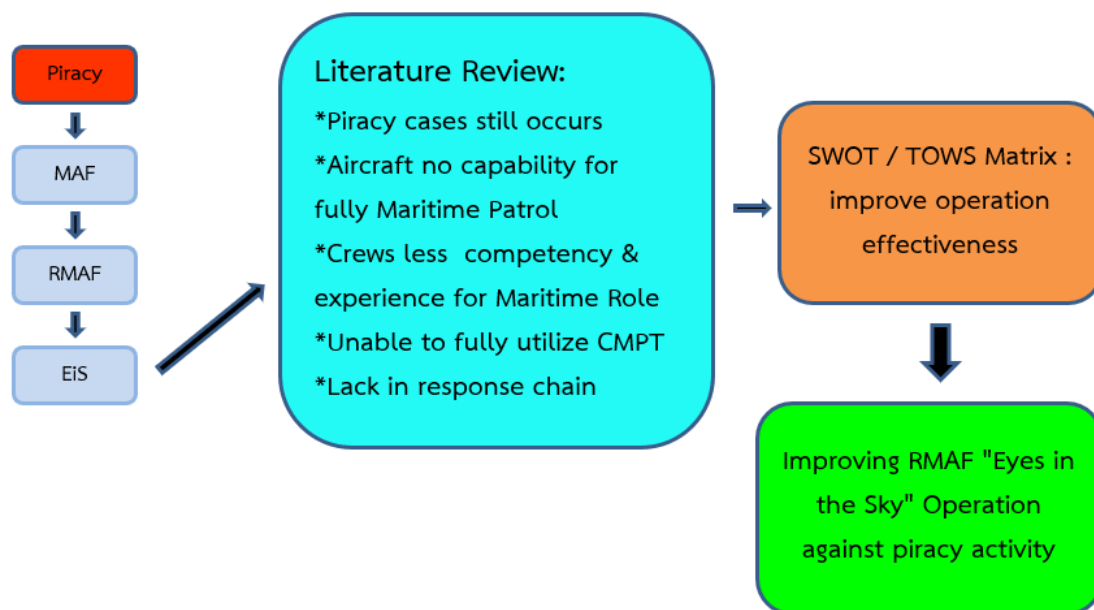


Figure 1-1 Conceptual Framework

CHAPTER 2

LITERATURE REVIEW

For the principle value of this research, varieties of credible sources will be used especially the publication from the Maritime Institute of Malaysia (MIMA), previous commandant paper of Malaysian Armed Forces Staff College (MAFSC) on EIS operation and Issues on Malacca Straits, journals, Standard Operating Procedure for EIS operation and data from mission report from the operation.

1. Straits of Malacca Background

In this region history, the Straits of Malacca has been always prominently figured. The Straits of Malacca Littoral States had already established the strategic importance of the straits ever since two thousand years ago. During great European powers, due to the nature of maritime choke point that become high value to the straits, the great powers had fought just to have control over the straits (Mohd Najib, 2004: p. 2). However, the strategic importance of the straits brings along the piracy attacks problem. Initially it was a form of rebellion from the population on the colonial rulers, but then had changed to as a source of income to support their living due to poverty and life difficulties. To overcome this problem, a boundary line was created by the British and Dutch to mark their area of responsibilities to eliminate piracy attacks along the Straits of Malacca. Both parties will fight the pirates only in their area of responsibility. Before the littoral states joint their hands together to fight the piracy attacks, the line has become the major obstacle in fighting the piracy over the Straits of Malacca (Sharidan, 2010: p. 17).

Today, from the total of seaborne trade all around the world, Straits of Malacca serving over one third of it, make it even more important. Huge numbers of high valuable cargo estimating more than 50,000 ships that comprises of East and West trading passed through the Straits of Malacca every single year (Mohd Najib, 2004: p.

2). As for Malaysia, our major ports namely Port Klang, Penang Port, Westport and Port of Tanjung Pelepas are located along the Straits of Malacca within 20 nautical mile radius. This port conducting billion of Ringgit trades and become one of the major sources of economy to the state and also to the traders which make the Straits stands as an economic significance and strategically important to Malaysia (Mohd Najib, 2004: p. 3). Straits of Malacca also become the source of nation's fisheries and it was estimated that more than half of Malaysia's fish supply are from this strait.

Due to the significance of the Straits, the continuance of security safeguarding from any kind of threats in the straits is vital. Before Straits of Malacca Joint Patrol Operation took place, the most critical part was handling the traditional security threats within the Straits of Malacca. Before the operation started, piracy and sea robberies activities were growing and posed greater threats to the sea traders (Mohd Najib, 2004: p. 5). Dato' Sri Mohd Najib Bin Tun Abdul Razak, Malaysia's Prime Minister, mentioned in his keynote address during Straits of Malacca Conference in year 2004, said that the threat should be subject of serious apprehension of all littoral states. In fact, not only in the littoral states, but also to all parties who may concern and interested in the security and safety of the Straits. He indeed was pleased when realized that those security matters have been looked up seriously by all the littoral states and other parties who interested to see the safety of the Straits of Malacca.

2. Comprehensive Security in the Straits of Malacca

From the international community perspective, the Straits of Malacca's littoral states claimed that they are not being able to guarantee absolute security and navigational safety of the busiest Straits that has been used for international navigation after quite some times (Mohd Nizam, 2006: p. 9). Due to this situation, the interested countries such as the United States, India and Japan has shown their same expressions that the littoral states failed in doing their responsibilities, by citing an intention to participate and get involved in ensuring security and safety over the Straits of Malacca. However, the littoral states having the same standing that the issue of the Straits cannot become the "internationalism" as what has been

published by The Star on 8 June 2004. The most important part is, the littoral states have the same mindset, the security of the Straits cover not only on economic security, but also on environmental and human security. For the communities along the Straits of Malacca, it is not only as medium for trade movement, it is also as a source of income, nutrients and their place of living. This shows how important the Straits of Malacca to the population that relying on it.

In 1981, International Maritime Bureau (IMB), a specialized division under the International Chamber of Commerce (ICC) was established mainly to provide assistance to the seafarers and traders in fighting all types of maritime malpractices such as pollution and also maritime crimes such as piracy and sea robbery. As for the consequent action, Kuala Lumpur remarks the next historic event in fighting the piracy and sea robbery by establishing the Piracy Reporting Centre (PRC) in 1992.

3. History of the Eyes in the Sky (EiS) in Straits of Malacca

Sharidan Nemas (2010: p. 27) had explained in detailed in detail on the history of the existence of Eyes in the Sky (EiS) operation. It was initiated after the recommendation by the International Maritime Organization (IMO) Council during the ASEAN Regional Forum (ARF) of Regional Cooperation on Maritime Security in March 2005. In the forum, the users of Malacca and Singapore Straits together with all three littoral States had discussed in the proposal by the IMO to work together in enhancing the safety of navigation, security and environmental protection in the Straits. The three littoral States acknowledged establishing joint effort and combining patrol to improve the security status over the straits. As for that reason, Malacca Straits Patrol (MSP) was established comprised of coordinated sea patrols and combined maritime air surveillance. The combined operation will be conducted using the existing bilateral agreements and national laws, rules and policies and international laws that have been practiced by the littoral States. The area of operations is according to Malacca Straits Patrol Standard Operating Procedure which has been divided into 5 sectors according to Figure 2.

There are two main operations in MSP which are Malacca Straits Sea Patrol (MSSP) and Eyes in the Sky (EiS) the combined maritime air patrol. These operations

are supported by the Intelligence Exchange Group (IEG) to manage the Intelligence Information for the operation. The responsibility to manage this operation is put under the respective Joint Working Group (JWG) and they will review the operation every four months, as an addition to the Joint Coordinating Committee (JCC) forum, and the meeting hosted among the participating states alternately (Malacca Straits Patrol, Confidential document, 2013).

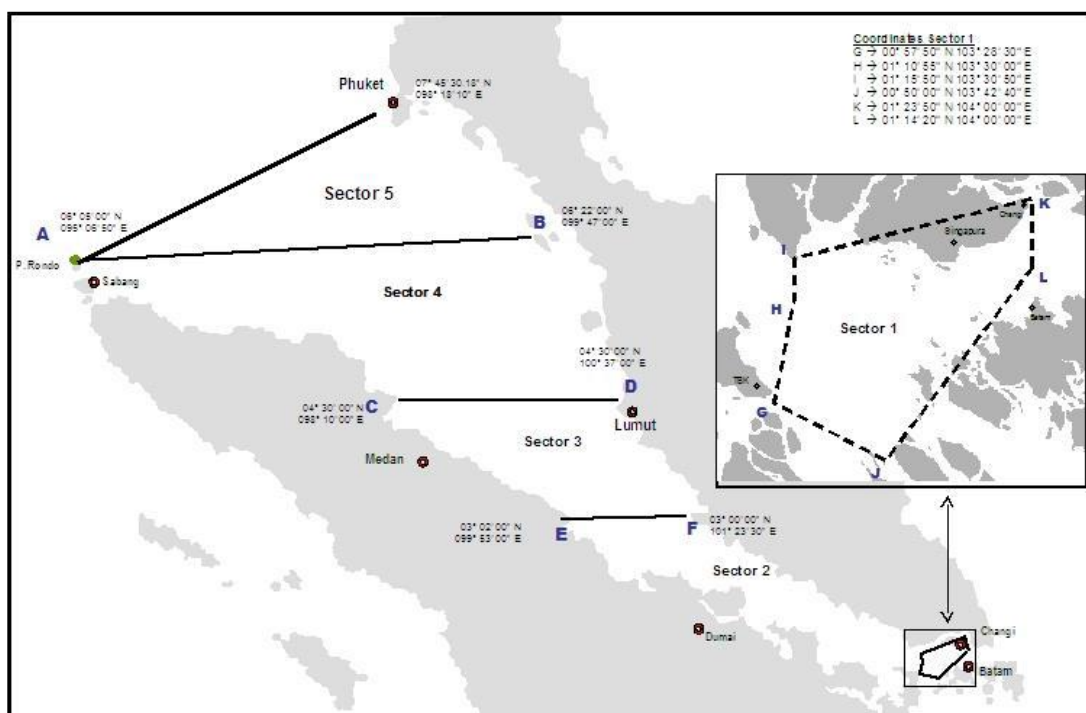


Figure 2-1 Area of Operation MSP

Source: Malacca Straits Patrol, Confidential document, 2013, Annex B

Each of the task units has their own responsibility. For MSSP, each participating state will conduct coordinated sea patrol operations in their respective maritime boundaries and in accordance with existing bilateral agreements. For EiS, every assigned aircraft from each participating state will conduct maritime air patrols with Combined Mission Patrol Team (CMPT) embarked within the area of operations. The CMPT role is to establish a comprehensive surface picture over the designated area by reporting any suspicious contacts on designated frequencies to Monitoring and Action Agency (MAA), which may require follow-on responses. Whereas, the Intelligence unit is to compile, evaluate, analyze data and to conduct intelligence information exchange in support of the operations.

First EiS operation over the Straits of Malacca was launched on 13 September 2005 by C 130H of the Royal Malaysian Air Force from Subang Air Base. The flight involved CMPT from the three littoral States and an observer from Thailand was invited. The three littoral States are responsible to conduct two patrol operations per week within the allocated sectors.

4. Strengths and Weaknesses of Eye in the Sky (EiS) Operation

4.1 EiS Strengths

One study by Sam Bateman (2014) highlights the strengths of aerial surveillance in detecting and deterring piracy in the Malacca Straits. Bateman notes that aerial surveillance can cover large areas of ocean quickly and efficiently, providing real-time intelligence to naval forces and other authorities. Additionally, the use of aircraft can help to identify suspicious vessels that may be involved in piracy and provide early warning of potential attacks.

Another study by Steven R. Beckman and David P. Auerswald (2014) also highlights the effectiveness of aerial surveillance in deterring piracy in the region. The authors note that the use of aircraft can improve situational awareness and provide a more comprehensive view of the maritime domain. Additionally, aerial surveillance can be used to gather intelligence on pirate networks and operations, which can inform future counter-piracy efforts.

Overall, the use of aerial surveillance, such as the "Eyes in the Skies" operation, can provide important strengths in combating piracy in the Malacca Straits. These include improved situational awareness, real-time intelligence, and the ability to cover large areas efficiently. However, it is important to note that the effectiveness of aerial surveillance relies on its integration with other measures such as improved communication and cooperation between regional navies, better intelligence sharing, and effective law enforcement.

The decreasing number as shown in the Table 1 is the reflection of the comprehensive effort by the littoral States in conducting the combined operation to enhance the security status over the Straits of Malacca.

Table 2-1 Sea Robberies in the Straits of Malacca

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Cases	58	34	36	60	51	6	7	2	2	2	1
Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Cases	1	1	1	5	0	0	0	0	0	1	0

Source: ICC International Maritime Bureau Piracy and Armed Robbery against ships Report compiled for the period 1 January 2001 – 31 December 2022

One Year after the initiation of MSP operation, the number of piracy cases has shown a significant decrement in actual cases as shown in Table 2-1. It is an indication that the level of security over the straits had improved. However, in 2021, the sea robbery case was still alarming.

4.2 EIS Weaknesses

An initiative of the littoral states in conducting Counter-piracy operations had successfully reduced piracy incidents over the Straits of Malacca in recent years, but the problem still persists. Why is this happening? Is there any decrement in an effort by the littoral states in protecting the seafarers? Or are the littoral states having some issues and challenges in conducting their combined operation over the straits? Let find out the answered for these questions.

Baharin Mohamad (2013), from his MAFSC National Defense University of Malaysia on title “Eyes in The Sky: Development and challenges”, the EIS mission since it was launched utilizing the existing Maritime Patrol Aircraft (MPA) under each littoral states military establishment. Initially there were three MPA from the RMAF, RSAF and TNI-AL was involved in these operations. They were the No 20 Sqn RMAF C-130H-30 Hercules, No 121 Sqn RSAF F-50MPA and DISNERBAL’s RON 800 TNI-AL GAF Nomad. Later in 2009 RTN participate utilizing Dornier 228. Since 2005, every year each littoral states conducted an average of 220 patrol flight over 5 designated MSP areas covering the Straits of Malacca and Straits of Singapore. It shows that the

littoral states really committed to ensuring the safety and security of the seafarers and users of the both straits.

No 20 Sqn C 130H aircraft and No 1 Sqn CN 235 aircraft used by RMAF for EiS are not dedicated maritime operation or Maritime Patrol Aircraft (MPA). It is used as an utility aircraft and tactical operation and does not have special equipment for maritime operation such as Forward Looking Infra Red System (FLIR) with laser pointing capability, Airborne Maritime Situation Control System (AMASCOS) with threat library, 360 ISAR (Inverse Synthetic Aperture Radar) / surveillance radar, Radar Warning Receiver (RWR), camera with GPS (geo tagging), Night Vision Goggle (NVG), data link capability, generation 2 communication system and others. All this while the crews only use visual surveillance method with limited maritime equipment capabilities such as stabiscope, camera with no GPS and so on. In terms of crew competency and experience of maritime operation, due to both aircraft are not dedicated maritime squadron, they are not considered as competent as maritime squadron crew because of multi role functions and limited exposure to maritime operations. During Maritime Surveillance from Space Seminar in London on 6 Dec 2012, John Yates the chairman of the Institute Engineering and Technology Satellite System and Application stated that they are many opportunities created by the integration of multiple space based maritime surveillance system.

According to MSP agreement, the participating state must carry a Combined Maritime Patrol Team (CMPT) and they must be suitably equipped for surveillance. The role of CMPT is basically to have and maintain comprehensive surface picture over the operation area and to report any suspicious contacts to Monitoring Action Agency (MAA) on available and designated frequencies if any follow up responses required. CMPT are provided with a Life Saving Jacket (LSJ) except the headset. Without headset for communication, it is impossible for the CMPT to have situation awareness while on the mission. Furthermore, the EiS mission under Malaysia were not utilizing proper MPA platform which further worsens the situation. The CMPT will have nothing to monitor at the cabin and will just conduct visual surveillance.

According to Graham Gerard Ong and Joshua Ho (2005) from the Institute of Defence and Strategic Studies, Nanyang Technological University, Singapore, mention that the entire 'response chain' of the Malacca Straits Security Initiative (MSSI) may have to be drastically improved before the littoral countries can officially say that they have a 24-7 surveillance and interdiction capability over the Malacca Straits. The response chain can be conceptualized in three parts: detection, identification, and interdiction. The air patrols or MPA are intended to achieve maritime domain awareness. The **detection** process presents a problem because of the lack of hi-tech equipment being used on the MPA as well as the large area that needs to be covered. The surveillance radar capability of the littoral countries is unclear whether the motorboats normally used by pirates will be easy to spot and identify. The subsequent weakness is in **identification and interdiction**. Even if the maritime patrol aircraft were able to detect a suspicious boat, it would be difficult for it to gauge the intentions of the boat. For example, if a suspicious craft is approaching or going alongside another ship, how can you tell if its activities are going to begin or not? The crew of the two boats could well know each other. The only way is for patrol craft to conduct the investigation on the water. However, aircraft can only patrol within its own respective territorial waters and limit for day time operation only.

5. Malacca Straits related research paper

5.1 Hamzah Ahmad (1997), in his book title *The Straits of Malacca International Co-operation In Trade, Funding and Navigational Safety* published under MIMA give various views from the experts such as, the experts from international law organization, marine environment experts and also navigational safety organization, on their opinion how to keep Straits of Malacca safe and clean. In one of the chapters, stated that to solve the complex issues in Malacca Straits need to involve international law jurisdiction and international cooperation especially the main littoral states. Being as the important source of economic not only to the main littoral states but also the other user states, international collaboration to resolve issues should not be complicated to achieve.

5.2 Maj Sharidan bin Nemad RMAF (2010), had also written for his MAFSC Commandant Paper on the topic **“Towards the Five years of Eyes in the Skies (EiS) Operation: The Achievement In Ensuring The Safety And Security In The Straits Of Malacca And Singapore Straits”**, the research had touched into details on the achievement of EiS operation by comparing the piracy and sea robbery activities since before and after MSP was established. This paper also examines in detail on the area that need to be improved such as communication centre and other operators which is MSSP. However he did not discussed on the conduct of the operation and coordination in between air and sea surveillance in case any actual of sea or piracy attack happen or any suspected activity reported by any of the operators, is there any Standard Operating Procedure publish for the crew, or any combine or joint operation instruction made available for the crew, and any exercise conducted in between littoral states and agencies involved to test their readiness and efficiencies in conducting the operation.

5.3 Counter Piracy in the Gulf of Aden.

In 2008, pirate attacks in the Gulf of Aden reached unprecedented dimensions, a total of 135 attacks resulting in the seizing of 44 ships by pirates and more than 600 seafarers being kidnapped and held for ransom. According to a study by Al-Sammarraie and Mohammed (2019), counter-piracy efforts in the Gulf of Aden have involved the deployment of naval forces from various countries, including the United States, United Kingdom, and China have deployed naval ships and/or aircraft to fight piracy in the Gulf of Aden. They formed so-called Internationally Recommended Transit Corridor (IRTC) to allow merchant vessels to transit the Gulf of Aden safely. By grouping merchant shipping by speed, with staggered starting points, the mechanism allows for close monitoring and quicker response by the nearest military ships in case of emergency. However, these operations are required huge and continuous funding and consume a long period of military operation to deploy in Operation area.

CHAPTER 3

RESEARCH METHODOLOGY

This chapter is a detailed description of the steps involved in conducting my research paper which includes research process, data collection and data analysis method.

1. Research process

This research study uses a mixed methods documentary research approach that combines both qualitative and quantitative methods in the analysis of documentary sources, such as scholarly books, published by MIMA, journals and articles from credible sources, SOP of MSP and post flight report by flying squadron under RMAF and academic research and analysis. This approach allows exploring and understanding complex phenomena by triangulating data from different sources and perspectives as secondary sources. Mixed methods documentary research can provide numerous advantages for understanding the Eyes in the Skies operation in Malacca Straits. It is a cost-effective, time-efficient, and non-intrusive research method that can provide objective data and a comprehensive understanding of the operation. It can also draw on a wide range of sources and provide transparency in the research process, making it a valuable tool for policy recommendations.

2. Data collection

Documents used in this study consist of 2 types, CONFIDENTIAL document such as Malacca Straits Patrol Indonesia-Malaysia-Singapore-Thailand Standard Operating Procedures and Post Flight Report from No 20 Squadron and No 1 Squadron as EIS operator for RMAF. Others are open sources from Google Scholar with searching topic of “Eyes in the Skies Operation for Malacca Straits Patrol”. Google Scholar provides access to scholarly articles from a variety of sources, including academic

journals, conference proceedings, and books. These sources are often peer-reviewed, meaning they have been vetted by experts in the field, and can provide reliable and trustworthy information. By using Google Scholar for research on the "Eyes in the Skies" operation in the Malacca Straits can provide with access to reliable and trustworthy information, advanced search features, citation tracking, and free access to many sources.

3. Data analysis

Qualitative data analysis involves examining textual data to identify patterns and themes. In analyze reports and other qualitative data to identify any common themes or issues related to the effectiveness of the operation. Quantitative data analysis involves examining numerical data to identify trends and patterns. In this case, analyze statistics related to piracy incidents before and after the implementation of the Eyes in the Skies operation from year 2000 until year 2022. Once completed analyzed both qualitative and quantitative data, can compare the findings to identify any inconsistencies or discrepancies. The qualitative data shows that the operation is effective by significant decrease in piracy incidents but from qualitative data shows lacks of performance for operations. Further investigate the reasons for this discrepancy by using SWOT / TOWS matrix and Ishikawa Diagram to identify, analyze and develop a comprehensive plan.

The SWOT and TOWS matrix can be a valuable research conceptual framework for improving the Eyes in the Skies operation at Malacca straits against piracy attacks can be highly effective. By considering factors such as collaboration, technology, training, risk management, stakeholder engagement, and ethical implications, develop strategies that address the operation's strengths, weaknesses, opportunities, and threats. The effectiveness of these strategies can then be evaluated, and adjustments made as necessary, to enhance the safety and security of the Malacca straits and the ships passing through it.

CHAPTER 4

RESULTS OF THE DATA ANALYSIS

In this chapter, we will discuss the analysis of ways to enhance the effectiveness of “Eyes in the Sky” operations for RMAF in Malacca Straits against Piracy Attack. To analyze strength and weaknesses of EIS Operation, I conducted an analysis using the theory of SWOT analysis by exploring internal factors and external factors of EIS Operation from the literature review, including various reference sources as mentioned in Chapter 2. SWOT analysis can be called a situation analysis, which is an analysis of strengths and weaknesses. To know ourselves, know the environment clearly and analyze opportunities - obstacles, analyzing various factors both outside and inside the organization. This will help the executives of the organization to know the changes that occur outside the organization, including what has already happened and trends in future changes Including the impact of these changes on the organization, strengths, weaknesses and capabilities that the organization has. This information will be very helpful in determining the vision. An effort by the littoral states to enhance safety and security over the straits must be recognized and become as an example because they put aside their sovereignty issue for the sake of security in the region. RMAF should look into the conduct of the operation and overcome the arising problems for the effectiveness of the MSP. The conduct of the operation also needs to be reviewed accordingly suitable with current environment that evolve based on technology. SWOT analysis and development of strategic planning to enhance effectiveness of EIS Operation using the TOWS Matrix tool should become priority for RMAF to consider as future plan to maintain nation sovereignty.

Table 4-1 Analysis of Strengths and Weaknesses (SWOT) of EIS Operation.

		STRENGTHS	WEAKNESSES
INTERNAL		1. The use of aircraft can improve situational awareness and provide a more comprehensive view of the maritime domain	1. Aircraft used by RMAF are not dedicated Maritime Patrol Aircraft and without special equipment for maritime operation.
		2. Ability of RMAF to provide consistently 2 sortie per week for patrolling operation to enhance surveillance.	2. Lack of communication system within aircraft and others agencies for response chain.
		3. Fast Response times to potential threats or incidents and ensuring quick deployment of resources for effective countermeasures	3. Limited Day time operation only due to lack of Night Vision capability.
		OPPORTUNITIES	THREAT
EXTERNAL		1. MSP operation presents an opportunity for regional collaboration and cooperation among littoral states to enhance effectiveness and resource sharing, thereby improving overall maritime security	1. Limited resources such as technology or competing priorities could impact its long-term viability of operation.
		2. EIS operation able to gathering intelligence information not only for immediate response but also for long-term intelligence gathering and analysis to identifying patterns, trends and potential threats, enabling proactive measures in future.	2. Pirate may develop countermeasures to evade or neutralize the operation's surveillance capabilities by employ advanced stealth technology or use other means to remain undetected.
		3. EIS operation can contribute to enhanced maritime domain in the Malacca Straits, including tracking vessel movements, identifying suspicious activities, and facilitating better coordination with other maritime security stakeholders.	3. Others operational challenges such as limited visibility due to complex geographical features, dense maritime traffic, or the presence of other aircraft in Malacca Straits.

Based on the analysis of EIS Operation using SWOT analysis, strategies can be formulated as guidelines for development and ways forward to improve EIS Operation by using TOWS matrix tool as shown in Table 4-2.

Table 4-2 Development of strategies to enhance effectiveness of EIS Operation using the TOWS Matrix tool.

INTERNAL EXTERNAL	STRENGTHS	WEAKNESSES
OPPORTUNITIES	<p>1. Satellite Surveillance Technology to monitor the movement off all vessels at all time and give real time analysis. (S3 O1 O3)</p>	<p>1. Provide good and compatible Communication Link to enhance awareness and improve the reaction time. (W2, O3)</p>
	<p>2. Involvement of other Subject Matter Expert (SME) for data collection and advice. (S1 O1 O2)</p>	<p>2. Having a proper MPA platform for maritime operation to enhance security status because can increase capability of surveillance. (W1 W3 O2)</p>
THREAT	<p>1. Optimize Resource by combined effort from all agencies that capable is required. (T1 S2 S3)</p>	<p>1. Strengthen cooperation with other agencies to collectively address maritime criminal networks. (W2 T2)</p>
	<p>2. New special SOP for MSP for joint operation involved other agencies to assist in operation. (T3 S1)</p>	<p>2. Seek external support and funding to overcome resource constraints. (W1 T1 T2)</p>

1. Strategic Plans

1.1 Satellite Surveillance Technology. Canada as an example had been used satellite for their maritime surveillance to enhance the security of their territorial waters and EEZ and claimed that the use of satellite is the key factor to Canada's maritime domain awareness. Satellite system which capable to monitor the movement of all vessels at all time and give real time analysis on the behavior of each vessels and subsequently identify the vessels that conduct any suspicious activity. With proper coordination and collaboration with all littoral states satellite that we are having now and, in the future, it is not possible that the satellite surveillance technology will develop and improve our future surveillance method that subsequently enhance the safety and security of our waters and our strategic interests. (S3 O1 O3)

1.2 Government Support. Malaysian government can provide significant support to the EiS operation, enhancing its capabilities and contributing to improved surveillance, security, and law enforcement efforts in the country. The government can establish or enhance existing legal and regulatory frameworks to support the Eyes in the Sky operation. This includes setting guidelines for the operation, ensuring compliance with privacy laws, and defining the roles and responsibilities of the agencies involved. A clear legal framework will provide a solid foundation for the operation and ensure accountability. The government also can allocate funds for the procurement and development of advanced aerial surveillance technologies to enhance the capabilities of the operation and provide better coverage of areas requiring monitoring. (W1 T1 T2)

2. Operational Plans

2.1 Improve Communication Link. Distance from MAA which is at Lumut, Perak to the farthest distance of MSP area is 280nm at Tanjung Piai. EiS aircraft normally does surveillance at 1000ft height. The most effective range for U/VHF for operating height at 1000ft is normally less than 50nm. This is one of the reasons why the communication in between EiS and MAA very bad and difficult to reach. It also recommended that HF radio frequency to be used as a primary means of

communication because HF radio has long distance coverage compared to U/VHF. It is also recommended that the MAA which at present located at Lumut, Perak transferred to in the middle position of Straits of Malacca which is somewhere at Port Klang to Kuala Selangor area. However, the present communication centre in Lumut should maintain to facilitate Navy operation and can be used to support new MAA centre. This is to eliminate the skip zone effect and would enhance the communication in the operation. Another reason why the MAA should be transferred to suggested area because the location of MMEA Quick Reaction Team that will response for interdiction is located at Port Klang area. This will enhance their awareness and improve the reaction time whenever they receive any sighting report from the air and sea surveillance. (W2, O3)

2.2 Proper MPA Platform. The effectiveness and efficiency of maritime operation are depending on technology and equipment that are used during the mission. Previous papers on MSP and EIS suggested that two types of aircraft should be considered to become an MPA platform for RMAF, Ilyushin-II-38 Maritime Patrol and Nimrod MRA4 Maritime Surveillance. However, the price for these two aircrafts and the operating cost are very high. Baharin Mohamad (2013), in his paper suggest CN 235 MPA become the main and only contention for RMAF MPA aircraft due to capable of flying for 7 hours and 1400 NM surveillance is sufficient enough to cover Malacca Straits with low fuel consumption and low operating cost. CN 235 MPA also can be equipped with varieties of armament and self protection system to improve survivability. By having a proper MPA platform for maritime operation, it will definitely enhance the security status over the straits because the number of surveillances can be increased with night mission capability. As what has been mention earlier, previously there is no air night surveillance being carried out due to limitation on aircraft capability, whereas all cases of piracy in the straits happened at night. (W1 W3 O2)

3. Tactical Plans

3.1 Involvement of other Subject Matter Expert (SME). United States and Australia are among the lead country in conducting Maritime Surveillance with advanced technology, including maritime surveillance systems, satellite imagery, and intelligence sharing, to effectively monitor and safeguard their maritime interests. Both of them are using maritime patrol aircraft, AP-3C Orion and the P-8A Poseidon, which are equipped with advanced sensors and surveillance systems. With their expertise and experience in this maritime operation, some collaboration training and meeting with them might strengthen our maritime security. (S1 O1 O2)

3.2 Standard Operating Procedure. After combined effort from all agencies, Special Standard Operating Procedure for joint operation with others littoral states is required to maintain good relationship. At the moment Royal Malaysian Navy (RMN) and MMEA already have joint operating involving ships for coordinated sea patrol especially along Malacca Straits. This joint sea operation should be extended to air operation to maximize the effort with optimization in resources. The models of Navy Air Force Operating Instruction (NAOI) can be used to assists and strengthen the joint operation in between agencies. NAOI is a joint SOP that is used by Air Force and Navy during Maritime Operation that consists of responsibilities, plan of action checklist and so on. With this NAOI, it enhances the communication between the two services and subsequently makes the operation more effective and efficient. (T3 S1)

4. Contingency Plans

4.1 Cooperation with other Agencies. Other than combine effort with MMEA, other agencies that play a vital role in enhancing maritime security are Royal Malaysian Police (RMP), Malaysian Space Agency (MYSA) and Civil Aviation Authority of Malaysia (CAAM). For time being, cooperation within RMAF and other agencies are not as per expected. By cooperate with RMP, can involve sharing intelligence, coordinating surveillance efforts, and conducting joint operations. This collaboration can help align aerial surveillance with ground operations and enhance overall situational awareness. Collaboration with MYSA can explore the use of satellite imagery and remote sensing technologies to augment the "Eyes in the Sky" operation.

Sharing satellite data, expertise, and research collaboration can enhance the accuracy and coverage of surveillance efforts. Lastly the CAAM oversees civil aviation in Malaysia and can provide valuable information and expertise regarding air traffic management and flight regulations. Collaborating with the CAAM can help ensure seamless integration of aerial surveillance operations with civilian air traffic, reducing any potential conflicts or disruptions. (W2 T2 T3)

4.2 Optimize Resource. Malaysian Maritime Enforcement Agency (MMEA) is equipped with air assets consist of Bombardier CL 415 MP and AS 365 N3 Dauphin. For effective and efficient safety and security enforcement over the straits, a combined effort from all agencies that capable are required. To safeguard the whole stretch of the Malacca Straits 24/7 is not an easy job. With limited resources on ship, aircraft and interdiction boat restrict the capabilities. This is why the idea of combined effort to optimize the resources comes into play. (T1 S2 S3)

A TOWS analysis can be helpful for the Eyes in the Sky Operation by providing a systematic approach to understanding its internal and external factors. By examining the strengths, weaknesses, opportunities, and threats, the analysis can yield several benefits. Overall, the TOWS matrix provides a structured framework for understanding the internal and external factors affecting the Eyes in the Sky Operation. It assists in strategy formulation, risk management, resource allocation, and enhancing the operation's competitive advantage.

CHAPTER 5

CONCLUSION, DISCUSSION AND RECOMMENDATION

1. Conclusion

Communication in between the MAA, Eis and MSSP still become major issue that has been solved since it was established. Furthermore, improper platform used for air maritime operation had caused the operation become inefficient and ineffective as expected. From this study it has been determined that there are no developments in term of assets and operational conduct in ensuring the effectiveness of MSP operation and also the challenges faced by the operating crew.

Even though it was claimed that the MSP under 4 littoral states combined operation had contributed to a significant value of success in providing security and safety to the Malacca Straits users, the theory by some analysis saying that it may also due to the tsunami cannot be ignored. If it is true, the pattern of piracy and sea robbery will come back as what it was in 2004 and earlier. This can be seen from the gradual increment in piracy activities especially in the Straits of Singapore and along the coast line of Sumatera. A few cases were also happened in the Straits of Malacca involving Malaysian fisherman. From the reported cases, MMEA unable to catch the pirates because they had left the scene once the enforcement team arrived. It shows that the reaction time taken by the enforcement agency to reach the victims is not encouraging. So, without any proper assets such as MPA aircraft, interdiction boats, asset development or enhancement, action to overcome the previous problem and challenges, the status of safety and security over Malacca Straits can be maintained in the future is questionable.

2. Discussion

The results of the analysis of data from literature reviews using SWOT Analysis and TOWS Matrix tools to determine guidelines to enhance the effectiveness of "Eyes in the Sky" Operations for RMAF in Malacca Straits against piracy attack found that proactive strategies can be formulated and consistent with theories mentioned in Chapter 2.

2.1 Objective 1: To identify effectiveness and weaknesses of "Eyes in the Sky" operation. From SWOT Analysis Table 4-1 shown the strength and also weaknesses from conducting of EiS Operation. The first objective was met by identify in this table. However, from this finding, furthermore will use as datum to propose the way to improve or enhance the EiS Operation for future benefit safety and security over Malacca Strait. From literature review, mainly strength from this operation is the reducing number of piracy cases since EiS begin in 2005, but all EiS operation was conducted during day time only and all reported piracy cases was during night. This shown the operation time of Surveillance Aircraft will play importance role to further reduce the piracy cases if able to operate during night with dedicated Maritime Patrol Aircraft.

2.2 Objective 2: To purpose ways to improve effectiveness of "Eyes in the Sky" operation. Effective planning is the foundation of any successful operations. For strategies to improve EiS operation from TOWS matrix, the four major types of plans include strategic, operational, tactical, and contingency. Strategic planning is the foundation of an organization. Essentially, strategic plans dictate the important decisions made within an organization. Strategic plans can have scopes that range from three years to ten years. These plans include the organization's mission, values, and vision. A good strategic plan always considers things in the long-term and remembers the big picture. Using **Satellite Surveillance Technology** and **Government Support** is considering a long-term strategy and need a proper research and planning. Operational planning can be ongoing and usually created for a specific event that will only occur once, such as **Proper MPA Platform** and **Improve Communication Link**. This procurement is a primary requirement for current situation to increase capability and effectiveness of EiS as mention before. Tactical

planning is within operator and is supportive of the strategic plan. It involves the **SME** and **SOP** that will be used to execute the strategic plan. Within a tactical plan, there are specific questions that need to be answered about what it will take to accomplish the goals set in the strategic plan; the most important question being how the RMAF will accomplish the mission. This type of planning is very focused and short-term. Tactical plans are sometimes flexible and often break the strategy down into several parts and assign actionable tasks to each part. A contingency plan is created for when the unexpected occurs or a major change needs to be made in order to continue towards the goal. Not every change can be anticipated which is why it's imperative to have a contingency plan in place. Involvement from other agencies and cooperation is the fastest and easiest way to increase strength of MSP in short period of time.

Finally, this paper has met the objectives to identify effectiveness, weaknesses and improvement that have been made on the operational conduct after 18 years of operation especially after a few recommendations that were given by others writers from previous papers on EIS regardless of the achievement or success of the operation. The primary improvement that needs to be done is to enhance the assets capability of sea, air and communication link in between the MSP members.

3. Recommendations

3.1 Recommendation to Enhance EIS Operation

From all eight analysis to enhance EIS operation as per chapter 4 according TOWS matrix, my recommendation is to purchase new MPA to replace C130 and CN235 for Maritime Surveillance under EIS operation due to capability and limitation of the aircraft in carried out surveillance duties is a top priority to improve the effectiveness Eyes in the Sky Operation for RMAF in Malacca Straits against piracy attack. New MPA aircraft able to eliminate most of the weaknesses and threat of EIS Operation such as equipped with special maritime equipment, able to operate day and night, having a good and new technology communication system, and countermeasures and self defense system for self protection.

3.2 Recommendation for further research

For future research and analysis related to the Eyes in the Sky operation could emphasis or examine on this following area:

3.2.1 Further study on Satellite Surveillance with High-resolution satellite imagery and advanced satellite communication systems in monitoring maritime activities.

3.2.2 Proper MPA Platform for RMAF maritime surveillance and EIS Operations for effectiveness and efficiency of Maritime Security.

3.2.3 New advance technology in maritime surveillance.

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