Role of the Unmanned Aircraft Systems in Maritime Security

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Abstract

Maritime Security is one of the key international issues. Nowadays, the threats such as illegal immigrations, terrorist activities, piracy make maritime environment less secure. Thus, States which have maritime boundaries face an increasing challenge of constituting the maritime domain awareness effectively. At this juncture, the importance of maritime patrolling and aerial maritime surveillance come on the scene. On the other hand, Unmanned Aircraft Systems (UAS), with their many key advantages, increasingly fill in very important gap in military operations requirements. Therefore, this paper argues that the UAS could be one of the most important instruments for maintaining effective maritime surveillance.

Keywords: Maritime Security; Unmanned Aerial Systems; Maritime Situational Awareness.

1. Introduction

Maritime security has been one of the widely spoken topics both in military environment and among scholars in recent years. The main reason of this situation is that all nations, no matter whether they have sea border or not, depend on a secure maritime environment for their safety and welfare. But, in particular, nations which have maritime boundaries and their navies, face a challenge of eliminating the threats which have potential to affect the freedom of the seas, commercial activities, security of energy lines.

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This increasing threat perception regarding maritime security is an issue related to changing security understanding. Within this respect, it is key to make a comparison of security understanding between during and after Cold War era. Some scholars argue that there was much more secure maritime environment during the Cold War era because there was a bipolar word system and the threats were mostly stemming from opposite polar. However, fall of the Berlin Wall in 1989 brought about new threats to all nations. This also caused a change in security understanding which is different from the conventional one [1]. This argument is clearly observable. For instance, it is possible to see reflections of this understanding on the NATO Documents. In particular, those published lately describe a new security environment and they counted new emerged threats as international terrorism, proliferation of weapons of mass destruction (WMD) material and technology in maritime environment, the illegal movement of drugs, human beings and arms as well as the growing flow of illegal immigrants, the dramatic upsurge in incidents of piracy and armed robber marine pollution illegal fishing and overfishing [2]. In relation with changing security understanding, how to tackle with new emerged threats is one of key issues. Today, in the context of building a secure maritime environment, all relevant parts, i.e. states, regional organizations, international organizations etc. Face a challenge of constituting the Maritime Situational Awareness (MSA) effectively. In this regard, at the national level, naval forces play a key role. In addition to their role in conventional and regional conflicts, they increasingly face with non-traditional challenges. Therefore, it is worth to ask the question of how today's Naval Forces, which have been designed and equipped against conventional threats, would overcome with new challenges.

In this sense, the study will discuss navies' role in maritime security and Unmanned Aerial Systems (UAS) together by arguing that UAS could currently play a complementary role for Naval Forces to establish the MSA and in the foreseeable future, it would be an indispensable tool for maritime security. For this reason, we first begin with a brief conceptual overview of maritime security. Afterwards, we will try to indicate who is doing what for maritime security both institutionally and militarily. Finally, we will analyze the probable role UAS in aerial maritime surveillance missions which aim to increase security of maritime environment.

2. Conceptual Overview of Maritime Security

In the post-Cold War era, security became a widening concept which covers various areas such as national security, economy, environment, human security. Within the context of the new security understanding, maritime security has not only gained importance but also became more apparent comparing with situation during Cold War era. New threat and risks at seas caused to increase situational awareness in maritime environment. This situation at the same time paves the way to emerge new navy strategies which deal with how to prevent new risks from affecting national security. From the perspective of wider security understanding, in economic thinking, it was established a direct link between maritime security and economic development. This is a direct result of importance of oceans for trade among the nations. From the perspective of human security, maritime security became vital for preventive actions of crimes on seas. In particular, human trafficking today poses great risk for human life. Given risks that may cause environmental disasters on sea, it is worth noting that maritime security is an issue which covers preventive measures against environmental risks.

Today, in widening security concepts, it is possible to find different conceptual description regarding maritime

security. One of existing description of maritime security is based on the idea that maritime security is the activities protecting stability of international system against risks or threats on, over, under and from the sea. This approach is mostly assessed as vague [3]. Alternatively, US National Strategy for Maritime Security Document has very comprehensive approach toward maritime security. It clearly counts threats such as piracy, terrorism, weapons proliferation, drug trafficking and other illicit activities on sea and stress achievement of the objectives such as protecting homeland, enhancing global security, and securing freedom of navigation while maintaining secured maritime environment [4, 5].

In conceptual thinking, diversity in the descriptions of maritime security is a result of differing geographical conditions and dependencies levels on sea or oceans. However, the approach which is widely expressed is that maritime security cannot be achieved without government intervention. Identifying threats ahead of time and taking necessary action are key responsibility of the governments; at that point, in order to respond to real and potential threats quickly, it should be underlined importance the comprehensive surveillance over all waters under national jurisdiction [6].

3. Who Is Doing What for Maritime Securıty?

In order to increase situational awareness for new emerged risks and to see their reflections on maritime security, at the strategic level, international organizations are the important players. Particularly, their strategy plans fill important gap in strategic planning activities.

NATO, as the most important security organization, accepted a strategy document in January 2011. The strategy which covers maritime security is the most important part of core tasks of NATO. It was aimed at resolving critical maritime security challenges. It was also emphasized alliance's commitment both to protect crucial sea lines of communication and to secure freedom of navigation. In general, it can be assessed that NATO priorities Maritime security. This is clearly observable at NATO's maritime forces exercises, training, cooperation between NATO and other key international actors in the maritime domain like European Union and United Nations [7]. European Union (EU), another important organization, adopted Maritime Security Strategy (EUMSS) on 24 June 2014. This strategy posed one of the important EU's response to modern risks and threats to global maritime security. The Strategy which was developed collectively by the Council, Member States, Commission and High Representative provides a collective framework for authorities regarding how to protect EU's maritime interests. On the other hand, it aims to make coordination and consistency among diversified specific policies and strategies which consolidates and secures the connection between EU maritime security policy and external maritime security policy [8,20,21].

In the context of maintaining maritime security in the field, the most important players are naval forces. They are primary actors in sea as security providers. They also play key role in collecting data in addition to demonstrating deterrent existence. Their role in collecting data is indispensable for constituting permanent situational awareness. Hence, determination of core capability requirements for Navies gains importance both at national and international levels**.**

4. Core Capability Requirements

Navies play key role in ensuring and maintaining maritime security in terms of their effectiveness in increasing awareness in maritime environment and maritime security operations. That is why they are given "deterrence" role. Their Intelligence, Surveillance and Reconnaissance (ISR) capability are indispensable part of their deterrence role. Navy should provide with ISR services not only for littoral purposes but also for open seas. Therefore, examining general and basic ISR architecture would be helpful to understand how Navies provide ISR services in best way.

In today's ISR architecture, ISR enablers can be divided in three categories as shown on Figure-1, in terms of what assets are used to gather ISR information. From bottom to top, the first level covers the ground-based sensors and ship borne sensors and this level represent traditional way and include cheapest assets. The second level covers the aerial based assets. These can be seen very cost-effective because they provide the line of sight (LOS) of higher altitude and their cost is relatively lower. The third level covers the space satellites. The most advantages aspect of these assets is their advanced sensor capability. They also have invulnerability to any adversary attacks [9].
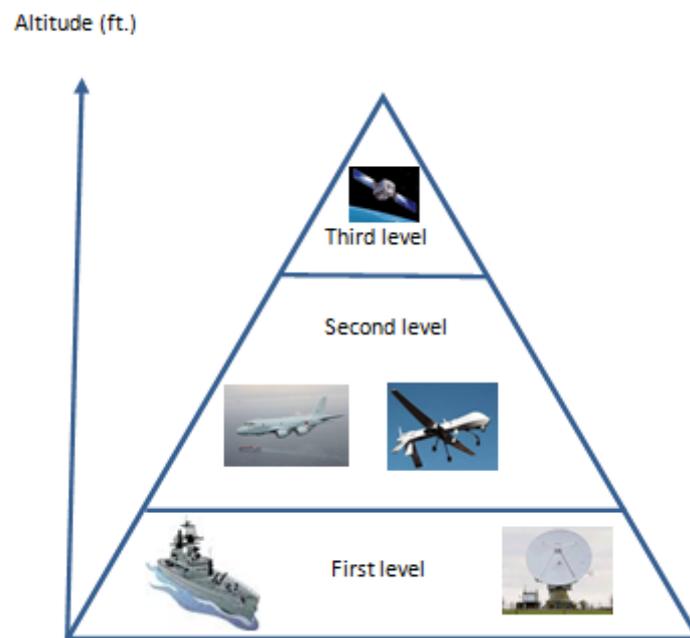

Figure 1: A Comparison of ISR Enablers.

In term of advantages and disadvantages of levels above mentioned, it can be said that assets on second levels have substantial advantages comparing with the assets on other levels. Because, the aerial based assets are very rapidly and flexibly deployable assets. It is also difficult to predict their deployment plans and flight patterns. Thus, they can conceal themselves from observation effectively [10]. However, the ground-based sensors and ship borne sensors at the first level have some disadvantages in term of their effectiveness regarding range, blind sectors and tracking a target. They are also under greater threat of hostile environment. In a similar way,

satellites on third levels, in spite of being very effective seemingly, are not widespread and ubiquitous. They also lack the loitering capability of UAS and only pass over the same spot on Earth about once every three days [9]. Moreover, satellite technology is very expensive in comparing other assets. Thus, it is widely believed that satellite solutions represent a Cold War approach to military reconnaissance [11]. Therefore, aerial based ISR enablers on second level, in particular the UAS, should be seen an important asset for ensuring the MSA effectively. At that point, the question is which assets (manned airborne vehicles or unmanned aerial vehicles) should be used by navies to produce more effective results for maritime security.

5. Implication of UAS for Maritime Security

UAS [15,16,19] which is placed at second level should be considered more advantages assets over manned assets given their operational effectiveness, cost, keeping risk of personnel and assets in hostile environment. In a similar way, composing a small fleet of unmanned air vehicles is the best solution for increasing the effectiveness of aerial maritime surveillance. These arguments can be supported by pointing much technical superiority of UAS.

First, UAS is a relatively new means for providing real-time intelligence to combat illegal activity along the sea borders and open seas. Almost all UAS is able to carry either an IR or an EO camera or both. They can also transmit real-time images to its ground operators. For this reason, they are widely deemed as a force multiplier for Naval Forces with their ISR capacities for detecting, disrupting, and dismantling unlawful activities over borders. The famous saying that "UAS are better suited for dull, dirty, or dangerous missions than manned aircraft" should be assessed within this context [12].

Second, Unmanned Systems Integrated Roadmap (2009-2034) of US DoD presents wider perspective for superiority of UAS. The most important point which is emphasized in this document is that UAS are highly desired by commanders due to their versatility and persistence. This demand is also result of the fact that ISR remains the number one priority for commanders [13]. This point of view is valid for Navy commanders who are supposed to constitute MSA. UAS can fly longer hours than any manned aerial vehicles. This provide a great advantages to navy commanders while gathering information about activities on sea and along borders and building a coherent MSA. Given a requirement of collaborating of large number of sensor systems in a systematic way, UAS made great contribution in ISR architecture with their endurance sensor diversity. Third, in terms of cost-effectiveness, the UASs are not strictly comparable to some manned vehicle due to the large differences in capabilities of the platforms. However, it is clear that producing UAS can be cheaper than adding to existing inventories of sophisticated aircraft. Their increased survivability and performance (maneuverability) is another factor reducing cost. Consequently, there is a common agreement that the cost of UAV operations in the same role as manned aircraft is less [14].

In addition to UAS's cost effectiveness, their operational usage for maritime security should be analyzed. Within this context, UAS can be divided into three categories by taking into consideration various factors such as mission requirements, flight characteristic and costs. These categories are; strategic level, operational level and tactical Level. At the strategic level, Navies can develop high altitude long endurance programs for the

purpose of ensuring maritime security in high seas by using UAS, For instance, Global Hawk, Phantom Eye, Global Observer are used at strategic level which covers broader area operations.

At the operational level, navies can use UAS for ISR missions from sea border to exclusive economic zone and ground based operation. The UASs such as Anka, Reaper, and Heron can be considered within this context. As for the tactical level, fixed wing UAS like Scan Eagle and rotary wing UAS like Camcopter provides solution for navies during their maritime operations both from ships and lands. For example, Italian Navy used a Camcopter UAS as a tool for its immigrant rescue operations. Therefore, UAS provide very comprehensive solutions with full-motion video and radar pictures which are key for ISR missions, and establishing and protecting MSA as part of maritime security aims [18].

5. Conclusion

Maritime Security is one of the key international issues that should be dealt with not only at national level but also at international level. During the post-Cold War period, ongoing attempts of nations and all relevant international organizations such as UN, EU and NATO to bring the issue on the agenda of international community by publishing strategy documents is a result of this situation. Within this context, Navies, as key players on the field, faces a challenge of developing core capability requirements to be able to increase situational awareness in maritime environment.

In this sense, the importance of ISR capability provided by UAS should be underlined because of both its cost-effectiveness and sensor capacities. In recent years, UAS has been widely used for ISR missions not only in peace time missions but also in real operations. It has been established a direct relation UAS and ISR capability. Even so, ISR term started to be used a synonym for UAS [17]. Consequently, UAS should be considered as alternative ISR capability that Naval Forces employ while maintaining maritime situational awareness. This article predicts that UAS will succeed in manned aircrafts in foreseeable future. For this reason, Naval Forces must heed to go in right direction by investing more on UAS. Currently, UAS are able to play a complementary role for Navies to establish the maritime situational awareness. However, in the near future, UAS will be an indispensable tool for maritime security.

6. Limitations

The limitations in the research process is explained as followings.

(a) There are very limited documents regarding the concepts of UASs in literature.

(b) The information on how to use UASs and the lessons learned from operational usage of UAS's are mostly classified by governmental and military organizations.

7. Recommendations

UASs should be seen as indispensible tools of modern warfare. In particular, Decision makers in Navies should

consider UAS as one of the most important instruments in thier attempts to increase situational awareness in maritime domain and invest more resources in development of UASs.

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