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Original article

The Utilisation of Pisang Island as a Platform to Support the Current Safety and Security Needs of Marine Navigation in the Straits of Malacca ☆

Ahmad Faizal AHMAD FUAD [a*], Mohd Sharifuddin AHMAD [b], Mohd Naim FADZIL[c], and Noor Apandi OSNIN [d]

[a*] Nautical Science and Maritime Transportation Program, Universiti Malaysia Terengganu, Malaysia, afaf@umt.edu.my, Corresponding Author

[b] School of Business and Maritime Management, Universiti Malaysia Terengganu, Malaysia, mohdsharifuddin@umt.edu.my

[c] Nautical Science and Maritime Transportation Program, Universiti Malaysia Terengganu, Malaysia, apandi@umt.edu.my

[d] Nautical Science and Maritime Transportation Program, Universiti Malaysia Terengganu, Terengganu, Malaysia, m.naim@umt.edu.my

Abstract

Current marine navigational practice relies less on long-range visual marine signals such as lighthouses for reference purposes. This is due to the availability of Global Navigation Satellite Systems (GNSS), which are integrated with other navigational aids on ships. Therefore, the objective of this study is to review the function of Pisang Island lighthouse and to propose the most relevant use of Pisang Island for current navigational needs. The function of the lighthouse was reviewed according to the IALA Navigational Guide and the AIS data image. The result showed that the most suitable navigational use of the lighthouse is to act as a reference for Line of Position (LOP). The AIS data image indicated that mariners are not using Pisang Island lighthouse for LOP. The trend in the Straits of Malacca (SoM) was compared with the trend in the Straits of Dover, UK. The selected experts verified that LOP was not practised there. As a specific example, a tanker ship route in the South China Sea was used to further support that LOP was not practised. This evidence supported the view that Pisang Island lighthouse is less relevant for current navigational practice and does not directly support the coastal state VTS operation and the establishment of the marine electronic highway. Furthermore, the existing shore-based VTS radar has limitations on range and the detection of targets near Pisang Island. Therefore, this study proposes the establishment of a new radar station on Pisang Island at the existing site of the lighthouse. The proposed new radar station on Pisang Island will add to the existing coverage of the VTS radar, bridging the coverage gaps to overcome the weakness of the existing shore-based radar and improve the safety and security of marine navigation in the SoM.

Keywords: lighthouse, marine, navigation, safety

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1. Background

Islands have been used as a base to establish facilities to support maritime operations. Japan established a military radar facility on Yonaguni Island in March 2016 as a monitoring station in East China Sea to increase its military presence over there (Lewis, 2016). The island is part of a chain of islands disputed between Japan and China. In 2014, India planned to establish a radar station at Narcondam Island, which is part of the Andaman and Nicobar groups of Islands for security and surveillance measures. The island is significantly important due its location near the Malacca Straits, which provides the ability to monitor the movement of all vessels to and from the Indian Ocean through the Malacca Straits (Vasan, 2014). The island would also enable India to monitor the Chinese naval activity in the North Andaman Sea and around Coco Islands. China built a military base in December 2016 on an artificial island reclaimed on Fiery Cross reef, which is part of the disputed Spratly Island archipelago (Buckley, 2016; Hunt, 2015). The facilities at the base are harbours, runways, and hangars. The purpose of the base is to support China's operations and claims over the Spratly Islands.

This study is about Pisang Island, which is one of a Malaysian islands at the southern part of the Straits of Malacca (SoM). The importance of Pisang Island to marine navigation was identified by the British colonial government in the mid-19th century upon charting the straits and using the island to mark a hazard (Yong, 2008). The SoM became more important upon the completion of the Suez Canal, where it formed part of the shortest shipping route from west to east. A 16-metre-high cylindrical iron tower lighthouse was established on the highest point on the island in 1914. The current lighthouse's solar powered lighting system produces a luminous range of 21 nm (Yong, 2008).

2. Problem Statement and Objective

Currently, long range visual marine AtoNs such as lighthouses are less important for marine navigation, as shown in the UK. The UK 2010 marine AtoNs review resulted in the decommissioning of 20 lighthouses and another 14 lighthouses were transferred to local authorities (ATKINS Ltd, 2010). The Review by the General Lighthouse Authority UK between 2010 to 2015 resulted in the following: 41 lighthouses reduced luminous range, 6 lighthouses discontinued operation, 14 lighthouses were transferred to local authorities, 1 lighthouse was replaced with a Port Entry Light, 1 lighthouse reduced fog signal range, 1 lighthouse was fitted with an Automatic Identification System (AIS), and the remaining 76 lighthouses were unchanged (Commissioners of Northern Lighthouses, Trinity House, & Commissioners of Irish Lights, 2010). Most of the 76 unchanged lighthouses have a range of light below 18 nm, which was previously reviewed between 2005 and 2009. The results of these reviews showed the trend of mariners to depend less on lighthouses due to a higher reliance on GNSS. This long-range marine signal form is not required anymore and has thus resulted in the reduction the light range of lighthouses and even the discontinuation of their operation.

With respect to the current trend in marine navigation, Pisang Island lighthouse remains operational by providing a long-range marine signal, which is not required by current navigation practice. Hitherto, no review of the operation of Pisang Island lighthouse has been performed with respect to current navigational needs such as supporting the operation of Vessel Traffic Services (VTS) and the marine electronic highway to ensure the safety and security of navigation in the SoM. Therefore, the current study addresses this issue by examining the function of Pisang Island lighthouse and identifying more relevant AtoNs with current marine navigation practice to support the safety and security of marine navigation in the SoM.

3. The Function of Pisang Island Lighthouse

This section examines the function of Pisang Island lighthouse. A lighthouse is generally considered to be a large conspicuous structure (visual mark) on land, close to the shoreline or in the water that acts as a daymark; it provides a platform generally for higher range marine AtoN signal lights (IALA, 2014). The purpose of a lighthouse is to perform one or more the following functions; mark a landfall position; mark an obstruction or a danger; indicate the lateral limits of a channel or navigable waterway; indicate a turning point or a junction in a waterway; mark the entrance of a Traffic Separation Scheme (TSS); form part of a leading (range) line; mark an area; and to provide a reference for