Malaysian Maritime Enforcement Agency

Malaysia

Verification Survey with the Private Sector for Disseminating Japanese Technologies for Vessel Mounted 24-Hours Operational Camera Surveillance System for Reinforcement of Maritime Security

Report Summary

December 2016

Japan International Cooperation Agency

KSK Corporation

INDEX

1. Background

Including the Malacca Straits, Malaysia has vast international sea routes which are used by international vessels of many countries including Japan. Therefore, the maritime related industry is one of the key industries for Malaysia. MMEA mentions about 70,000 merchant ships a year passing the Malacca straits, which consists one fifth of the world's sea cargos. However, the number of illegal fishing by foreign fisherman, marine accident, smuggling, piracy, sea robbery, human trafficking and other criminal activities is increasing.

Because of the above situation, in 2005 MMEA was newly established by Malaysia government in order to make unitary management and handling of related duties which had been taken under the Marine Police, Immigration Department and so on. Moreover, the Japanese government has continues cooperation, such as technical cooperation projects by JICA, for Malaysian maritime safety. However, according to the International Maritime Bureau (IMB), more than 260 incidents of piracy took place in Malacca Straits from 2002 onward, and it is still necessary to enhance measures to secure the peace and safety of the Straits of Malacca. Maritime security enhancement is one of the practical measures against these problems. Although, lots of ships cruise in the Malacca Straits even at night, MMEA's patrol ships are not equipped with infrared cameras with stabilizer device for night recording purposes. Recording by infrared camera will enable patrol ships to capture ships image clearly and will highly contribute to criminal investigation and exposure. MMEA has large expectations for more practical control by the cooperation between the radar monitoring network in the coastal area of Eastern Malaysia and this vessel mounted camera surveillance system.

In the Survey, the effectiveness and feasibility will be examined by installation of the infrared camera with stabilizer to the MMEA's vessel through cooperation to strengthen Malaysian's maritime security.

2. Outline of the Verification & Disseminating Survey

(1) Purpose

The study aimed to verify effectiveness of the Products through practical work of the patrol vessel with the camera system,to show an effective night patrol model with using the Products and to explore future promotion of the Products through MMEA's understanding of its effectiveness.

(2) Activities

① Determine Specification and Detailed Design (February 2015 ~ April 2015)

- To propose the system specification from KSK Corporation (hereinafter referred to as " KSK ") to MMEA.
- To determine the system specification taking account of opinions of MMEA and the JICA's technical Cooperation Projects for MMEA.

・ To obtain approval from MMEA regarding rack-design, lay out of cabin console, wiring, connection to GPS. Work order and furnishing schedule will be determined upon meeting with MMEA and Malaysian local shipping yard.

② Place order, Procurement and Inception (May 2015 ~ November 2015)

・ To assemble components to the system at the stabilizer manufactured and examine its performance.

・ To undertake consignment inspection upon debug, alignment and environment endurance test.

※ Stabilizer and infrared camera will be combined in Japan.

※ Export procedures will be conducted complying with the export control order upon assessment by the International Trade Control Department of METI with the letter form MMEA which attests that the system is solely used for maritime safety and not for military use.

③ Conduct Training activity in Japan (April 2015 & November 2015)

・ To train in Japan twice as follows;

1st Training (April 2015)

Participants:	3 MMEA Personnel
Contents:	Promote understanding over vessel mounted surveillance camera system and its effectiveness. (7 days)
	・Specification
	・Install and fabrication work Explanation
	・Visit Japan Coast Guard
	・Stabilizer Manufacturer factory visit and Training
	・Specification Confirmation & Discussion

2nd Training (November 2015)

Participants:	4 MMEA Personnel
Contents:	Promote acquaintance with the system operation, maintenance, install work.
	・Specification
	・Stabilizer factory visits and system operational training
	・System operation and Maintenance Training
	・Vessel work and install work explanation

④ System installation and Mounting by MMEA (December 2015 ~ February 2016)

[Shipyard Works before Installation]

- To furnish with the shipyard working environment, of the vessel of MMEA under Japanese engineer Mr. Sanin's leadership
- Furnishing activity includes stabilizer rack design, production and furnishing, wiring and control consoles' furnishing in the cabin.

[System Installation]

- To bring the camera system and the stabilizer with infrared camera into the shipping yard and install it in the vessel.
- To execute wiring work of the cabin.

[Trial voyage, Operation explanation]

- To inspect the camera system
- To perform trial operation by ocean.
- To hold a seminar to explain to MMEA operational procedures.
- To prepare a set of complete books in English including instruction manuals and hand over to MMEA.

⑤ Verification at Malacca Straits (March 2016 ~ August 2016)

- To conduct the vessel mounted surveillance system's operational test at the Malacca Straits.
- To examine for 6 months its operability and admissibility of evidences collected with the system regarding subject visibility, time and location identity and recording.

<u>Quantitative Analysis</u>

- ✓ Number of voyages
- ✓ Camera operating time duration
- ✓ Number of Camera Operating Personnel
- ✓ Number of Monitored Vessels (by area)
- ✓ Number of Inspected Vessels

<u>Qualitative Analysis</u>

There are qualitative differences compared to naked eye based patrol activities for following parameters.

- ✓ Inspected vessels detailed information (Wide-range supervision)
- ✓ Possibility of apprehension (distance and day/nighttime difference)
- ✓ Competency of evidence(Visual recording, location identification with GPS)
- ✓ Information sharing (information share by more than one staff)

※ Monthly analysis will be carried out based on discussion with MMEA's personnel of patrol vessels, regarding clear analysis of elements, recognition of operational challenge and possible solutions. Permission shall be granted to the boarding of KSK, JICA and study team to share the on-site information appropriately.

※ Analysis results will be presented to vessel captain, chief engineer, patrol and operational chief to discuss tested results and solution of identified issues. A reporting session will be held at the end of the test period to present findings to HQ's Administrators including Head of Agency, Head of Patrol Department, and Supervision Department.

⑥ Dissemination (July 2016 ~ October 2016)

- To hold seminars to present survey outcomes to related agencies such as custom, maritime, police and other law enforcement agencies. Other ministries and law-enforcement agencies will also be invited for the seminar to promote effectiveness of vessel mounted surveillance system. If available, Japanese government agencies and representatives, JICA, JETRO and Embassy will also be invited.
- To present a nighttime patrol model stemmed with vessel loaded surveillance camera system based on data collected through this survey and market research conducted in previous activity.
- To examine business strategy of surveillance camera in Malaysia. Business plan of the product including marketability, structure, market, budget scale and preposition of products.
- To do inquiring survey to MMEA regarding night-time patrol policy and conduct hearing to other law-enforcement agencies where needed.
- To research Malaysia's demand for maritime security control system and market outsets by researching companies.

(3) Product/Technology Provided

Vessel mounted 24-hour operational camera surveillance system for reinforcement of maritime security has functions as follows.

Stabilizers; to counteract the motion and vibration of the vessel at sea. The stabilizer will be set up on the deck with the Infrared camera housed inside.

Control unit: to control the IR camera and to swivel the stabilizer in the direction of the target.

Superposition system: to superpose GPS (Global Positioning System) information such as the time and location of the vessel with the captured IT images.

Monitoring display: to display IT images and other information describes above.

Recording: to Record the necessary information during the 24-hour surveillance.

Table 1 Product Specification

Title	**Vessel Mounted Camera Surveillance System**	
Specification		
Weight	Deck：less than 50kg（including mount） Cabin：less than 80kg	
2-axis Stabilizer (including window)	Stabilization to correct swing by wave and vibration from vessel	
	spatial stability (condition ： ± 15 ° [4sec. cycle])	pitch direction：less than±0.1° yaw direction：less than ±0.1°
	scope of swivel	pitch direction: over －30° ～＋10° yaw direction ：over ±150°
Uncooled Infrared Camera Infrared Camera （all-in one type）	Camera: Visualization of thermal emission from objects number of pixel：640×480 pixels（300 K pixels） response for wavelength：8～16 μ m frame rate：30 Hz（NTSC)	
	Lens: focal length：25 mm～150 mm (zoom lens)	
Operation Unit	System operation with touch panel Remote operation of stabilizer and lens : operation of stabilizer, adjustment of camera image, dimmer adjustment for switches	
Information Superimposition Unit	Display of location of vessel,direction of stem,day/time and camera direction on monitor	
Recording unit	Recording of camera image and related information	
Display Unit	Output of camera image superimposed pixel：1024 × 768	
Feature	The system can detect the target even in tight sea condition by using 2- axis stabilizer. 24- hour surveillance can be achieved by using Uncooled Infrared Camera because of thermal visualization for the target. KSK will adopt 150 mm zoom lens instead of 100mm fixed lens because of emphasizing night surveillance. Therefore Auto tracking system can’t be used by changing of zooming ratio and has been excluded under MMEA’s approval.	
Product Superiority	The KSK’s system allows wider monitoring than CCD camera by using infrared camera. Crews can control the camera system from the cabin without exposing to danger. Infrared camera with 150 mm zoom lens has the maximum level of	

	capability of similar stabilizer mounted camera system. KSK original, Drift calibration system adjusts system stability by censoring ambient temperature to capture clear images in tropical, climate like Malaysia.
Sales Track Record	KSK has installed more than 300 systems including car-mounted and fixed system since 1994. The company has installed vessels owned by Japan Customs, Japan Coast Guard, Fishery Agency and regional governments' fishing monitor vessels. In particular, the KSK system has more than 90% share of Japan Coast Guard's patrolling vessels' camera system.
Measurement	On deck: W360 mm, H480 mm, D350 mm In cabin: W550 mm, H124 0mm, D540 mm
Installation Location	KM Marline belonging to MMEA at Lumut port
Number of System Installed	1 unit
Price	JPY 50,000,000 (including install work)

(4) Counterpart organization

Malaysian Side : MMEA (Malaysian Maritime Enforcement Agency)

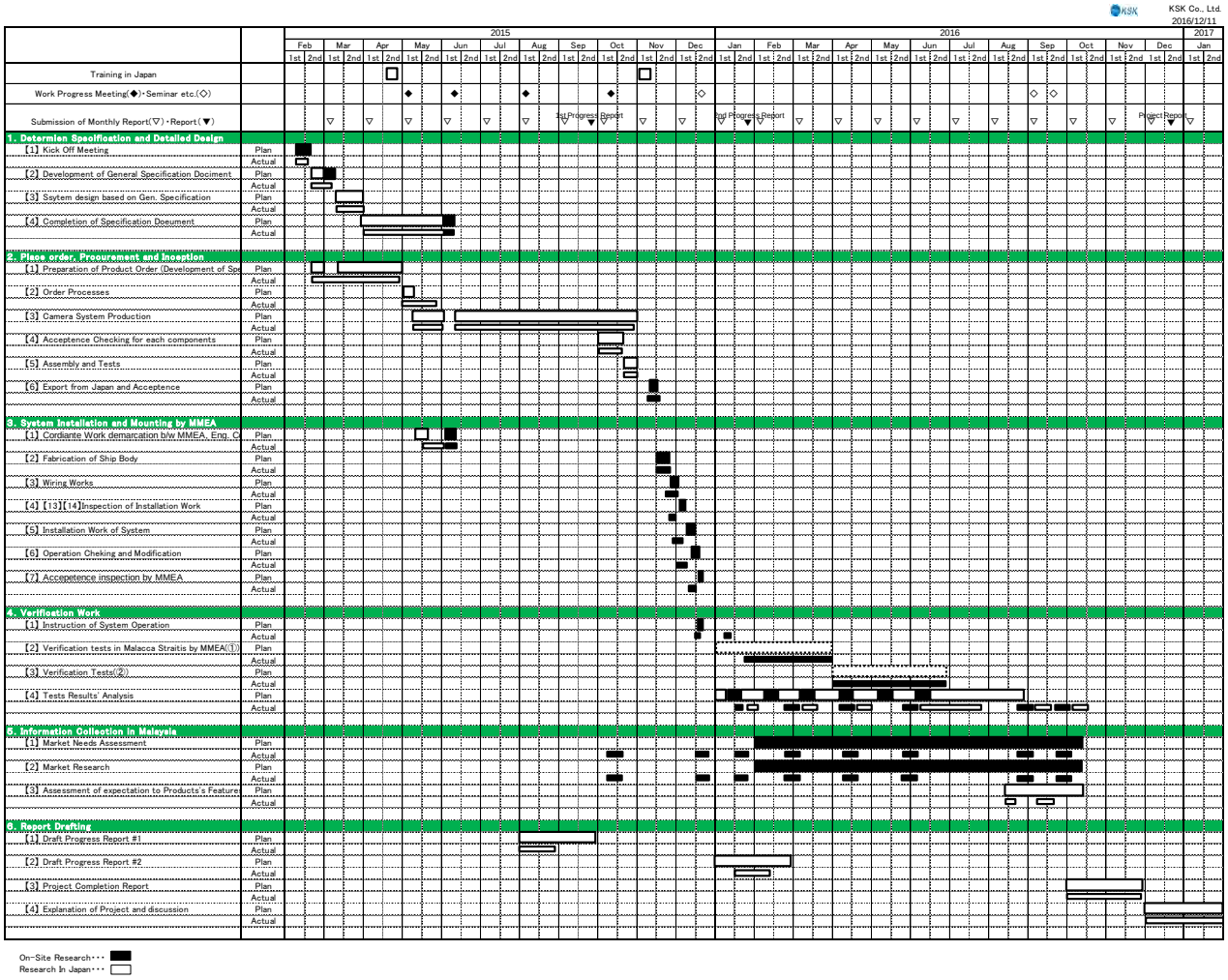
(5) Target Area and Beneficiaries

Target Area : The Straits of Malacca and coastal area in Malaysia

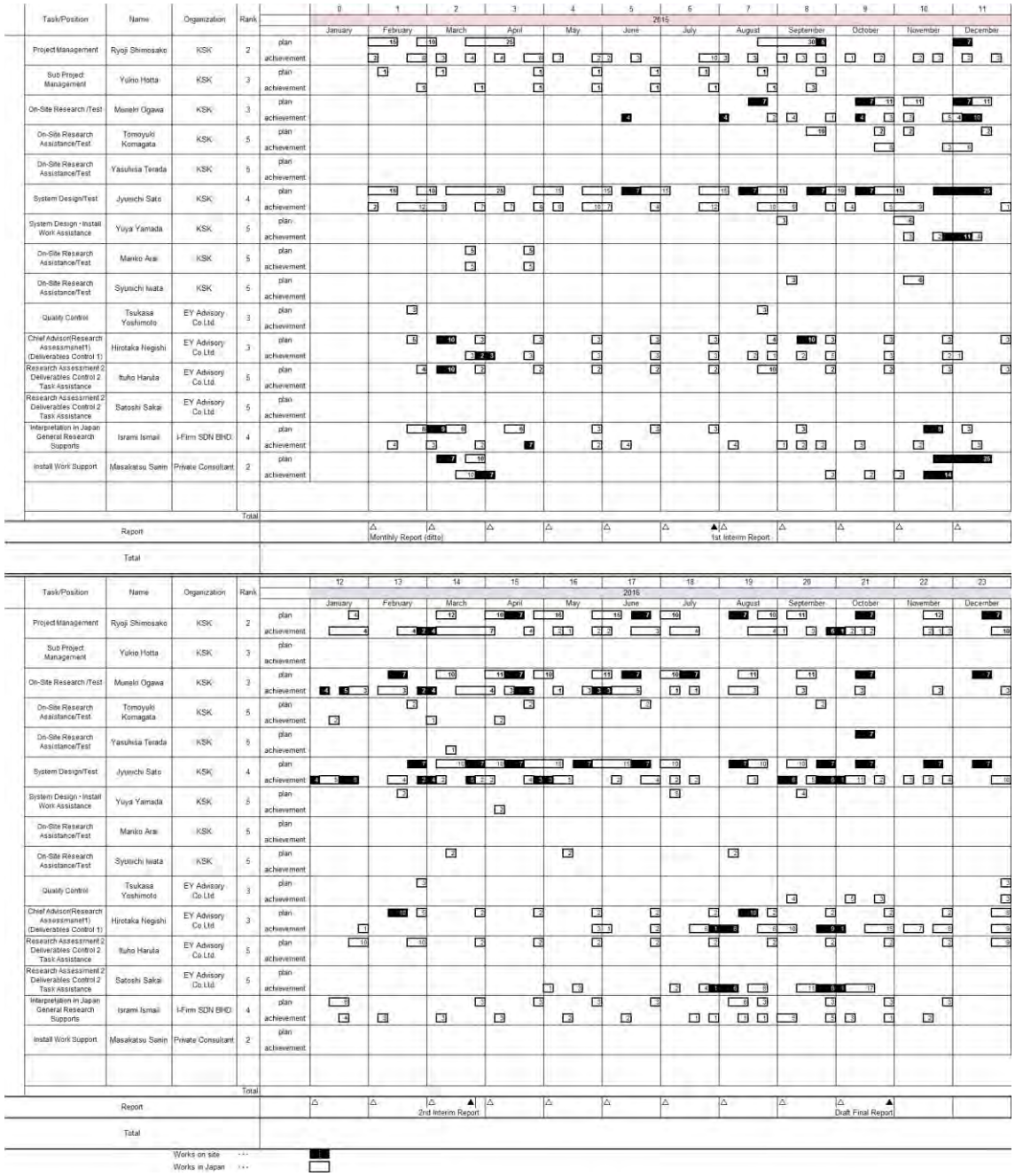
Beneficiaries : International ships including Japanese vessels sailing international routes, coastal petroleum stations, Customs and the Police in Malaysia

(6) Project Duration

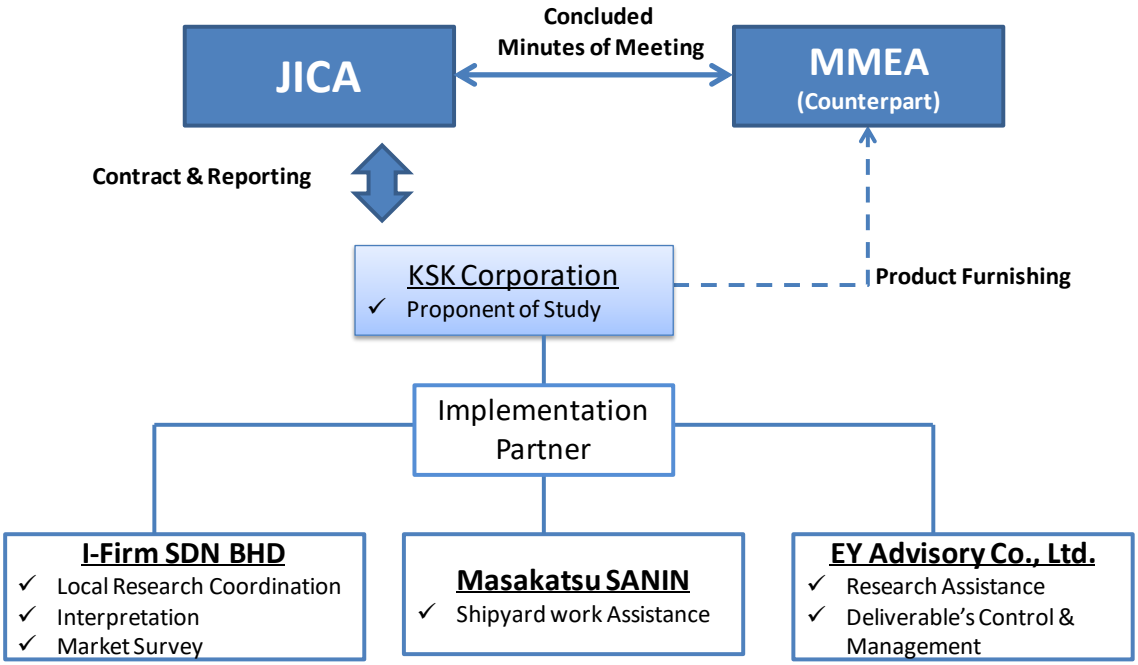
1 year and 10 months from the signing of the contract between KSK Corporation and JICA.



(7) Project Schedule



(8) Implementation Scheme



3. Achievements of the Survey

(1) Outputs and Outcomes of the Survey

Following is the summary table of survey results and achievements.

Objectives	Expected Results		Achievements	Remaining Issues
☐ Verify effectiveness of the infrared camera system through practical work of the patrol vessels with the camera system ☐ Show an effective night patrol model with using the camera system to MMEA. ☐ Explore future promotion of the camera system through MMEA's understanding of its effectiveness.	Achievements 1 Comparing to the conventional method of surveillance using naked eyes / binocular, qualitative differences can be observed	Wider angle of observation to observe ships situation	Conventional: Binocular monitoring Area of monitoring 30m Distance 300m Current : Camera system's monitoring Area of monitoring 900m, Distance 2,000m Camera system enables to achieve 6.6 times longer monitoring distance than conventional binocular. Images captured by the monitoring system enables to share among camera syste, operator and radar operators.	Daytime operation recognized the name of vessels and body color by naked eye, however, infrared camera unable to recognize characters and colors. Hence an application of color camera was requested.
		Possibility of recognizing the targeted ship	Conventional : Unable to monitor by binocular at night Current :Able to monitor target vessel's movement from 2km away The verification tests demonstrates patrol activities are executed in day and night evenly. The camera system enables to provide same capability in both day and night.	Average area width of monitoring is regarded as $89km^2$ (radius of $5.3km$) and 5km detectable lens was requested.
		Usage as evidence of recorded footage with GPS identification	Conventional :No recording function Current : Video footage from the camera +GPS information(time, location), which can be used in report etc Superimposing function could show information of time, location, longitude & latitude, direction of camera and head direction with camera captured images.	Image capture function is requested to capture an image for report submission

Objectives	Expected Results	Achievements	Remaining Issues
	Achievement 2 MMEA's staff skill up through the technology / knowhow transfer during the training (equipment training, usage of surveillance data etc.)	Operators already trained operating methods of camera system through manual and training. The captured images shows the operation is well understood. Crews of KM Marlin were trined during the project and around 10 staffs are trained nad operate the system. The verification tests' results demonstrate the crews' capabilities are satisfactory to operate the camera system with a compbination of radar..	SOP is developed to integrate camera system and safe cruising and arresting procedures for future applications.
	Achievement 3 Further understanding on the operation and maintenance management of the system through the training in Japan	During the training in Japan, participants have observed a Japan Coast Guard vessel, factory of the camera system and disclosed with the operation method of the system. After installation, KSK did not receive any questions or clarifications associated with system operation. The error messages appeared on the screen during the operation had appropriately handled.	Promote camera system in Malaysia to explore future market.
	Achievement 4 Development of proposed model of surveillance SOP for MMEA	Standard Operation Procedure has been proposed to relevant section in MMEA	Standard procedures shall be approved and standardized to apply camera system while patrolling.

(2) Design Modification, Installation & Training

① Design Modification

Original design of the camera system is agreed during the 1st training held in April 2015. The agreed specification is reflected onto the system assembled between May and November 2015. Modified features from the original design are as follows;

	Items	Original	Rationale	Modification
1.	DVR(Digital Video Recorder)'s Image Saving methods	Automatic Overwrite	Automatic overwrite unable to retain specific record.	Manually erase
2.	Automatic tracking	Mounted	Linked with radar imagery is an effective rather than monitor image tracking.	Non-mounted. Instead ARPA signal chasing devices are added.
3.	ARPA signal tracking functions	Not included	Tracking device is required instead of "Automatic tracking function"	Designated vessels are tracked based on radar image.

② Installation and calibration

Installation work executed between November and December 2015. The installation work completed on 9 December 2015 according to the standard checklist applied in Japan. Trial operation started immediately after the installation work. During trial operation, KSK detected non-clarity of image due to high-humidity and temperature environment which is beyond the expected environment conditions. The system send back to Japan for calibration in January 2016 and mounted again on 12 January 2016.

③ Training

Training activity conducted intermittently in parallel to the system development. training activity in Japan held in April 2015, inviting key personnel of MMEA aiming to acquainted with the KSK's camera system. The program is indicated in table below.

In addition to the training activity in Japan, KSK closely communicated with MMEA's personnel on board to train its operability of the camera system during installation work in Lumut, Kedah, where KM Marlin's mother port.

As a result, more than 4 crews of KM Marline are familiar with the operation of the camera system during the project period.

(3) Verification Survey

① Test Objectives

The vessel mounted surveillance camera system is used to monitor Malaysian waters concentrating in Malacca Straits 24h (especially night-time) to verify its visibility, location and time. A quantitative and qualitative comparison is made with the conventional method (naked eye, binocular).

The survey conducted from January to June 2016 at mainly off the coast of Lumut port, Kedah, followed by the data assessment in July and August 2016.

② Test Results

Following is a summary table of verification results.

Test Items	Result	Remarks
Number of days sailing out	55 days	1 voyage = 5 days and normally makes 2 dispatches every month. 1320 hours of records are collected during tests periods, the test schedule did not affect to MMEA's vessel' allocation based on prior discussion and coordination.
Usage Hours of infrared camera	1,317 hours	Infrared camera turned to ON throughout patrol activities, and record suggested the function used for watching and cruising safety. Using patterns of camera system gives an idea of frequency of maintenance and replacement timing of coolant devices. These data gives better understanding on application patterns.
Number of infrared camera operators	4 operators	Most crews are acquainted with the operation of the system. Combination with camera system, naked eyes and radar system enables safer patrolling activities.
Numbers of vessel monitored	79 vessels monitored	No arresting/inspection conducted by KM Marlin during this period. 30 vessels are observed at night time during test period.

Followings are quantitative analysis compared with conventional naked eye based patrol and camera system installations. Evaluation is performed for following three aspects;

(a) Wide range monitoring

(b) Visibility

(c) Record ability and admissibility of information

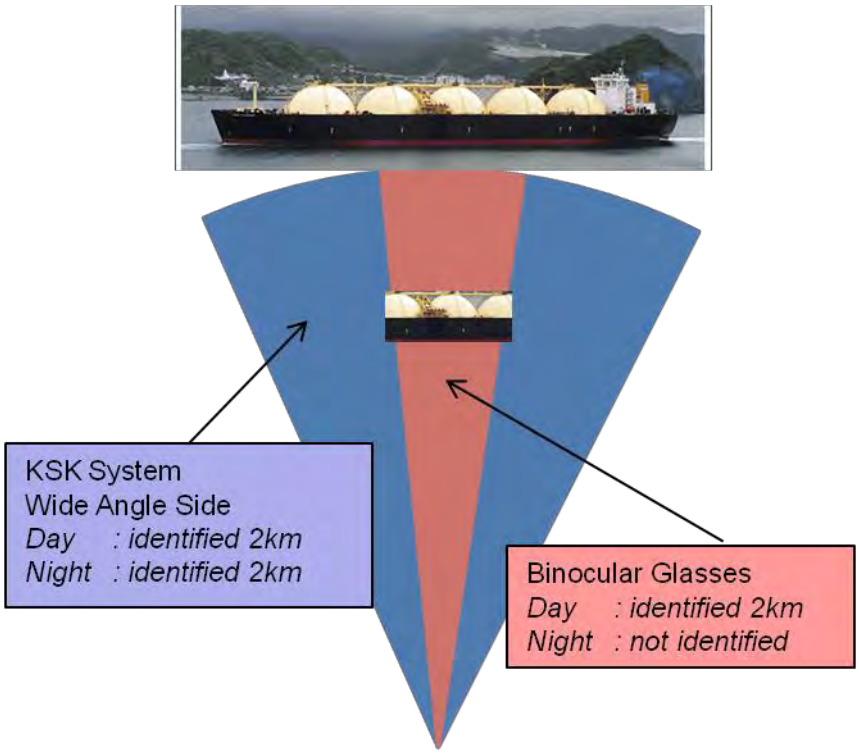
(d) Effective information sharing

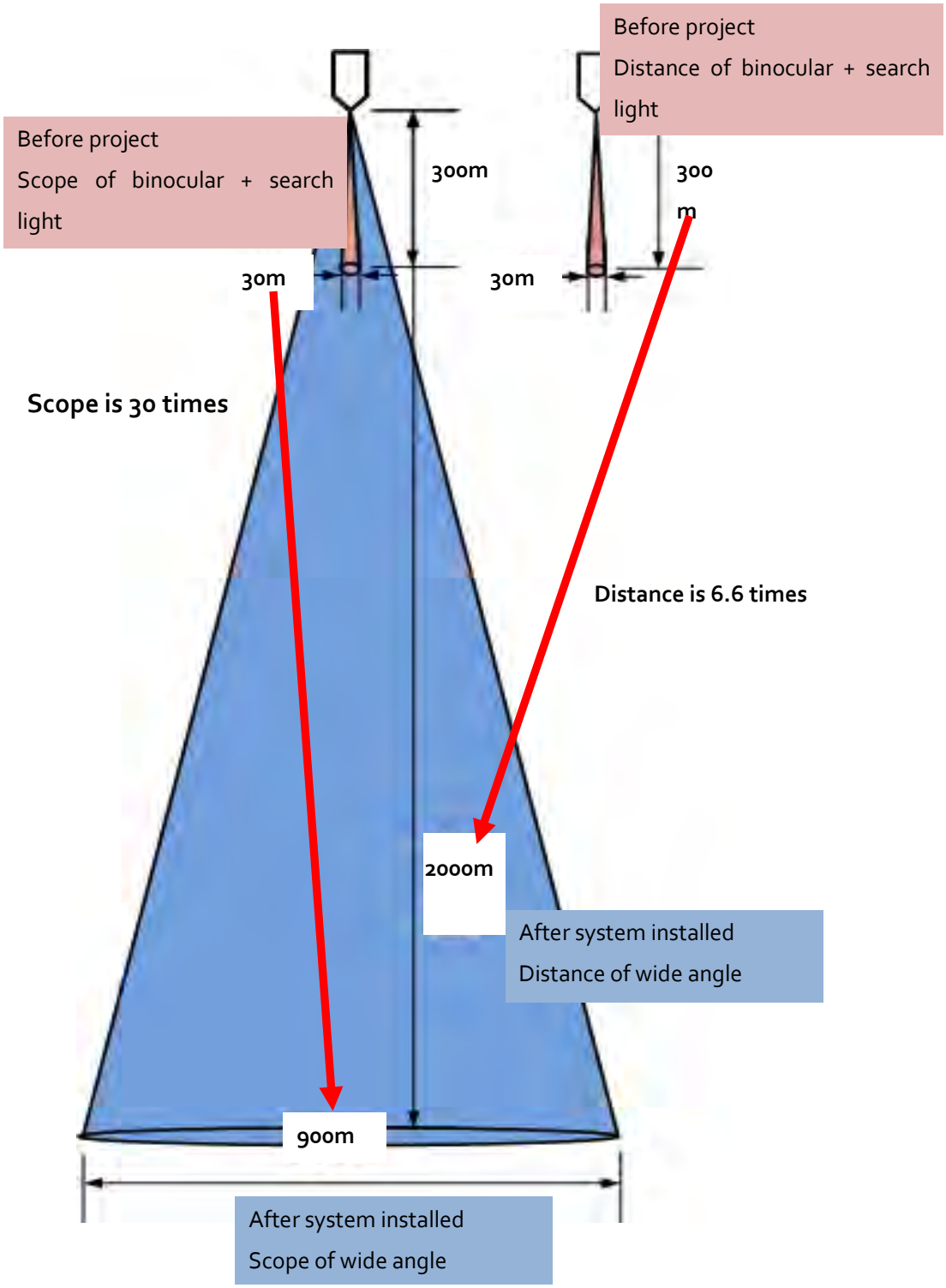
(a) Wide range monitoring

This item evaluates the recognition ability of wide range surveillance and subject recognize ability.

According to the KM Marlin's crew, night time patrol procedure before the camera system installation is based on radar image, crew spot the subject ship with a search light to check vessel's activity. KM Marlin's search light capacity is 300W type with lighting distance of 300m and lighting range of 30m. KSK's camera system would monitor range of 900m (30 times larger space than conventional searchlight and binocular) and enables to monitor 2,000min distance (6.6 times farther than conventional methods).

Following chart shows the purpose of camera system application and distance observed while verification period.

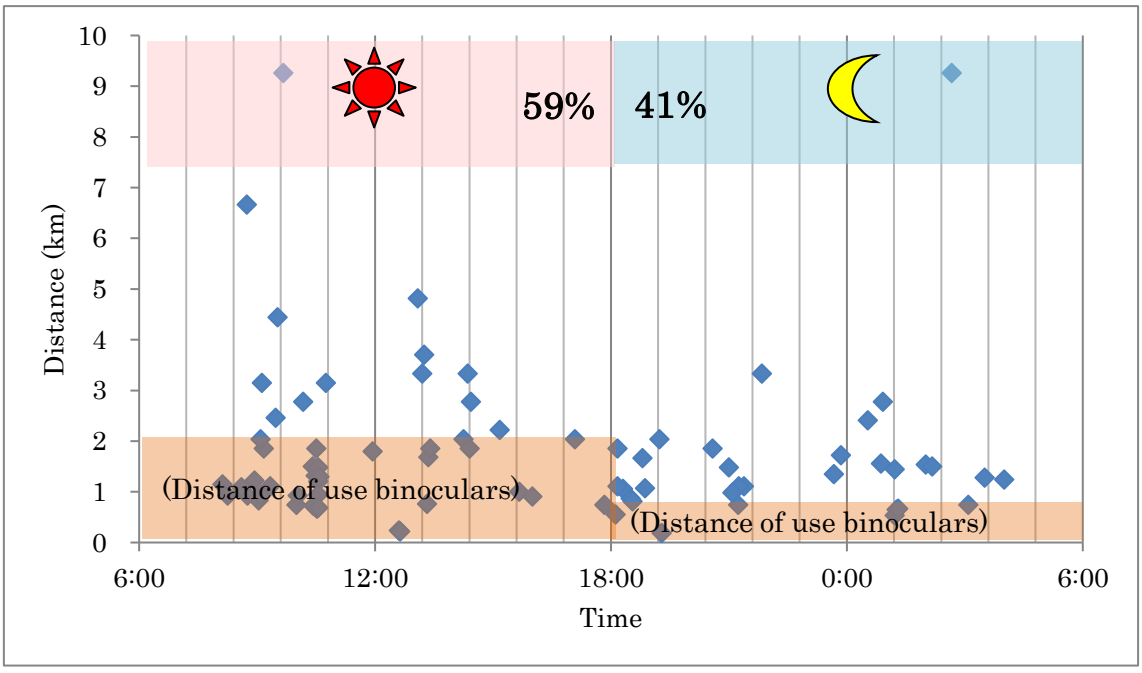



Before project
Distance of binocular + search light
Before project
Scope of binocular + search light
300m
300
m
30m
30m
Scope is 30 times
Distance is 6.6 times
2000m
After system installed
Distance of wide angle
900m
After system installed
Scope of wide angle

(b) Day/night time visibility

Camera system usage in daytime and night time is compared. The data shows the occurrence is same for both daytime and nighttime with 59% for daytime and rest for night time. In terms of distance, the camera system monitored beyond binocular based observation capacities, which are 2km in daytime and 0.3km in night time. Camera system enables to provide better vision compared to binocular.

This item evaluates the vessel recognize ability. The data of daytime and night time surveillance is compared. Daytime surveillance is 59% of entire usages while night time is 41% and does not show remarkable in-distribution of camera system usage. The distance between KM Marlin and subject vessels are 1.9km in daytime while 1.5km in nighttime. This shows the usages of camera system is even in both night and day. According to the interview, binocular surveillance is tend to short in distance and daytime 2.0km and 0.3km in night time.



Average area width of daytime and night time is compared within the squared area of 80km x 50km,indicated in the Chart Number 33.

KM Marlin's surveillance activities are not different during day and night in terms of distance from the port. The difference of day and night does not specify particular areas for surveillance and area of activities are almost similar. (See Table 2)

Table 2 Average Patrol Area distance from Lumut Port

	Daytime	Night-time
Average Patrol Area distance from Lumut Port	31.8km	30.1km

KM Marlin's surveillance activity within the square designated zone between day and night. KM Marlin conduct surveillance within radius of 5.3km during daytime and 6.4km radius during night.

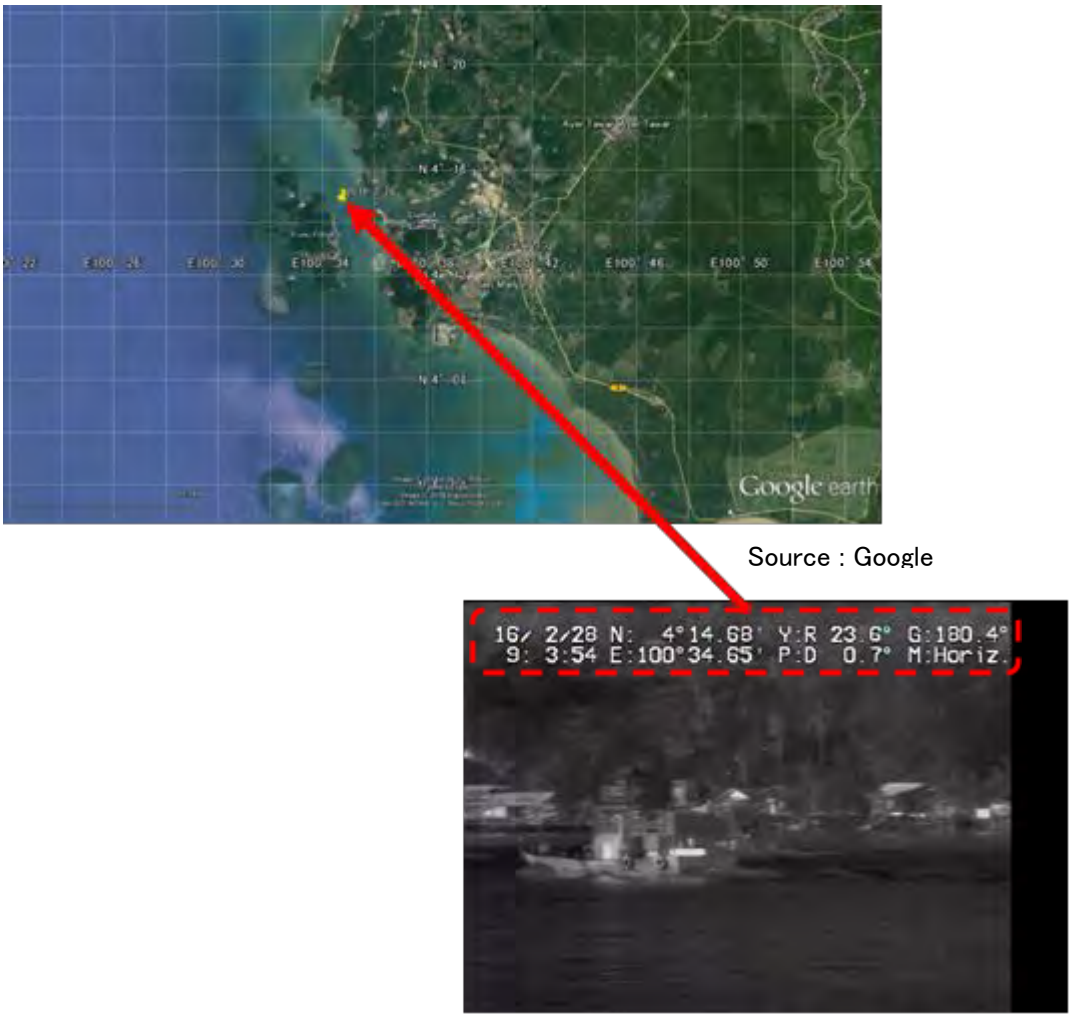
In daytime, other ships, such as heavy vessels or shipping vessels, are cruising aside from KM Marlin hence, KM Marlin could approach to the subject vessesls. However, there are less ships in night and close distance surveillance is noticed by the suspicious vessles. This results in long distance surveillance conducted in night.

The most frequent distance surveyed during verification survey is 2km which is meet with the specification agreed with MMEA, the capacity satisfies the KM Marlin's surveillance range. Particularly in night, the camera system improved surveillance capacity compared with conventional binocular. There were comments from KM Marlin's crew to request larger & width clear image which can be achievable through zoom capacity of more than 2km. KSK will prepare to propose better zoom capacity for future proposals.

In night time, camera is more often used for coast surveillance rather than distance surveillance this implies the camera system is used for cruising safety.

(c) Admissibility of camera system data

This items evaluates the data admissibility for a criminal prosecution. The KSK system can overlay information such as time, location (longitude, latitude), camera direction, heading direction to demonstrate the criminal record more substantially. The crew interview highlight the usage of the data.



Source : Google

(d) Effective information Sharing

Comparison made between binocular and camera system for the sake of information sharing.

Binocular's images are basically monitoring by using officer, while camera system's monitoring panel can be shared by at least three personnel. The information shows overlaid navigational information assist to make any decision instantly.

The crew interview also suggests the image clearness contributes MV's cruise safety by adjoining the radar images to confirm objects appeared on radar screen. It is also pointed out that camera system's imagery data attached to the daily patrol report enables to verify the effectiveness of patrol and information sharing among crew teams by referring images and data each other.

(4) Feedbacks of Counterparty

Interview has conducted to the KM Marlin's crew after the verification tests. Followings are major comments/feedbacks to the products.

	Visibility (Resolution)	Visibility (Brightness)	Image Stability	Speed of Image Capture	Operability with Other system
Camera system is effective than search light to patrol wider range since the lighting does not require.	X	X		X	
Camera system can give clear images of tug-boat's activity, particularly in narrow channels.	X	X			
Radar image pick up rough wave with a distance of around 1.5km and camera system could give clear image of the area to confirm either the radar detected image is a wave or particular object.	X	X	X	X	X
Small boat is hard to distinguish between ocean buoy. Camera system could give a clear image.	X	X		X	X
Camera system could trace illegal smuggling boat from neighboring countries by interlock with radar system	X	X		X	X
Camera system could give clear image of floating objects.	X	X			X
Camera system could give an image of small fisher boats without lump at the distance of 1.5km.	X	X			
In case the human body is floating, the camera system could give better image than radar system.	X	X			X

Some comments from the MMEA crew suggests necessary modification for future marketing.

Feedbacks	Explanation	Modification
Enable to monitor longer distance.	Longer distance patrol is required	Larger/longer lens can attached an additional costs.
Color image monitoring helps better patrol.	Color monitor helps to apprehend the image	Color camera system can attached with an additional costs.

Image snap shot function shall be useful.	Snap shot helps to capture the images on the monitor.	Snapshot function is an optional for system installed in KM Marlin.

(5) Survey Results

Verification survey results are satisfactory for MMEA. MMEA understands the function and capability of KSK's monitoring system through the verification survey. Based on survey results, MMEA is examining standardization of patrol activities' procedures to MMEA's Committee for Operation Standard. The assessment is undergoing at the point of this study report.

The survey results are reported at the seminar held on September 30th, 2016 in Putra Jaya, with a presence of Datok Puzi Bin Hi Ab Kaha, Director General of MMEA and Mr. Yoshinori Kodama, Minister, Deputy Head of Mission, Embassy of Japan in Malaysia.

5. Future Prospects

(1) Future Business Development

① Markets and Potential Needs

In addition to the counter-party, the MMEA, the project explored potential demands for infrared surveillance camera system in Malaysia given considerations on recent border security environment of Malaysia.

In light of the situation, the study team interviewed to Royal Marine Police and Department of Marine in addition to MMEA. ESSOM (Eastern Sabah Security Command) is also regarded as a potential user of the camera system, but no physical interview or communication held due to its headquarter location in East Sabah.

Among contacted parties, Marine Police and ESSCOM are possible user of KSK's camera system. Other agencies' boats are relatively smaller and not suitable for furnishing camera system.

Marine Police and MMEA's coast guard forces are reinforced to deal with smuggling, human trafficking and illegal emigrants. MMEA and Marine Police are using camera systems of FLIR (USA) and SAGEM (France). Marine Police is using Seagull (Germany) as well. These facts suggests an actualized needs for camera system.

Organization	Current Camera system	Future Application Likeliness
MMEA	Using FLIR & SAGEM	Newly built or replacement of old vessels are expected
ESSCOM	Unknown	Armament control function is required.
Marine Police	FLIR	Enhance
Dept. of Maritime	Not Using	Patrol is not included organizational tasks for time being.
Navy	Mostly using SAGEM	Armament control function is a vital specification to fulfill.

② Key factors for propagation of products

The study team interviewed to Malaysian government organizations and major ship-builders to explore the key factors to sell camera system in Malaysia. Existing camera system suppliers' activities are suggesting following conditions to be fulfilled;

a. Sales & Marketing Activity

Most of existing camera system vendors are deployed in Malaysian market through representatives.

b. Service Maintenance

Service & Maintenance service is indispensable due to the product's application for patrol activity.

c. Proxy Products promotion

Vessel mounted camera-system is not a commodity products and that relying on vessel-mounted camera system alone does not make sense for deployment to off-shore market. Coordinating with local sales partners to explore proxy products, i.e. security surveillance camera systems etc, need to be designed to sustain marketing activity of vessel mounted camera system.

③ Business Development Strategies

KSK has examine Malaysia market and neighboring countries in South East Asian countries such as Indonesia, Philippines and Singapore where coast security is important. The camera system installed this study is double axis mono-camera system. Feedback from MMEA's users suggested more axis and longer range of monitoring capability. Additional functions results in increase of system price and each country has a different understanding on balance between cost/benefit.

Potential risks and threats associated with local deployment are, an insufficient funding source, promotion within potential users and lastly the preparation of service and maintenance of the products in Malaysian market. KSK need to pay attentions to the Malaysian government's interests on surveillance equipment in coastal patrolling activity and modify mechanical specifications and products' advantages appropriately to meet with the government's interests with timely manner.

(2) Lessons Learned and Recommendations

① Difficulties in Non-Commodity Products Export

This project dealt with purposely designed product and that the potential user is limited. Also the core technologies of the product is tightly regulated and to comply with export control programs. These unique backgrounds of the product makes promotional activity difficult. The study understand the existence of the Malaysian government's demand for distance monitored equipment to fulfill its national security requirement, however, these demands are closely linked with armament design of the subject vessels. As a result, the surveillance camera system consists a part of armor in design of the vessels in many cases. Hence, KSK could not limit or control potential applications and is questioning a pursuance strategy for independent monitoring camera system market without connection with armor design.

② Business Climate

For KSK, exploring offshore market is still new experiences and some of the business practices are losing consistency and predictability of project management. For instance, installation work of the camera system is not rigidly document controlled in Malaysia which opposed to the Japanese close-managed project management and quality control. Understanding over the Malaysian business practices forces KSK to pay its attention and resources to project management rather than market explorations and verification of product's performances.

The product's local adjustment is also managed in parallel to verification period. Combined with aforementioned business practice's differences, the modification takes time than expected.

③ Roles of SMEs in the project

The roles and responsibility of the SME in the entire program need to be fully understood by the SME before the project start. Unless the SME itself has a strong interest in business development in the targeted market, the project's responsibilities are managed by either external professionals or counter-parties. The status of external experts need to be involved in the project's goal with the SMEs to attain project goals, otherwise, the project management responsibility left without responsibility and manageability, since the external expert is not necessarily familiar with the product itself. Some of the project rely on the external expert's expertise to carry of this program. The reliance, however, results in lean responsibility of the SME itself and makes it difficult to continues business development beyond the conclusion of JICA project.

Therefore, the SME's commitment to explore the targeted market is indispensable for autonomous business development after the JICA project.

Attachment: Outline of the Survey

Malaysia

Others

Vessel mounted 24 hours surveillance camera system demonstration and dissemination project

KSK Corporation (Tokyo)

Malaysia's development needs

- Malaysia straits is exposed to piracy and terrorism.
- Malaysian Maritime Enforcement Agency(MMEA) needs to upgrade surveillance capability

Contents of project

- Installation of surveillance camera system on board of MMEA vessel.
- Transfer of technology for operation and maintenance
- Market research on the dissemination of camera system

SME's product and technology

Example of installation of vessel mounted surveillance camera

Infrared image of Small boat taken from the vessel

Benefit to Malaysia

- Strengthen night surveillance against smuggling and border intrusion.
- Improvement of the illegal operation seized rate .
- Development of the shipping industry by ensuring safety of navigation .

Benefit to Japan

- The safety of Malacca straits, international maritime route will ensure the safety shipping route between Japanese trade and ASEAN countries.
- Overseas deployment of this system, it will contribute to both central and local economy in Japan.