

Inland Water Transport
The Ministry of Transport and Communication

Summary Report

The Republic of the Union of Myanmar

Verification Survey with the Private Sector for
Disseminating Japanese Technologies for a
Container Barge for Shallow Water on
Ayeyarwaddy River

September, 2016

Japan International Cooperation Agency

SA marine, Co., Ltd.

BACKGROUND

Inland water transportation, which is expected to be low cost and a means of mass-transit transportation, is impeded by large difference of water level between rainy and dry season in Myanmar. For example, inland water transportation in dry season is sometimes very difficult as a lot of shallow places (only 1m draft) appeared in Ayeyarwaddy River.

On the other hand, expectation for containerization has been rapidly increasing with the surge of modernization of logistics. With the surge of containerization, inland water transportation will have to play a feeder service for the connection, by which cargo is transshipped to international carriers, to international transport. However there are a lot of issues to be solved for inland water transportation such as insufficient port facilities and mechanization (loading/unloading machine) in the river. To cope with the above mentioned challenges, the proposed container Barge for shallow water is expected to contribute to developing a safe and stable transportation system throughout the year as well as to responding to the containerization.

1. OUTLINE OF THE PILOT SURVEY FOR DISSEMINATING SME'S TECHNOLOGIES

(1) Purpose

The purposes of the Survey are to achieve the following:

- 1) To operate the Barge for shallow water in Ayeyarwaddy River so as to verify its effectiveness in securing safe and stable inland water container/cargo transportation in all seasons
- 2) To identify potentials and challenges of container transportation through the above Barge pilot operation and make recommendations for future container transportation
- 3) To share the identified potentials and challenges with stakeholders for strengthening the ground of the inland water logistic system

(2) Activities

The survey commences with preparatory activities, followed by three (3) components of activities corresponding to the purposes described in the above 2. (1)

【Preparatory activities】

- 1) Research on current situation of inland water transportation in Ayeyarwaddy River
- 2) Identify pilot operation routes by researching on potential local shippers to use the Barge logistic services
- 3) Agree with IWT on the pilot operation routes and activities
- 4) Build a container barge

As for the preparatory activities, the Survey Team started with a market research on current situation of inland water transportation in Ayeyarwaddy River by interviews with government agencies and local and international private companies in order to obtain cargo flow data in terms of means of transportation, type of cargo and port of origins along River Ayeyarwaddy.

To design pilot operation routes, it was necessary to expose potential local shippers who are considering using inland water transportation as logistic services in the near future. The Survey Team categorized potential shippers into the three categories as follows;

- a) Exporting industries (e.g. rice, mining, and apparel)
- b) Importing industries (e.g. daily/consumer goods, automobiles, and gasoline)
- c) Domestic distributors (e.g. daily goods, oils, and agricultural products)

According to the above categories, the Survey Team conducted interviews with Japanese and foreign manufactures, local daily goods distributors, rice processors/exporters and mining and material manufacturers.

Based on the interview results, the Survey Team drafted a pilot operation plan for dry and rainy seasons. Particularly for dry season, the Survey Team demonstrated the Barge in the northern area of Mandalay. Successfully discussed and agreed on the pilot operation plan with IWT, the Survey Team executed the pilot operation.

Building the Barge was one of the highlighted activities in the Survey. The Survey Team prepared a contract with Myanmar Shipyard (hereinafter referred to as 'MS') to build the Barge which would be delivered by the end of August 2015.

【For Purpose 1】

- 1) Conduct pilot operation of the Barge at shallow water area
- 2) Collect operational data in operating the Barge in shallow water area

During the pilot operation, the Survey Team installed measuring instruments on the Barge for river environment to collect data such as velocity, stream, water depth, bottom conditions of Ayeyarwaddy River in the three different conditions- vacant, the half and full load.

【For Purpose 2】

- 1) Conduct pilot operation of the Barge for containerization transport
- 2) Collect operational data of containerization transport by the Barge
- 3) Analyze potentials and challenges towards containerization transport by the Barge

The pilot operation aimed at identifying issues and challenges on international container transportation, including transshipment, bonded warehousing and bonded transport, export and import permission and customs clearances. The pilot operation also demonstrated door to/from door container transport.

【For Purpose 3】

- 1) Identify challenges and recommendations for strengthening inland container/cargo transportation as well as utilizing the barge for shallow water
- 2) Organize a seminar for sharing the analysis/result throughout the Survey

The Survey Team organized a seminar to share all the findings through the market survey and the pilot operation and presented possible solutions to the related government agencies, organizations and private sector for further promotion of inland water transportation including container transport.

(3) Information of Product/ Technology to be Provided

General Cargo Barge:

- 60m barge for shallow water
- Roll on –Roll off available load for 100ton crane
- Size: L 60.0 , W 15.0 m, D 3.0m
- DWT :1219.2ton , Max number of container: 80 TEU with 2 – stack
- DWT draft : 1.845m
- Draft for 1m is about 609 ton
- 40 TEU- 1 stack is 0.9m draft

In Japan, SA marine has a lot of experience to operate barges with more than 1,000 tons capacity and tug boats with more than 1,000 horse power in a wide variety of environments such as fast stream, large water level difference, which SA marine believes that it would be

applicable even to local environments and derive best possible solutions for further development of inland water transportation in Myanmar.

- (4) Counterpart Organization
Inland Water Transportation, the Ministry of Transport and Communication
- (5) Target Area and Beneficiaries
Target Area: Ayeyarwaddy River basin
Beneficiaries: IWT, cargo owners/users of inland water transportation (agriculture, forest industry, manufacturer, distributor and Logistics Company)
- (6) Duration
From February 2015 to October 2016
- (7) Progress Schedule
Due to two month delay of ship building, the team put off the start of the pilot operation. Originally, the pilot operation in dry season (October, 2015) was planned executing first, but we started the pilot operation in rainy season (March, 2016) with the agreement of IWT

Table. Ship Building, Pilot Operations and Seminar Schedule (Original and Revised)

		Original Plan	Revised Plan
FY2015	February	The survey starts	No change
	April	Starting the barge building	No change
	August	Completing the barge	Postpone to the end of Oct. 15
	September	-Final Inspection -Handing over the barge from JICA to IWT, Registration to DMA by IWT -Agreement on the pilot operation between IWT and SAMarine -Permission for the pilot Operation from DMA	Postpone to Dec. 15, Jan and Feb. 16
	October	The Pilot operation in rainy season	The pilot in rainy was postponed to June 2016 -Final Inspection
	December		-Handing over the barge from JICA to IWT, Registration to DMA by IWT
FY2016	January February		-Agreement on the pilot operation between IWT and SAMarine -Permission for the pilot Operation from DMA
	March	The Pilot operation in dry season	No change
	April	Seminar	Seminar was postpone to July
	June		The Pilot operation in rainy season
	July		Seminar
	August September	Drafting a final report	Drafting a final report

Sources) Created by SAMarine

(8) Manning Schedule

The team consists of Mr. Hanji Miyamoto (Team Leader), Mr. Takeshi Miyamoto (Chief of the team), Dr. Shinichi Ishii (Chief Advisor), following with Nippon Koei, Kamigumi and Mr. Isao Igarashi (Container logistics expert).

Base on the discussion between IWT and SAmarine, we allocated tasks as followings.

Task allocation between IWT and The Survey Team

Activities	IWT	The Team	Remarks
Preparatory Activities			
Agree with IWT on the pilot operation routes and activities	Main	Main	SA marine to prepare a draft pilot operation plan
Build a Container Barge	Sub	Main	SA marine to subcontract to Myanmar Shipyard
Registration	Main		IWT to coordinate with MPA for approval issues
For Purpose-1			
Research on current situation of inland water container/cargo transportation in Ayeyarwaddy River		Main	
Identify pilot operation routes by researching on potential local shippers to use the Barge logistic services	Sub	Main	IWT to provide advices on necessary basis
For Purpose-2			
Conduct pilot operation of the Barge at shallow water area	Sub	Main	IWT to provide advice on necessary basis
Collect operational data in operating the Barge in shallow water area		Main	
Analyze potentials and challenges towards containerization transport by the Barge	Sub	Main	IWT to provide advice on necessary basis
For Purpose-3			
Identify challenges and recommendation for strengthening inland container/cargo transportation as well as utilizing the Barge for shallow water	Sub	Main	SA marine to prepare materials for discussion IWT to review the materials and provide comments
Organize a seminar for sharing the analysis/result throughout the Survey		Main	SA marine to plan and make necessary arrangement for the seminar

Note: 'Main' means playing major role and 'Sub' means supporting Main with advice

(9) Assignment Schedule

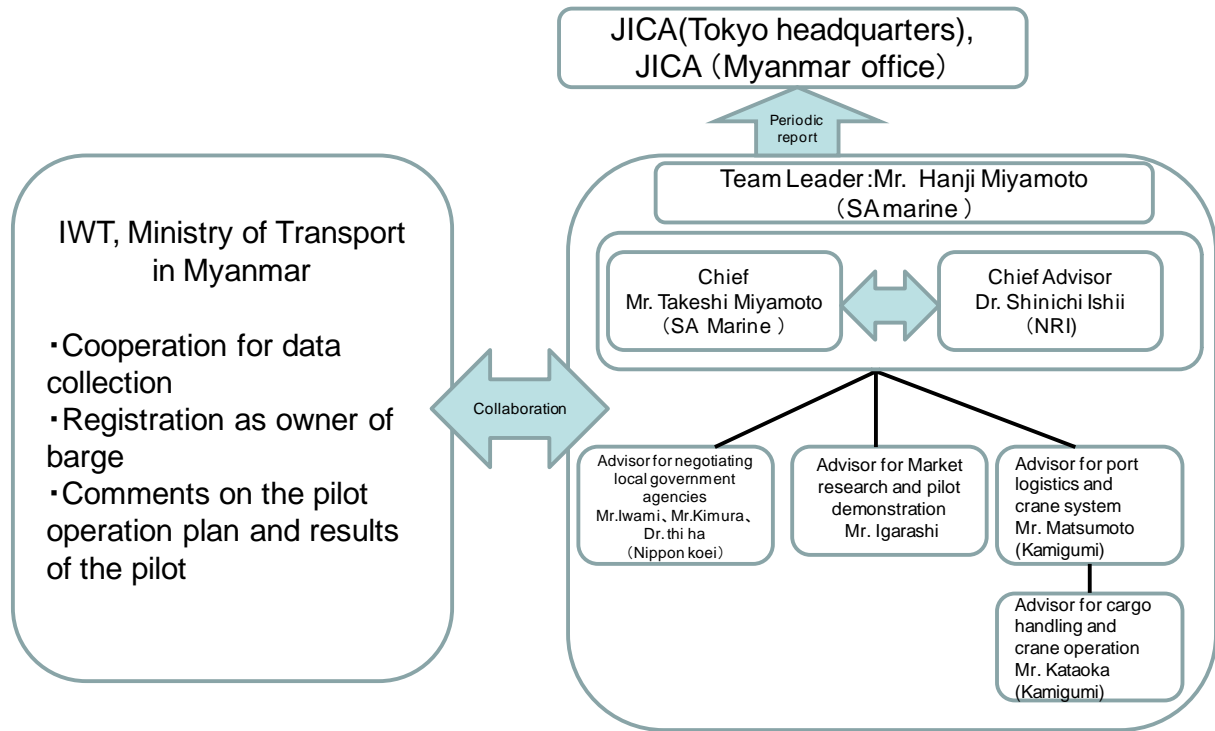
	Roles and Tasks allocated	Name	Affiliation	FY2014																								FY2015												FY2016							
				2015 year																								2016 year																			
				2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8													
Myanmar work	Team Leader	Mr. Hanji Miyamoto	SA marine Co., Ltd.		3/17-3/23 (7)	4/23-28 (6)	5/21-27 (0)																		3/10-20 (11)					7/24-27 (4)	8/24-30 (7)																
	Chief of the survey	Mr. Takeshi Miyamoto	SA marine Co., Ltd.	2/22-3/1 (8)	3/17-4/4 (19)	4/23-5/2 (28)	5/18-6/14 (19)	6/28-7/16 (10)	8/6-15 (16)	9/10-25 (15)	10/18-11/1 (11)	11/29-12/11, 21-27 (17)	1/17-2/2 (49)	2/13-4/1 (8)	23-30 (43)	5/22 (29)	7/3 (15)	7/20 (15)	8/3 (7)	8/24-30 (7)																											
	Pilot Operation	Mr. Noriyuki Nakano	SA marine Co., Ltd.							9/10-10/1 (22)															2/27-3/20 (23)					6/5-7/3 (29)																	
	Chief Advisor	Dr.(Mr.) Shimichi Ishii	Nomura Research Institute, Ltd.	2/24-27 (4)	3/17-3/23 (7)	4/23-28 (6)	5/21-6/4 (15)	6/25-7/1 (15)	7/30-8/13 (15)		10/21-11/1 (12)		12/1-12/11 (12)	1/13-21 (12)	2/14-25 (14)	3/26-4/8 (14)		5/26-6/8 (6)	7/22-27 (6)	8/24-30 (7)																											
	Marketing and Pilot Operation	Mr. Isao Igarashi	Individual Consultant					6/28-7/9 (15)	8/1-15 (15)								3/10-20 (11)																														
	Government Relations	Mr. Kazuma Iwami	Nippon Koei CO., LTD.																										6/1-21 (21)																		
		Mr. Kentaro Kimura																											6/7-21 (15)																		
		Dr. (Mr.) Thi Ha						6/28-7/16 (19)																																							
	Port Logistics	Mr. Yukihiko Matsumoto	Kamigumi Co., Ltd.					6/28-7/11 (14)																																							
	Stevedoring	Mr. Norihiko Kataoka																																													
Japan Work	Team Leader	Mr. Hanji Miyamoto	SA marine Co., Ltd.	2/10, 16-19 (5)						8/1, 3-8 (7)	9/1-5, 24-26, 28-30 (11)												1/4-9, 12-15 (10)	2/3-6, 2/8-10, 15-17 (10)	3/1-5, 22-26 (10)			5/9-14, 15/16-19 (10)																			
	Chief of the survey	Mr. Takeshi Miyamoto	SA marine Co., Ltd.	2/10, 16-19 (5)	3/2-6, 9-10 (7)	4/6-10 (10)	5/7-17 (11)	6/15-20 (12)	7/15-18 (12)	8/3-5 (10)	9/1-5, 7 (8)	10/13-17 (5)	11/4-7 (20)	1/4-9, 12 (7)	2/3-6, 8-10 (7)												5/9-14 (10)																				
	Chief Advisor	Dr.(Mr.) Shimichi Ishii	Nomura Research Institute, Ltd.			4/6-10 (10)				7/6-9, 13-14 (6)	8/17, 19-21, 27 (5)	9/8, 16, 25 (3)	10/1, 5-9, 12-15 (10)	11/6, 15, 16, 30 (4)												4/11-14, 18-20 (10)	5/9, 16-18 (6)	6/9, 13-15, 17, 20, 21, 28-30 (10)																			
	Marketing and Pilot Operation	Mr. Isao Igarashi	Individual Consultant																																												

Note :

- Work engaged (Planned)
- Work engaged (SA marine's voluntary work)

(10) Implementation System

SA marine shall be responsible for overall implementation of the Survey, including management and supervision of seven outside advisors.



2. ACHIEVEMENT OF THE SURVEY

(1) Outputs and Outcomes of the Survey

1) Barge Building, handing over it to IWT and registration

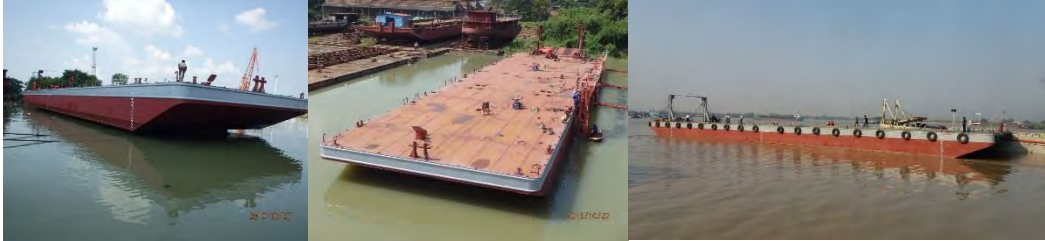
Firstly, SAmarine obtained a building Permission with an inspection for drawing by safety regulation and structure regulation from Marine Engineering Department, Department of Maritime Administration of the Ministry of Transport and Communication (MED of DMA).

MED of DMA executed the interim inspection, when the barge building is 50% completed.



After the completion of the barge, the final site inspection was executed with land inspection. After land inspection, the barge was launched into water for checking leakage in the water at the site

After the final inspection, the barge was handed over from JICA to IWT. IWT processed registration procedure to Ship Building Department, Department of Maritime Administration (SBD of DMA) of the Ministry of Transport and Communication.



2) The pilot operation

Dry season pilot operation was executed in March, 2016 between Yangon and Mandalay (Se Mei Khon Port at Mandalay Myota Industrial Development: MMID). SAMarine leased a 50 ton crane for loading/unloading at Se Mei Khon Port. Cargo Owners were United Nations World Food Program (WFP), Beans Suppliers and Consumer Goods Distributer. The barge was powered by a tug boat with two 440 horse power engines owned by IWT.

Rainy Season pilot operation was executed in June, 2016 between Yangon and Mandalay / Pakkoku). These containers are unstuffed at Mandalay and Pakkoku. Cargo Owners were WFP and Consumer Goods Distributer. The barge was powered by a tug boat with two 350 horse power engines owned by a Private barge Operator in Myanmar.

The summary of pilots result is

Dry Season: Yangon - Se Mei Khon

Distance: 563miles (one way)

Voyage durations between Yangon and Se Mei Khon were 11 days with the average velocity of 3 to 4 knots in the up-current and 7 days with the average velocity of 4 -5 knots in the down-current.

The shallowest point in the river was between Pakkoku and Magway with 1.6m depth, but we could clear the draft.

Rainy Season: Yangon - Mandalay – Pakkoku – Yangon

Distance: 656miles (one way)

Voyage durations between Yangon and Mandalay were 11 days with the average velocity of 4.0- 4.5 Knots in the up-current and 6 days with the average velocity of 10- 11 knots in the down-current.

Fig. Pilot Routes Red line is Dry and Blue line is Rainy

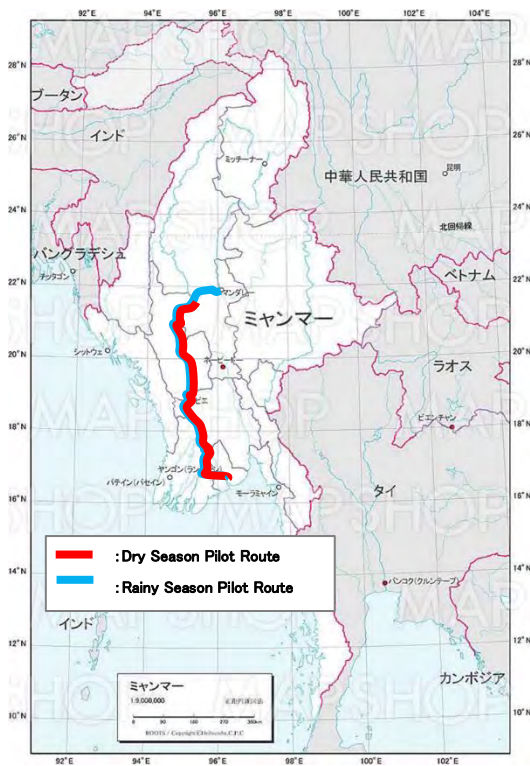
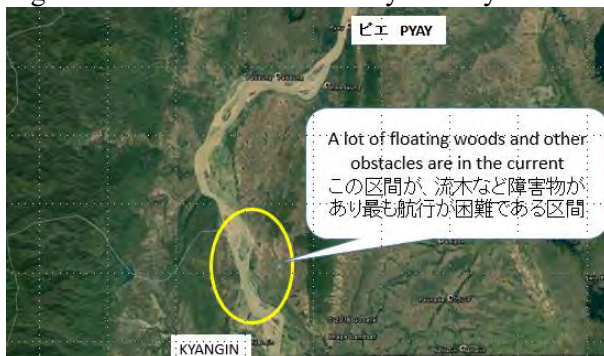


Fig. The most Shallow Point during the pilot in Dry Season on 10th March, 2016



Fig. The most difficult water way in rainy season on 10th June, 2016



(2) Self-reliant and Continual Activities to be Conducted by Counterpart Organization

The barge handed over was strong enough for the transportation in the river Ayeyarwaddy. But appropriate maintenance is needed with a few times light check and maintenance a year and through check and repair in the dock every three years. We recommend using IWT's own facilities as IWT has own dock yards such as in Dalla and Mandalay.

Regarding the business with the use of the barge, SA marine would like to continue collaboration with IWT to expand Inland Water Cargo Transportation business in Myanmar by using such various collaboration options as a Mutual Agreement, Memorandum of Understanding, Contract and Joint Ventures.

3. FUTURE PROSPECTS

(1) Impact and Effect on the Concerned Development Issues through Business Development of the Product/ Technology

For the better logistics in Myanmar, using the river Ayeyarwaddy with the barge is very effective and stable transport means. The pilot demonstration proved physical viability.

On the other hand, economic viability is still remaining issue. Truck is still common transport means. Compared with truck, the barge transport is lower cost with high volume of mass-transit system. However the barge transportation system requires a lot of steps for door to door transport.

The table illustrates the comparison of steps for door to door transport between Inland Water Way and Truck.

Table. Procedure Comparison of Inland Water Transport and Road Transport

Procedure for door to door transportation	IWT	Road
1. Loading at a Factory	✓	✓
2. Transport	Truck	Truck
3. Unloading from truck at Port	✓	
4. Loading onto the barge at Port	✓	
5. Transport	Barge	
6. Unloading from the barge at Port	✓	
7. Loading onto the truck	✓	
8. Transport	Truck	
9. Unloading from the truck at Warehouse	✓	✓

We have concluded that if we would provide the container barge service with the following conditions with 70 % load in the both way transport, the barge transport between Yangon and Mandalay could be competitive enough with the truck transport and attractive for potential users (cargo owners).

Table. Challenges for cost in Inland Water Transportation compared with Truck

Conditions/ Requirements	Truck	Requirement for Inland Water Transportation (recommended)
Travel time/date	2 days	5 days
Travel time/date for Door to Door	2 days	7 days (including pick-up and delivery to the destination)
Transportation cost for only each mode	80 USD/ton	15 USD/ton
Total Door to Door Transportation cost	80 USD/ton	50 USD/ton

※These costs are only for your reference. They are subject to change based on the conditions.

For example, if we would launch one round service between Yangon and Mandalay per month, we could transport approximately $1,300\text{ton} \times 2 \text{ (round)} \times 12\text{months} = 31,200\text{ton/year}$. Based on the expert of logistics in Myanmar, there is a 1.2million ton of cargo flow between Yangon and Mandalay. The capacity from the monthly service barge is only 2.6% share of the Yangon – Mandalay cargo flow volume. But it is very important first step for the future logistics business in Myanmar because Inland Water Transport takes an important role for long distance transport such as Yangon and Mandalay, as currently there is no other operator started the container transport by barge.

(2) Lessons Learned and Recommendation through the Survey

Through the barge building and pilot operations, we have learned a lot of Lessons.

1. Water way with the use of 60m barge between Yangon and Mandalay is possible solution for the logistic in both dry and rainy season
2. We found that operation durations/dates are the same in dry and rainy seasons. In rainy season, there are a lot of obstacles due to heavy rain. We presumed that rainy season is easier than dry season because of enough depth of water, but this was not the fact.
3. Container transport using badge are not easy to coordinate and share information among many parties concerned
4. Human resource development with well proficient operation technique, more than 10 years experiences, is needed for tag boat operation in the river Ayeyarwaddy
5. Barge transport by 60m barge is extremely safe, stable with no vibration. We did observe no damage.

For the better logistics in Myanmar with the use of Inland Water Transportation, we recommend that continuing challenges for the development of the followings are needed.

1. Improvement of operation management for regular service
2. Rapid human resource development to tug boat operation in the river for increasing transport capacity of Inland Water Transportation
3. Sharing system of Real time (frequently updated) River / Water way information for effective and safe transport

Other remaining issues are mainly infrastructure development

1. River ports development
2. Water way maintenance
3. Bonded transport system to the inland

The Republic of the Union of Myanmar

Verification Survey with the Private Sector for Disseminating Japanese Technologies for a Container Barge for Shallow Water on Ayeyarwaddy River
 Samarine Co. Ltd. , Hiroshima–Prefecture, Japan

