

Country Name	Project for Productions of Integrated Digital Terrain Model and Electronic Navigational Chart in the Kingdom of Cambodia
Kingdom of Cambodia	

I. Project Outline

Background	<p>In Cambodia, the Sihanoukville Port is the sole deep-water port facing the outer sea, and the revitalization of international trade by developing the Port and its surrounding areas became an important issue. Although a navigational chart covering information about water depth and facilities was essential for safe boating, only out-of-date chart was available in the country. In addition, in July 2012, the International Maritime Organization (IMO) mandated installation of an electronic chart display system (ECDIS) for passenger ships of more than 500 GT (gross tonnage) and tankers of more than 3,000 GT (all new ships are subject to this requirement). In the future, not only new ships but also existing ships were going to be required to install ECDIS in accordance with the type and size of ships. Therefore, it was necessary for the country to produce electronic navigational charts (ENC) in accordance with the global standards responding to the latest ECDIS.</p>														
Objectives of the Project	<p>The project aims to produce electronic navigational charts for sailing in the surrounding sea areas of the Sihanoukville Port, thereby contributing to strengthening the navigation safety and enhancing the international credibility of the Sihanoukville Port.</p> <p>1. Expected Goals through the proposed plan¹: 1) Strengthening the navigation safety in and around the Sihanoukville Port, 2) Enhancing international credibility of the Sihanoukville Port.</p>														
Activities of the Project	<p>1. Project Site: The Sihanoukville Port and its surrounding areas 2. Main Activities: 1) Collection, processing and analysis of chart information, 2) Acquisition, processing and analysis of digital hydrographic survey data, 3) Implementation of oceanographic observation (tide), 4) Trainings for counterparts on operation and management of ENC, etc. 3. Inputs (to carry out above activities)</p> <table border="0"> <tr> <td>Japanese Side</td> <td>Cambodia Side</td> </tr> <tr> <td>1) Mission members: 11 persons</td> <td>1. Staff Allocated: 8 persons</td> </tr> <tr> <td>2) Trainees Received: 5 persons</td> <td>2. Land and facility: a project office in Department of Waterway Infrastructure and Port Construction of Ministry of Public Works and Transport</td> </tr> <tr> <td>3) Third country training: 5 persons (the Philippines)</td> <td></td> </tr> <tr> <td>4) Equipment: multi-beam echo sounder, global navigation satellite system positioning system, unmanned aerial vehicle, PCs, etc.</td> <td></td> </tr> <tr> <td>5) Local expense: cost for project activities</td> <td></td> </tr> </table>			Japanese Side	Cambodia Side	1) Mission members: 11 persons	1. Staff Allocated: 8 persons	2) Trainees Received: 5 persons	2. Land and facility: a project office in Department of Waterway Infrastructure and Port Construction of Ministry of Public Works and Transport	3) Third country training: 5 persons (the Philippines)		4) Equipment: multi-beam echo sounder, global navigation satellite system positioning system, unmanned aerial vehicle, PCs, etc.		5) Local expense: cost for project activities	
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Project Period	July 2013 – December 2016 (Extension: January 2016 – December 2016)	Project Cost	(ex-ante) 302 million yen, (actual) 473 million yen												
Implementing Agency	Department of Waterway Infrastructure and Port Construction of Ministry of Public Works and Transport (DWIPC/MPWT) (Waterways Department was renamed to the DWIPC in October 2016)														
Cooperation Agency in Japan	Aero Asahi Corporation.														

II. Result of the Evaluation

1 Relevance
<p><Consistency with the Development Policy of Cambodia at the Time of Ex-Ante Evaluation> The project was consistent with Cambodia's development policy of the "National Strategic Development Plan" (2009-2013) giving importance to "safety enduring of ships and ports".</p> <p><Consistency with the Development Needs of Cambodia at the Time of Ex-Ante Evaluation> The project was consistent with Cambodia's development needs of producing ENC in accordance with the global standards responding to the latest ECDIS for securing navigation safety and international credibility.</p> <p><Consistency with Japan's ODA Policy at the Time of Ex-Ante Evaluation> The project was consistent with "The Country Assistance Policy for Kingdom of Cambodia" (2012) positioning "strengthening of economic base" including "development of economic infrastructure" as one of the priority areas.</p> <p><Evaluation Result> In light of the above, the relevance of the project is high.</p>
2 Effectiveness/Impact
<p><Status of Achievement for the Objectives at the time of Project Completion> The objectives of the project were achieved at the time of project completion. Through the project, hydrographic survey data and information necessary for editing ENC around the Sihanoukville Port, such as tide, were prepared, and the staff of the DWIPC were trained so that they would be able to design, collect and process such survey data and information (Output 1). On top of that, the project established the Database of Integrated Digital Geospatial Terrain Model of Land and Sea (DTM) (Output 2) which was also essential for editing ENC, and transferred the related skills to the staff of the DWIPC. As a result, ENC at a 1:10,000 scale (harbor navigation) was firstly produced at the original project period and ENC at a 1:80,000 scale (coastal navigation) was additionally produced at the extended</p>

¹ The degree of achievement of expected goals is not to be assessed in principle at the time of ex-post evaluation, since it is defined as the medium-to-long-term goals which will be attained as a result of crystallizing the proposed plan ("output" of the project).

project period (Output 3). Furthermore, in order for the staff of the DWIPC to appropriately operate and manage the ENC's, the project enhanced the skills of the staff (Output 4).

<Utilization Status of the Proposed Plan at the time of Ex-post Evaluation>

The proposed plan has not been utilized at the time of ex-post evaluation. The DWIPC and the Sihanoukville Autonomous Port (Port Autonome de Sihanoukville: PAS) have yet to be able to publish and distribute the ENC's at 1:10,000 and 1:80,000 scales because it is necessary to first sign a memorandum of understanding (MoU) with the United Kingdom Hydrographic office (UKHO), which has the international sales market and effective mechanism to provide ENC's to vessels in service internationally which Cambodia does not have at the moment. Before the official communication in late 2018, there had been some discussions initiated by the MPWT with the UKHO about the MoU preparation and necessary procedures. Then, both sides began drafting the MoU in early 2019, and the DWIPC sent their inputs to the Office in February 2020 after the internal review and approval within the DWIPC and the MPWT. However, upon receiving the draft MoU, the UKHO could not respond immediately because of staff turnover and the unexpected global pandemic of COVID-19, which made it challenging for the newly assigned staff to implement the works including reviewing the draft MoU. Due to these reasons, their reviewing process has been hindered, which has also caused delays in publishing the ENC's. Thus, it may take more time to publish the ENC's. This has also prevented the DWIPC from issuing waterway notifications, since it can only be done (and widely distributed) on the UKHO's platform. It should be noted, however, that the DWIPC has continuously sent reminders to the Office and made as many efforts as possible to conclude the MoU after the project completion. They will keep following up until the MoU is approved and signed.

The ENC at a 1:10,000 scale was updated in 2018 whereas the one at a 1:80,000 scale has never been updated since the project completion because there have been no significant changes on coastal areas around the Sihanoukville Port. Furthermore, according to the DWIPC, they have collected new data for shoreline mapping along four coastal provinces, including Preah Sihanoukville province, once per year. Carrying out shoreline mapping in different provinces can take a long time, and the coverage area hinges on the amount of DWIPC's annual budget. Thus, it is difficult to collect the data for all of the coastal provinces at once, and they have divided the coverage into several according to the available budget amount. Conducting shoreline mapping is a mandatory obligation, since it is necessary to incorporate its data when updating the ENC's in the future.

<Status of Achievement for Expected Goals through the Proposed Plan at the time of Ex-post Evaluation>

The expected goals through the proposed plans have been partially achieved at the time of ex-post evaluation. As mentioned above, the latest DTM and Vector Fair Sheet have been necessary to update the ENC's. Therefore, the DWIPC has continued to produce the DTM and the Vector Fair Sheet on the surrounding areas of the Sihanoukville Port since the project completion (Indicator 1). In terms of sea-level conditions (Indicator 2), the DWIPC has continuously used the sea-level conditions (water depth of 0.99 m) set by the project and has not set a sea-level condition (water depth of 0 m) by themselves after the project.

According to the DWIPC and the PAS, no accident in and around the Sihanoukville Port has occurred before and after the project, which indicates that the navigation around the area has remained safe since the project completion. Furthermore, the DWIPC reported that the Port earned the international credibility thanks to the ENC's developed in accordance with the international standards and will be further enhanced if the MoU with the United Kingdom Hydrographic office is signed.

<Other Impacts at the time of Ex-post Evaluation>

Some positive impacts were confirmed at the time of ex-post evaluation. With the skills and knowledge acquired through the project, the DWIPC newly produced two paper nautical charts at a 1:20,000 scale by leveraging the hydrographic survey data constructed by the project. One was jointly produced with the PAS to update an existing paper nautical chart as a new channel dredging at the PAS was completed. After its updating, the DWIPC and the PAS made 100 copies of the chart and distributed them to their contracted container shipping lines and ships for free of charge and internal use. According to them, the lines and ships have used them. The other one was produced to response to the request from PAPA Port, a privately-owned port located in Kampot province. There were no other positive or negative impacts confirmed.

<Evaluation Result>

In light of the above, despite the fact that the postponement of the reviewing and signing process of the MoU between the MPWT and the UKHO has significantly affected the utilization status of the proposed plan, what has been achieved so far is believed to be critical for Cambodia's future navigational safety; therefore, the effectiveness/impact of the project is fair.

Status of Achievement of Utilization Status of the Proposed Plan and Expected Goals through the Proposed Plan

Aim	Indicators	Results
(Utilization Status of the Proposed Plan) The Government of Cambodia appropriately provides users (including shipping companies) navigational charts (electronic navigational charts) and hydrographic information essential for safe maritime transportation.	1) The status of the publication of the ENC of Cambodia (No. of copies).	(Ex-post Evaluation) Partially Achieved • The DWIPC and the PAS have not published and distributed the ENC's at 1:10,000 and 1:80,000 scales produced by the project, since the MoU with the UKHO, which has the international sales market, has not been signed. This is mainly due to the influence of COVID-19 pandemic. However, the said MoU has already been drafted by both the DWIPC and the Office, and the DWIPC will keep following up until it is signed.
	2) The number of waterway notifications issued.	(Ex-post Evaluation) Partially Achieved. • Waterway notifications have yet to be issued, since the above-mentioned MoU has not been signed mainly due to the COVID-19 pandemic. It should be noted, however, the draft MoU has been approved by the Cambodian side and the notifications will be issued as soon as the signing process is over.
(Expected Goals through the Proposed Plan) 1) Strengthening the navigation safety in and around the Sihanoukville Port, 2) Enhancement of	1) Production of DTM and Vector Fair Sheet on the surrounding areas of the Sihanoukville Port.	(Ex-post Evaluation) Achieved • The DWIPC has continued to produce the DTM and the Vector Fair Sheet on surrounding areas of the Sihanoukville Port, which is essential for editing and updating the ENC's produced by the project.
	2) Standard sea-level conditions (water depth of 0 m) of the surrounding areas of	(Ex-post Evaluation) Not Achieved • The DWIPC has continuously used the sea-level conditions (water depth of 0.99 m) set by the project.

international credibility of the Sihanoukville Port.	the Sihanoukville Port is set.	
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Source : Final Report, Interview and questionnaire to the DWIPC and the PAS

3 Efficiency

The project cost and period exceeded the plan (ratio against the plan: 157% and 140%, respectively). The original output, ENC at a 1:10,000 scale, was produced as planned, and the additional output, ENC at a 1:80,000 scale, was also produced due to its urgent demand. For the production of the ENC at a 1:80,000 scale, Japanese experts were additionally dispatched, which contributed to an increase in the project cost. The project period was also extended. Therefore, the efficiency of the project is fair

4 Sustainability

<Policy Aspect>

“The law on Waterway and Marine” (2015-2020), which is scheduled to come into effect in 2020, aims to improve the implementation and management of waterway and marine transportation and “the sub-decree on Navigation Survey and Mapping” (2020), which has been planned to be approved in 2020, aims to improve survey and mapping standards for ENC. As the project aimed to strengthen the navigation safety in and around the Sihanoukville Port and enhance the international credibility of the Port by producing ENC in accordance with the international standards, it has been endorsed by such national policies.

<Institutional Aspect>

In October 2016 just before the end of the project, Waterways Department, an organization responsible for the operation and maintenance of the ENCs produced by the project, was renamed the DWIPC. As the DWIPC fully took over the roles and responsibilities of Waterways Department, the change did not have any negative impact on the operation and management of the ENCs. According to the DWIPC, 4 staff have been allocated there, and as there has not been any problem by the time of ex-post evaluation, the number is considered to have been sufficient.

<Technical Aspect>

The staff of the DWIPC have sustained the knowledge and skills necessary for the operation and management of the ENCs produced by the project. In the background, the staff received trainings served by the project. On the other hand, the organization has mentioned that as there is no formal and internal training, the staff cannot update their knowledge and skills. Therefore, they plan to apply for the membership of the International Hydrographic Organization by 2021 thereby enabling their staff to take advantage of trainings and other opportunities to improve their knowledge and skills.

In addition, according to the DWIPC, the prescription for digital hydrographic survey and the ENC production manual developed by the project have been used continuously by their staff when performing their tasks of the operation and management of the ENCs.

<Financial Aspect>

No accurate budget data of the DWIPC was available. According to the DWIPC, they have been allocated the budget of between 50,000 US dollars (USD) and USD 80,000 from the MPWT every year, and the 2018 budget was around USD 57,000. They also claimed that the amounts have been so small that they sometimes face difficulties in conducting hydrographic survey and fixing small items they identify in the survey and that more budget will be needed for large-scale repairs. Taking into consideration that some data to update the ENCs is collected every year and the sufficient number of staff has been secured, it can be concluded that DWIPC’s budget has been secured to some extent.

Once the MoU with the United Kingdom Hydrographic office is signed, the DWIPC is supposed to secure their budget by selling ENCs. However, as the Sihanoukville Port is smaller than other ports and the number of ships which come to the Port is relatively small, the sales of the ENCs will not reach a satisfactory level. Thus, the DWIPC is required to make any further efforts to secure a sufficient budget.

<Evaluation Result>

In light of the above, as some problems have been observed in the financial aspect, the sustainability of the effectiveness through the project is fair.

5 Summary of the Evaluation

The ENCs at 1:10,000 and 80,000 scales produced by the project have not been published and distributed by the DWIPC and the PAS yet. Waterway notifications also have yet to be issued. This does not indicate that The Government of Cambodia appropriately provides users (including shipping companies) navigational charts (ENCs) and hydrographic information essential for safe maritime transportation. However, this is mainly because the MoU between the UKHO and MPWT has not been signed. As for sustainability, there is some room for improvement in the financial aspect. As for efficiency, the project period and cost exceeded the plan; however, this was due mainly to the additional output of project, the preparation of ENC at 1:80,000.

Considering all of the above points, this project is evaluated to be partially satisfactory.

III. Recommendations & Lessons Learned

Recommendations for Implementing Agency:

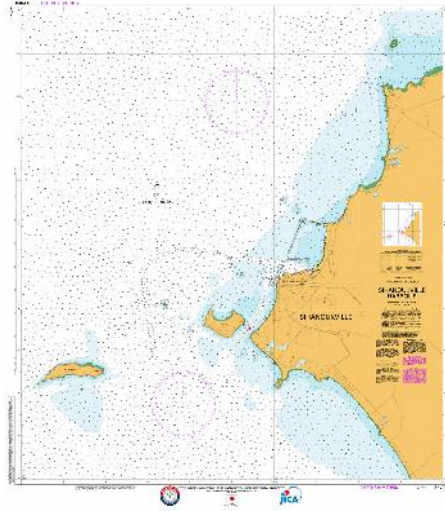
- The DWIPC should secure the source of revenue to improve their financial condition and ensure the sustainability of the project effects. While selling the ENCs can be an additional source of revenue, the amount could be small. Therefore, the DWIPC is encouraged to seek more financial support from the government and secure other sources of funding by presenting the importance of hydrographic survey and related activities.
- Since publishing the ENCs mainly depends on this MoU signing, the DWIPC should continuously follow up with the Office by arranging online meetings for a more effective communication and together setting timeline, if possible, to accelerate the MoU conclusion.

Lessons Learned to JICA:

- Several opportunities such as publishing the ENCs for external use and issuing waterway notifications are being held back, since the MoU with the United Kingdom Hydrographic office has not been signed yet. Therefore, JICA’ future projects should review important factors, such as the MoU signing, that can support the project’s faster outcome delivery, and incorporate them in the project activities at

the time of planning.

- It can be seen that this project is not very sustainable due to some problems in the technical and financial aspects. For future technical cooperation projects, JICA should review the implementing agency's long-term plan in supporting the project even after its completion at the early stage (formulation stage) of the project. One of the main items to be mentioned in the long-term plan should be about a financial aspect, in which the implementing agency needs to assure JICA of its capability to secure sufficient budget to sustain the project's impacts and update staff's technical capacity on their own after the project completion.



The newly produced paper nautical chart at a 1:20,000 scale