



Executive Summary

EDCF Bridge Sector Evaluation

- This study is the result of an evaluation of bridges supported by the Export-Import Bank of Korea EDCF in Vietnam and Tanzania, and was conducted by a research team at the Jeonbuk National University through fieldwork, literature research, and survey methods from August 2023 to February 2024.
- As the large-scale bridge projects of the Economic Development Cooperation Fund (EDCF) expand, this study aims to conduct the following in order to reinforce efficiency and effectiveness of the relevant projects: 1) Analysis of the bridge management system of important recipient countries (Vietnam, the Philippines, Cambodia, Bangladesh, Tanzania, etc.), 2) Analysis of various ODA cases of main countries and international organizations in the area of road traffic, 3) Post evaluation of the Vam Cong Bridge and a literature review on the Vinh Thinh Bridge, the Tinh Long Bridge and the Hung Ha Bridge, Vietnam, and, 4) Post evaluation of the new Selander Bridge, Tanzania and a literature evaluation on the Malagarasi River Bridge, Tanzania.
- In addition, this study sought to derive implications for the EDCF project by analyzing the bridge management system of main recipient countries (Vietnam, the Philippines, Cambodia, Bangladesh, Tanzania, etc.) where the construction of large-scale landmark bridges is increasing.
- The Vietnamese government is promoting continuous cooperation with advanced countries such as the Japan International Cooperation Agency (JICA) in order to improve the bridge management system and strengthen their capacity. Recently, Korea's ODA projects have been consistently promoted to strengthen Vietnam's bridge management system and their capacity. Especially, at the request of the Vietnamese government, the Korea Institute of Civil Engineering and Building Technology (KICT) plans to promote an ODA program to transfer the management system capacity that can ensure integrated management and maintenance of all special bridges in Vietnam for four years from 2025. Therefore, the ways to associate with the EDCF's bridge projects must be explored.

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- The bridge and road traffic infrastructure projects of the Philippines are conducted via international development cooperation funds and Public–Private Partnership (PPP) rather than the government funding. As of 2023, 42 out of 51 bridge projects are conducted via ODA or PPP. For maintenance and repair in bridge construction that tends to rapidly increase, related laws and promotion system are being quickly improved. Especially, the efforts to establish performance indices and manage them and arrange detailed reward and punishment guidelines for each local management personnel through regular performance checks are outstanding.
 - While Cambodia, with the support of the JICA, has strengthened its management capacity and established and managed the bridge maintenance and repair manuals, a significant part of the records pertaining to completion drawings of the bridges, maintenance and repair and years of completion that are necessary for bridge management is not being maintained. Also, China’s encroachment into major road traffic infrastructure projects has been serious and it is necessary to cope with this phenomenon, supplement national administrative capacity, strengthen the local constructors’ construction technology capacity and reinforce the consultants’ construction supervision capacity.
 - As Bangladesh is aware of the importance of the budget for preventive repair measures (PMP Minor) in the budget of the bridge maintenance and management, it is necessary to prevent major defects by increasing the portion of the relevant budget and consequently save the life cycle cost while making the bridge life longer. Alongside, overall, it is necessary to establish the cooperation system of related departments of Bangladesh and improve the project management capacity.
 - As for Tanzania’s bridge management system, despite national policies and implementation strategies of responsible departments, there are matters to be improved such as the lack of human resources for bridge (infrastructure) management, insufficient financial resources, frequent delays of the bidding processes, a delay of the VAT exemption processes, a delay of permission and approval procedures for the projects and the lack of basic bridge maintenance and repair technology and financial resources.

■ **Analysis of the ODA of major countries and international organizations in the area of the road bridge.**

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- The bridge construction area as the subject of evaluation of this report pertains to road traffic. Therefore, the trends in aid for the relevant area have been reviewed and the road construction cases have been introduced.
 - Major donor countries in the area of road traffic are Japan, Korea and the USA. Only Korea and Japan repeat increase and decrease while maintaining a certain scale at large. Major donor countries including the USA show insignificant aids in the area of road traffic and indicate a decreasing trend.
 - As a result of our review of nine cases including three Japanese bridge and road construction cases, one US road construction case, two ADB bridge and road construction cases and two AfDB bridge and road construction cases, the following implications have been derived in terms of sustainable use and maintenance.
 - While noticeable examples related to present indices for sustainability of the bridges have not been found, most of the projects commonly mention the necessity to strengthen the technological capacity to increase sustainability of the bridges or roads.
 - There is a case which has designed the inclusion of free or charged education and training programs.
 - At the same time, some cases have prescribed the condition to win a bid under the premise of technology transfer from constructors.
 - On the other hand, as for the bridge or road construction projects, the effects are affected by the national infrastructure status. Therefore, comprehensive approaches are necessary in consideration of each industrial structure.
 - Additionally, as for large-scale construction projects, the variability of the project budget and the range is high. Therefore, professional reviews must take place more closely in the process of preliminary feasibility studies, etc. in order to secure completion of the projects and sustainable maintenance. Especially, if a process pertaining to advanced technologies is included, the failure to secure a close preliminary review will result in variation in the project budget and term and cause safety accidents.
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■ **Post evaluation of the Vam Cong Bridge and literature reviews on the Vinh Thinh Bridge, the Thinh Long Bridge and the Hung Ha Bridge, Vietnam.**

- The Vam Cong Bridge is the core axis of the 'Central Mekong Delta Connectivity project (CMDCP)' which originates from the project of Vietnam and the ADB to establish a national traffic network. It is the first large-scale project of the EDCF for Vietnam amounting to USD 277,238,000 (EDCF, USD 200,000,000). The loan was approved in 2010 and the completion took place in May 2019.
 - Based on evaluation of the Vam Cong Bridge, the overall score is 3.59/4.00, meaning that it is a 'successful' project: Despite the positive evaluation in most of the evaluation indices, certain factors of reduction of the score occurred due to the deviation between the estimated traffic volume and the actual traffic volume.
 - The Vam Cong Bridge is the Vietnamese government's 'Component 3: Vam Cong Bridge (2.97km) and Access Road (2.8km)' project, an element of the 'Central Mekong Delta Connectivity project (CMDCP)' consisting of six projects divided into the first and the second stages and conducted through joint financing between the ADB and Australia's Department of Foreign Affairs and Trade (DFAT). By securing the consistency with the projects and strategies of other donor countries, it secured the landmark effect as the national key bridge and is the first case of EDCF's project enlargement in Vietnam (above USD 200 million).
 - The social benefits (travel time, transportation cost, air pollution and noise reduction) estimated based on the results of the traffic volume survey on the Vam Cong Bridge is expected to reach USD 1,299.92 million (KRW 1.6803 trillion).
 - The indirect estimation of the economic effect of the Vam Cong Bridge based on the evaluation model and the cases of the effects of improvement of traffic infrastructure on the local areas tells that GRDP per capita of An Giang where the Vam Cong Bridge is located rapidly increased from VND 15,800,000 (KRW 845,000) before the completion of the bridge to VND 46,800,000 (KRW 2,504,000) in 2010 right after the completion. It consistently increased, reaching VND 61,000,000 (KRW 2,884,000) in 2023. There has been a similar increase of GRDP in the adjacent area such as Can Tho.
 - Based on evaluation of the effects of the Vam Cong Bridge as a landmark, the levels of awareness,

favorability and interest are relatively high and positive aspects of the location and appearance have been found: The respondent who know that Korea has contributed to construction of the Vam Cong Bridge takes up 65% and the respondents who evaluate that the construction has positively affected the improvement of awareness of Korea amounts to 96%, which is very high.

- However, the traffic volume, based on a survey, is only about 26,000 a day, which is only a half of the prediction under the 2011 feasibility study. The deviation comes from the location of the bridge which is far away from Long Xuyen, the result from the main purpose of the bridge being the connection of the expressway traffic network and the resumption of the ferry operation which was supposed to be stopped due to inconveniences of residents arising from absence of the bridge entry lamp.

- Also, the initial project term was 62 months while a delay of 33 months took place. Considering that the delay was inevitable due to the man-made and natural disasters, institutional strictness to minimize the unnecessary delay in the pre-construction stages such as employment of consultants (five months delayed) and the purchase contract (11 months delayed) is required. It has been confirmed that the impractical reduction of the construction term (five years recommended based on the technology review report and four years spent in reality) may lead to safety and quality problems.

● The early commencement of construction of the Vinh Thinh Bridge through organic cooperation among the recipient country's government, project executors and constructors and early completion of the compensation procedure has resulted in the exemplary project which has reduced the project implementation period without a quality decline.

- However, the issue of use of the reserve fund coming from price increase and additional earthwork has been mentioned in the preliminary feasibility study and the project review report. It is found that cost planning and actualization of execution through accurate research and analysis is important.

- Also, unlike the positive effect on local economic growth universally considered in general bridge projects, the negative effect on the residents near the dock coming from the closure of the dock due to the bridge construction has not been considered. Therefore, such a factor shall be proactively considered in the project planning.

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- The Hung Ha Bridge is the infrastructure expected to expand connectivity of the project site and increase freight volume through connection with major expressways and arterial roads of the Red River Delta. It is estimated that the actual traffic volume is very high. However, post evaluation as an EDCF project is absent and appropriate evaluation pertaining to this is required.
 - Especially, it was completed at 56.6% of the loan approved for this project by the EDCF and appropriate evaluation of the cost-saving factors is necessary. Despite early completion through proactive term reduction, the access road opening was delayed by ten months. Considering the importance of access and access roads for any bridge project, such a factor needs to be appropriately tended at the planning and execution stages of the entire project.

 - The Thinh Long Bridge was expected to produce great effects on creation of added value to the local economy through industrialization and improvement of investment environment of the Hong River Delta and Nam Dinh along with better accessibility on the part of the nearby residents. By including the project which is uncertain to take place in the effect and the background upon the preliminary feasibility evaluation, it produced negative effects in terms of effectiveness of the project.
 - The smooth achievement of the daily traffic volume goal and the similarity of the actual economic growth rate of Nam Dinh to the average annual economic growth of the Red River Delta mean that there has been the demand for local traffic volume undiscovered at the stages of the feasibility study and the review. Therefore, it is suggested that a realistic analysis at the stages of the strict feasibility study and the project review is very important in terms of performance management.

 - The lessons from evaluation of the Vietnamese bridges are as follows:
 - The Vam Cong Bridge is the project where the EDCF contributed to the completion of Vietnam's national infrastructure building plan along with the ADB and Australian government. It is the EDCF's first project in Vietnam involving enlargement and multilateral cooperation. It is Korean ODA's positive example that contributed to improvement of economic infrastructure of a developing country.

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- For this reason, the Vam Cong Bridge was recognized by the Vietnamese government and people as a landmark symbolizing Vietnam's splendid economic growth. In that such a value of the bridge has been confirmed to have contributed to formation of positive images on Korea, it is an exemplary case supporting the necessity to expand the large-scale infrastructure projects in the areas of the bridges and road traffic that have the meaning as landmarks.
 - In that the Vinh Thinh Bridge and the Hung Ha Bridge have become the symbols of Korea-Vietnam cooperation through their installation in appropriate locations based on the traffic development plan of the Vietnamese government and Hanoi, it presents the lesson that selection of the location is important.
 - However, as for the Vam Cong Bridge project, the difference between the estimated traffic volume predicted upon the feasibility study and the actual traffic volume, adjacent residents' low accessibility to the bridge, failure to meet the construction term presented in the technology review report, the pressure to reduce the construction term, immoderate excess of the construction term due to (highly probable) crack accidents and the unnecessary delay at the stages of consultant and purchase contracts are the tasks to be overcome.
 - Also, as for large-scale infrastructure projects, there shall be the efforts to reduce the gap between the estimated value of effectiveness and the actual effect through strictness of the project feasibility study. As for the Thinh Long Bridge, the factors at the planning stage rather than the project under way or to be completed were included in the necessity and imperativeness of the project. However, the actual project was not executed, resulting in the failure to meet the expected value of effectiveness of the traffic volume.

● The recommendations from evaluation of the Vietnamese bridges are as follows:

- **Recommendations to the EDCF**

- As for the bridges to which the newest construction techniques have been applied, the need to improve maintenance and repair in terms of Vietnam's policies, technologies and budgets has been confirmed. Therefore, from the stage of EDCF's planning, it is necessary to include strengthening of O&M, affiliation for technological cooperation and related budgets.

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- In order to minimize the delay that occurs at the stages of consultant and purchase contracts, it is necessary to prevent any possibility of unnecessary delays by making quantification for participation and regulations on the conditions strict.
 - The effect of the EDCF's bridges as landmarks has been confirmed while as the level of awareness that the project came from Korea's EDCF has been low. Therefore, additional online and offline activities informing that the projects originated from Korean government's aids are necessary. In this pursuit, the related budget shall be included in the process of a project negotiation with each recipient country (MOD). It is also necessary to arrange a route to indicate the landmark indices pertaining to the details of each EDCF project in the project achievement framework in advance.
 - The need to reinforce efficiency and effectiveness of the project through strictness in the project feasibility study: The main purpose of the Vam Cong Bridge was prominent in terms of construction of the national expressway network and the plan was to establish it in an area that detours the adjacent city center. However, on the other hand, there was contradictory estimation of the effect in the prediction that the completion of the bridge will replace the adjacent local residents' demand for ferries.
 - In order to solve the problem of administrative delays in each recipient country in terms of project efficiency, it is necessary to introduce the commitment fee system as a device to provide an incentive if a project is executed by a recipient country within the planned project term.
 - *** As for the Vam Cong Bridge, despite the fact that the EDCF rapidly dispatched the project personnel to solve the problem of a delay on the part of the recipient country in the process of the consultant and the purchase contracts, the excessive delay worked as a negative aspect in the evaluation. Therefore, it is necessary to systemize the incentive mechanism in terms of prevention of unnecessary delays on the part of the recipient countries.**
 - Also, as for the large-scale landmark infrastructure projects where advanced technologies of recipient countries were used, the limit in terms of the capacity for maintenance and management has been confirmed. Therefore, there shall be a continuous annual inspection system working between the EDCF and each recipient country even after the after-service period.
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– Recommendations to the recipient country

- The difference between the system and actual operation occurred in terms of maintenance and repair of the bridge and there shall be efforts to reduce this difference: While there is a manual on maintenance, repair and management of the bridge, the actual state of maintenance and repair was far from positive. Therefore, at the stage of project planning, there shall be consultations so that the financial resources necessary to secure workforce, budget and technologies for operation, maintenance and management of each recipient country can be arranged within the independent budget of each recipient country or the budget provided by the EDCF.
- Spontaneous cooperation and interest on the part of the recipient country upon evaluation of the project are necessary: Vietnam runs preliminary approval system upon contact with residents for evaluation of the aid project conducted by a foreign institution. This works as a barrier disabling the actual contact with residents and it is necessary to improve the system pertaining to evaluation of overseas institutions.
- The need for continued promotion of the accessory projects to reinforce the usability of the bridge: As for the Vam Cong Bridge, the absence of an entry lamp worked as one of the factors that halved the traffic volume over the bridge estimated upon the feasibility study.

■ Post evaluation of Tanzania's new Selander Bridge and a literature review on the Malagarasi River Bridge

- The new Selander Bridge project was to construct the bridge and the roads connecting the CBD area, the center of Dar es Salaam and the Msasani Peninsula. The EDCF provided USD 123,653,000 including the main loan and the supplementary loan. It was completed in December 2021 after approval of the loan in 2014.
- The result of evaluation of the new Selander Bridge was 3.72/4.00, meaning that it was a 'very successful' project.
- Although there has been a reduction of the score by reflecting the fact that the estimated value of demand to develop traffic infrastructure is within 20% of the error range, there has

been a performance management framework very appropriate for policies of the Tanzania's government and the sense of ownership on the part of the government of Tanzania is very high. Therefore, the project is considered to be very appropriate in general.

- In addition to the fact that the project is highly synergistic with the EDCF's other aid projects, consistency with the aid projects of other donor countries is found. Therefore, consistency of the project is very high.
- The selection of the project site was very efficient and the execution of the project budget was effective. Despite the difficulty to continue the construction due to the exceptional rainfall, efficiency of the project was very high in reflection of the fact that efficiency in the measures taken prevented an excessive delay of the project term.
- Although certain unexpected effects of concentration of the project effect on certain classes were observed, the output was 100% achieved and considering that the output was achieved as planned, the project was very effective.
- Although there are restrictive aspects partially, it is found that the economic effect was achieved as purported and the influence of the project is very high.
- Based on the aspect that this bridge is being very actively used currently, sustainability is positively evaluated. However, the coping capacity in terms of future technologies is expected to be low. In that there is the need to secure mid-to-long term financing, sustainability is not high.
- Diverse aspects in terms of environment and climate change were considered. From the aspect that regular reporting was planned based on a manual, positive evaluation is possible.
- Not only in that the bridge was constructed in a location very appropriate as the local marker but also in that the use as a landmark is proactive in relative terms, it can be evaluated very highly as a landmark. However, as to whether the landmark contributed to improvement of awareness of Korea, the evaluation was negative.

- The Malagarasi River Bridge project was to construct the bridge and the connecting roads in

the Malagarasi River, Kigoma, Tanzania. The EDCF completed it in 2016 with a total budget of USD 54 million. It is an exemplary project that has contributed to facilitation of economy of the adjacent area very effectively.

- The Malagarasi River Bridge project reflected the Tanzania's governmental policies and its suitability was very high as its plan was made based on discussions of appropriate levels.
- The Malagarasi River Bridge project is consistent not only with the EDCF's aid strategies but also with aid strategies of other donor institutions.
- Although the Malagarasi River Bridge project was conducted with the selection of the site in a very effective area, the efficiency in terms of the construction term and spending of the project cost was not high.
- The Malagarasi River Bridge project achieved the output as expected. As planned, it provided conveniences to poor adjacent villages. Thus, it was a sufficiently effective project.
- The Malagarasi River Bridge project guaranteed the safe mobility right of the adjacent residents and affected their economic activities very significantly.
- The Malagarasi River Bridge is subject to regular management of the TANROADS, a public institution of Tanzania. It has been identified that the TANROADS has conducted maintenance and repair of the bridge in a relatively sustainable form. However, the capacity of the TANROADS must be strengthened.

● The lessons from evaluation of the bridge in Tanzania are as follows:

- The new Selander Bridge project was to construct the bridge and the roads connecting CBD, the center of Dar es Salaam and the Msasani Peninsula. It is a very successful project that has produced the effect of dispersion of the traffic volume of the area.
- At the same time, the new Selander Bridge involves high technologies where Korea's technological excellence played its role. Therefore, for Tanzania's independent and sustainable management, technological capacity must be strengthened.

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- On the other hand, due to the limit of the feasibility study, the project cost increased and the provision of a supplementary loan had to take place. In order to reduce the need for a supplementary loan, a close feasibility study will be required. The lesson is that there shall be an appropriate budget for this.
 - Based on the fact that the new Selander Bridge is recognized by the government of Tanzania and its residents as a landmark that symbolizes the modernization of Tanzania, it is a very effective project. However, the small number of users who recognize the connection between the landmark and Korea is something missing.
 - The Malagarasi River Bridge connects the core districts of logistics connecting the east and the west of Tanzania, which conforms to the national policy. The needs for it were very clear for safe movement of local residents. Therefore, the effect can be very high.
 - However, the provision of a supplementary loan due to the changes of the project term until the completion of the bridge and the connecting road as well as the budget can be interpreted as an aspect reducing the project efficiency. Nevertheless, the supplementary loan provided at an appropriate point of time played a very critical role in the completion of the project and worked as a direct factor that produced the project effect. The lesson is that it is very important to solve the problems in time through continuous communication and exchange with related institutions upon any similar future projects.

● The recommendations from evaluation of the bridge in Tanzania are as follows:

- **Recommendations to the EDCF:**

- In order to reduce errors such as a supplementary loan, a close review of the project is required through appropriate budget support at the stage of the feasibility study.
- However, regardless of the results of the feasibility study, if the need for a supplementary loan arises from an external factor, there shall be a response in time to smoothen the completion of the project and generation of the effects.
- There shall be sufficient technology education in the scope of the project so that the

cooperation subject can independently implement systemic maintenance and repair of the output after completion of the project. The capacity building on the part of the recipient country shall be encouraged for it to cope with technological risks after the completion of the project.

- In addition to outright generation of economic benefits pertaining to the landmark construction project, there shall be our interest in creation of social values interworking with long-term economic benefits.
- It is necessary to arrange a relevant plan so that a landmark construction project can be linked to improvement of awareness of contribution of Korea. It is also necessary to have a plan to indicate the landmark indices in the project achievement framework.
- Also, as for a landmark construction project, it is necessary to specialize and consider the conditions for selection of a project site as a landmark.

– Recommendations to the recipient country:

- From the aspect of sustainable maintenance and repair of the bridge, the recipient country shall voluntarily work hard to strengthen its technological capacity.
- It is necessary to promote timely accessory projects additionally required for effective use of the output.
- As for a landmark-type construction project, awareness of users must be improved for effective use of the output.
- Upon evaluation of a project, the recipient country's proactive cooperation and interest covering provision of documentary materials, approval of access to the worksites and safety support upon visits and permission of local residents' access are required.