People's Republic of Bangladesh

FY2022 Ex-Post Evaluation Report of Technical Cooperation Project

"The Project for Capacity Development on Natural Disaster Resistant Techniques of Construction and Retrofitting for Public Buildings in Bangladesh"

"The Project on Promoting Building Safety for Disaster Risk Reduction in the People's Republic of Bangladesh"

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0. Summary

CNCRP[1] and BSPP[2] aimed to reduce disaster risks in urban areas in Bangladesh through technology transfer of seismic retrofitting and construction to Public Works Departments (PWD) in charge of management for public buildings and knowledge dissemination to related organizations and private engineers. CNCRP aimed to promote the construction and retrofitting of public buildings to resist natural disasters by improving the capacity of PWD in charge of management of public buildings in the country for seismic retrofitting and earthquake-resistant construction. BSPP also aimed to reduce the risk of natural disasters in urban areas by improving the capacity of PWD and disseminating knowledge to relevant departments and private sector engineers in order to promote the strengthening of safety in public buildings in urban areas. Both projects were consistent with the development policy and development needs in Bangladesh both at the time of planning and at the time of completion of the both projects. The consistency with Japan's ODA policy at the time of planning was also confirmed. Furthermore, the collaboration, synergy, and complementarity with JICA's related projects and other international organizations were also confirmed. Therefore, the relevance and coherence of the project are high. The project purpose and outputs of both projects were generally achieved and contributed to the achievement of the overall goals. Hence, the effectiveness and impact are also high. Regarding efficiency, both project cost and project period exceeded the plan due to external factors such as the Rana Plaza collapse during the implementation of CNCRP, terrorism as well as the spread of COVID-19 infection during the implementation of BSPP. However, it is appropriate to exclude the impact of these external factors from the evaluation if the details of the exceedances can be confirmed in the document. The increase in project cost and project period is considered to be a necessary input to achieve the expected outputs, and therefore, the overall efficiency of the project is high. Regarding the sustainability of the effects of the two projects, some issues were found in terms of institutional/organizational,

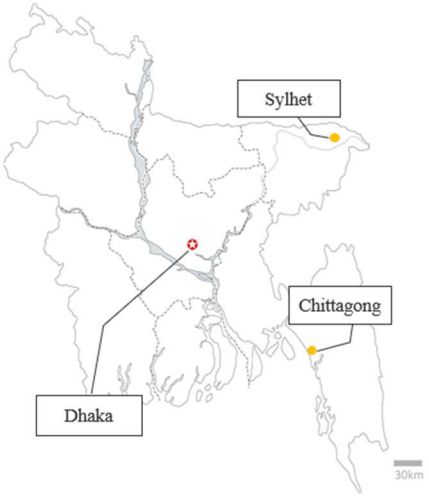
[1] Abbreviation of "The Project for Capacity Development on Natural Disaster Resistant Techniques of Construction and Retrofitting for Public Buildings in Bangladesh"

[2] Abbreviation of "The Project on Promoting Building Safety for Disaster Risk Reduction in the People's Republic of Bangladesh"

technical, financial aspect, and the current status of operation and maintenance. Therefore, the sustainability of the project effect is moderately low.

In light of the above, this project is evaluated to be satisfactory.

1. Project Description



Project Locations
(Source: External Evaluator)

Seismic retrofitting by the implementing agency
(Source: External Evaluator)

1.1 Background

Bangladesh is located south of the Himalayan mountain range, one of the regions with the highest frequency of earthquakes in the world, and the potential danger of earthquakes has been highlighted. Since the Assam earthquake in 1897, there have been eight earthquakes with a magnitude of 7 or higher in the surrounding areas of Bangladesh over approximately 100 years. Among them, the Gorkha earthquake in Nepal, which occurred in April 2015 and caused over 8,000 casualties, resulted in more than 200 injuries in Bangladesh, including 4 fatalities, despite Dhaka, the capital, being over 500 km away from the epicenter. According to a survey by the United Nations Development Programme (UNDP), if a magnitude 7.5 earthquake were to occur on a fault near Dhaka, it is estimated that about 30% of buildings in the Dhaka metropolitan area would be completely or half destroyed, with a death toll of approximately 60,000 to 90,000 people. This has rapidly increased the need for improving earthquake preparedness and strengthening measures against earthquake disasters.

In urban areas, there has been rapid economic development, leading to the rapid construction of tall buildings and high population density. However, many of these buildings lack consideration for earthquakes and fire safety, and building standards are often not followed, leading to an increasing number of building collapse incidents. In April 2013, a

large-scale collapse occurred in a tenant building called "Rana Plaza[3]," which housed garment factories, due to illegal construction and unauthorized additions, resulting in over 1,130 casualties. This had a significant impact on the garment industry that supports Bangladesh's economy.

In order to provide essential support for Bangladesh's steady economic growth, it was of utmost urgency to reduce disaster risks in urban areas. Therefore, it was necessary to focus on the development of technical experts who could contribute to promoting building safety and the strengthening of administrative functions.

1.2 Project Outline

<The Project for Capacity Development on Natural Disaster Resistant Techniques of Construction and Retrofitting for Public Buildings in Bangladesh>

Overall Goal		Construction and retrofitting of public buildings which are strong against natural disasters are promoted.
Project Purpose		The capacity of PWD for the construction and retrofitting works of the public buildings against natural disasters is developed.
Outputs	Output 1	The capacity to do inventory, vulnerability assessment (seismic evaluation) of the existing public buildings is developed.
	Output 2	The design methods for new building designing as well as retrofitting the public buildings against natural disasters are established.
	Output 3	The capacity to manage retrofitting works of the public buildings is developed.
	Output 4	Quality control process is developed.
	Output 5	The technologies on construction and retrofitting for new building design and retrofitting design of public buildings which PWD gets by the Project are succeeded within PWD as well as are disseminated to relevant engineers of other organizations.
Total cost (Japanese Side)		725 million yen
Period of Cooperation		March 2011 - January 2016 (Extension period: March 2015 to January 2016[4])

[3] On April 24, 2013, an 8-story commercial building called "Rana Plaza" located in Savar City, which is approximately 20 kilometers northwest of Dhaka, the capital of Bangladesh, collapsed. Rana Plaza housed banks, several shops, and garment factories for fashion brands. Many of the casualties in this incident were young women who worked in these factories.

[4] Regarding the agreement for the extension period, it has been confirmed through records of discussion (R/D) with the host government, minutes of the Joint Coordination Committee (JCC), and amendment contracts.

<The Project on Promoting Building Safety for Disaster Risk Reduction in the People's Republic of Bangladesh>

Overall Goal		Seismic disaster risk in urban area is reduced.
Project Purpose		Capacity for promoting seismic safety in public buildings of urban area is enhanced.
Outputs	Output 1	Human resource development system for seismic building safety is enhanced.
	Output 2	Manuals, handbooks and tools prepared to promote the seismic related techniques are applied to actual implementation works for public buildings in urban area.
Total cost (Japanese Side)		912 million yen
Period of Cooperation		February 2016 - February 2022 (Extension period: February 2020 to February 2022[5])

<Items common to both projects>

Target Area	Dhaka, Sylhet and Chittagong
Implementing Agency	Public Works Department (PWD) / Ministry of Housing and Public Works (MoHPW)
Related Projects	[Technical Cooperation] ・ Short-Term Expert for strengthening earthquake preparedness (2004) ・ Disaster Management Sector Advisor (2015 - 2018, 2019 - 2022) ・ The Project for Technical development to upgrade structural integrity of buildings in densely populated urban areas and its strategic implementation towards resilient cities (2016 - 2021) ・ The Project for Improvement of Design and Construction Quality for Resilience of Private Buildings (2020 - 2026) [ODA Loan] ・ Financial Sector Project for the Development of SMEs (L/A signed in 2011) ・ Urban Building Safety Project (L/A signed in 2015) [Grant Aid]

[5] Regarding the agreement for the extension period, it has been confirmed through the R/D with the host government, minutes of the JCC, and amendment contracts.

	・ The Project for Construction of Multipurpose Cyclone Shelters (Phase 1 - 5) (1993 - 2006) [Other Donors] ・ UNDP: Comprehensive Disaster Management Programme (2010 - 2014) ・ World Bank: Urban Resilience Project (2015-)

1.3 Outline of the Terminal Evaluation

1.3.1 Achievement Status of Project Purpose at the Terminal Evaluation

Regarding CNCRP, trainings of seismic retrofitting have generally been conducted as planned, and it was evaluated that the Project Purpose are likely to be achieved by the end of the project. As for BSPP, it was considered highly likely that the project purpose would be achieved because there has been an increase in buildings conforming to the *Bangladesh National Building Code* (BNBC).

1.3.2 Achievement Status of Overall Goal at the Terminal Evaluation

Regarding CNCRP, there were some inadequacies in the budget and human resources for earthquake retrofitting projects. However, PWD was expected to create a roadmap for earthquake retrofitting projects, and they had also received requests for earthquake retrofitting work from other public agencies. Because of this, it was assessed that the likelihood of achieving the overall goal is high. As for BSPP, the understanding of the importance of seismic retrofitting has been promoted not only among PWD staffs but also among related organizations and private engineers through trainings. It was expected that through continuing to promote the dissemination of experience and knowledge related to seismic technology, the overall goal would be achieved.

1.3.3 Recommendations from the Terminal Evaluation

In CNCRP, recommendations included the appropriate maintenance and management of manuals, guidelines, and inventory data created by the project, sharing insights from a pilot project among stakeholders, conducting regular training sessions, and establishing a dedicated seismic retrofitting unit within PWD. For BSPP, recommendations included the dissemination of seismic technology through regular trainings for PWD staff and private engineers, utilization of inventory data, handbooks, and guidebooks created through the project, and the establishment of a dedicated seismic retrofitting unit within PWD.

2. Outline of the Evaluation Study[6]

2.1 External Evaluator

Keisuke Nishikawa / Shunya Awamura, QUNIE CORPORATION

2.2 Duration of Evaluation Study

This ex-post evaluation study was conducted with the following schedule.

Duration of the Study: September, 2022 - October, 2023

Duration of the Field Study: December 3, 2022 - December 23, 2022, March 6, 2023 - March 14, 2023

3. Results of the Evaluation (Overall Rating: B[7])

3.1 Relevance/Coherence (Rating: ③[8])

3.1.1 Relevance (Rating: ③)

3.1.1.1 Consistency with the Development Plan of Bangladesh

At the time of the planning and completion of CNCRP, in *the National Plan for Disaster Management* (NPDM), Bangladesh was recognized as being susceptible to damage from earthquakes which are considered one of the natural disasters. Furthermore, *the Standing Orders on Disaster* (SOD) explicitly specified the role of PWD in handling disaster risks in public buildings. The BNBC contained detailed provisions regarding disaster zoning maps and seismic design. *The Disaster Management Act* positioned seismic retrofitting work as a pre-disaster mitigation measure against earthquake disasters.

Similar to the implementation phase of CNCRP, at the time of the planning of BSPP, the importance of earthquake disaster preparedness was explicitly stated in NPDM, SOD, BNBC, and *the Disaster Management Act*. In *the Seventh Five Year Plan (2016 - 2020)*, disaster management was identified as one of the critical areas, alongside climate change and environmental issues.

At the time of the completion of BSPP, NPDM (2021 - 2025) has emphasized disaster risk reduction as its core objective, with particular emphasis on positioning the reduction of earthquake risk as a crucial action plan. The BNBC amended in 2020 has introduced "Earthquake-Resistant Design Provisions" with the aim of minimizing damage to buildings during earthquakes. The SOD amended in 2019 has outlined the roles and responsibilities of various ministries and agencies during disasters including earthquakes and establishing earthquake preparedness committees. Furthermore, in *the Eighth Five Year Plan (2020 - 2025)*, disaster management has continued to be recognized as a critical area, alongside

[6] In the evaluation process, CNCRP and BSPP were assessed as separate projects, and based on the results of these individual assessments, a comprehensive evaluation of both projects was conducted.

[7] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

[8] ④: Very High, ③: High, ②: Moderately Low, ①: Low

climate change and environmental issues, following the pattern established in *the Seventh Five Year Plan (2016 - 2020)*. Development policies for both projects at the planning and completion stages are presented in Table Table 1.

Table 1 Development Policies at the Time of Planning and Completion of Both Projects

	At the Time of Planning	At the Time of Completion
CNCRP	NPDM (2010 - 2015) SOD (2010) BNBC (1993)	NPDM (2010 - 2015) SOD (2010) BNBC (1993) Disaster Management Act (2012)
BSPP	NPDM (2010 - 2015) SOD (2010) BNBC (1993) Disaster Management Act (2012) Seventh Five Year Plan (2016 - 2020)	NPDM (2021 - 2025) SOD (amended in 2019) BNBC (amended in 2020) Disaster Management Act (2012) Eighth Five Year Plan (2020-2025)

Source: External evaluator created this table based on information from various policy documents and implementing agencies.

Based on the information provided, development policies and regulations related to disaster management and building standards have explicitly emphasized the importance of disaster risk reduction, including earthquake damage, and disaster management. Therefore, it can be concluded that both projects align with Bangladesh's development policies at the time of both the planning and completion.

3.1.1.2 Consistency with the Development Needs of Bangladesh

As mentioned in the Background section, at the time of the planning of CNCRP, the need for measures against earthquake disasters was increasing. However, the technical expertise among government officials regarding building earthquake resilience was insufficient, and many buildings had been constructed before the year 1993, in which BNBC was established, hence, the buildings were vulnerable to natural disasters.

Similarly, at the time of the completion of CNCRP and the planning of BSPP, efforts to enhance the safety of buildings in urban areas were underway. Still, there were bottlenecks, such as an insufficient number of government officials and engineers, a limited number of experts, and few examples of seismic retrofitting works. Thus, administrative mechanisms for building earthquake resilience and compliance with building standards were not effective.

At the time of the completion of BSPP, based on the information from PWD, there remained earthquake disaster risks and was a need for strict compliance with laws such as BNBC and awareness-raising activities for organizations other than PWD. Additionally, addressing issues related to landslides in hilly areas, as well as liquefaction problems in low-lying areas along rivers associated with earthquake disasters, were both identified as target

problems to be resolved.

In summary, earthquake disaster risks have existed through both project terms and the necessity for compliance with BNBC and the dissemination of earthquake-resistant technology were confirmed. Therefore, at the time of both the planning and completion, both projects align with Bangladesh's development needs.

3.1.1.3 Appropriateness of the Project Plan and Approach

Following the Rana Plaza collapse in 2013 during the implementation of CNCRP project, PWD signed a memorandum of understanding with the Bangladesh Garment Manufactures and Exporters Association and others for a support program aimed at improving the working environment of the garment industry. Then, seismic retrofitting for a private garment factory, which was not included in the original scope of the project, was implemented. Although seismic retrofitting for private-sector buildings is outside the jurisdiction of PWD, the additional scope is considered appropriate because the project contributed to capacity building for PWD staffs and achieving the outputs[9] of CNCRP by providing opportunities for seismic retrofitting, while also collaborating with JICA's ODA loan "Financial Sector Project for the Development of SMEs." As for the Project Design Matrix (PDM) of CNCRP, as shown in Table Table 2, indicator 2 through 4 of Output 5 had not set numerical targets, which is considered to have been set before or during the implementation of CNCRP.

Table 2 Points to be considered regarding the appropriateness of the PDM in CNCRP

Outputs and Indicators	Points to be considered
Indicator 2 of Output 5: Number of seminars on the training for external dissemination	No numerical target
Indicator 3 of Output 5: Number of certificates given to the trainees who completed the seismic evaluation course, new building designing as well as retrofitting of the public buildings	No numerical target
Indicator 4 of Output 5: Number of certificates given to the trainees who completed the construction supervision course and quality control course for public buildings	No numerical target

Source: External Evaluator created the table based on interviews to implementing agency and Japanese experts.

Although BSPP included private buildings in the scope of the project at the beginning, there was a change during the implementation of the project to remove the scope of private buildings from the PDM since it was outside the scope of PWD, which has jurisdiction over public buildings. Accordingly, each output and indicator in the PDM was changed or deleted

[9] On the PDM, it contributed to Indicator 2 of Output 2, "Design documents for retrofitting the selected buildings are prepared."

during the project implementation, as shown in Table 3. It is considered that this change was a necessary measure in terms of excluding the contents that are not in PWD's scope of work, and therefore, it is judged to be appropriate.

Table 3 Points to be considered regarding the appropriateness of the PDM in BSPP

Outputs and Indicators	Points to be considered
Indicator 1 of Output 1 300 engineers in PWD, 30 architects in Department of Architecture (DoA), National Housing Authority (NHA), Urban Development Directorate (UDD) and Housing and Building Research Institute (HBRI), 300 engineers in private sector / other departments complete training program about seismic techniques.	Change of the indicator[10]: Initially, the training was targeted only to PWD staffs, but this was changed to include participants from related organizations so that the number of trainees could be increased as much as possible for the purpose of promoting seismic technology.
Indicator of Output 1: Level of trained engineers' understanding of seismic technique	Deleted[11]: The indicator was deleted as it was supposed to be difficult to measure the achievement level
Indicator of Output 1: Level of proper operation of developed training manual	Deleted[12]: The indicator was deleted as it was supposed to be difficult to measure the achievement level
Indicator 1 of Output 2: 10 cases of seismic evaluation, seismic design, retrofitting design, construction supervision following the prepared manuals and handbooks are implemented for public buildings.	Revision of numerical target[13]: After BSPP started, the numerical target was revised from 50 cases to 10 cases. This is because, at the time of the ex-ante evaluation, the target figure had been set to include the achievement generated from the ODA loan project "Urban Building Safety Project," that was implemented at the same time.
Output 3: Regulatory System for Building Safety is developed	Deleted[14]: The output was deleted by the Bangladesh government since PWD does not cover private buildings in its scope of work.

Source: External Evaluator created the table based on interviews to implementing agency and Japanese experts.

As lessons learned in the past in disaster risk and construction-related fields, the

10 Revised in May 2019
11 Revised in May 2019
12 Revised in May 2019
13 Revised in May 2019
14 Revised in July 2017

importance of construction quality management, the promotion of understanding of earthquake disasters and the provision of information on findings from the pilot projects to related organizations were mentioned. Since the provision of construction management-related training and the preparation and utilization of quality control checklists were conducted through both projects, it is thought that awareness of the importance of construction quality control has increased to a certain degree. In addition, the necessity of earthquake retrofitting has been widely recognized through the provision of training to related organizations, and thus understanding of earthquake disasters has been promoted. The experience gained from the pilot project of earthquake retrofitting has also been provided to the organizations concerned through training programs. It is therefore considered that the lessons learned in the past have been fully utilized in both projects.

3.1.2 Coherence (Rating: ③)

3.1.2.1 Consistency with Japan's ODA Policy

At the time of the planning stage of CNCRP, "Social Development and Human Security" was identified as a priority goal and sector in the "Japan's Country Assistance Program for Bangladesh" (May 2006) by the Ministry of Foreign Affairs. One of the items in the program was "disaster management," and the prevention and mitigation of disaster damage was identified as an issue.

At the time of the planning of BSPP, the "Japan's Country Assistance Program for Bangladesh" (June 2012) stated that it would support "disaster reduction and climate change countermeasures" to achieve the priority goal of "overcoming social vulnerability." The "JICA Country Analytical Paper" (April 2013) also identified disaster reduction as a prioritized issue.

Therefore, it can be said that both projects, which aimed to reduce disaster risk in Bangladesh, were in line with Japan's ODA Policy.

3.1.2.2 Internal Coherence

In the ODA loan "Financial Sector Project for the Development of SMEs," which was implemented at the same time as CNCRP, PWD designed and constructed a seismic retrofit for a private sewing factory. The collaboration was not anticipated before the project started, and was an emergency response to the Rana Plaza collapse. However, it is recognized that there were certain synergies between CNCRP and this ODA loan project, as it contributed to the accumulation of on-site practical experience for PWD staff.

At the same time as BSPP, technical assistance through the SATREPS[15] "The Project for technical development to upgrade structural integrity of buildings in densely populated urban areas and its strategic implementation towards resilient cities" was implemented. BSPP implemented the results of SATREPS research into the seismic retrofit projects, whereas, SATREPS conducted research on inexpensive seismic retrofitting methods that were adapted to local conditions. A clear distinction between the two projects had already been made at the time of the planning. In addition, the manuals prepared for both projects were mutually utilized, and it is recognized that there is collaboration and mutual complementarity between the two projects.

Therefore, it is considered that there is internal coherence because there was collaboration and coordination with other JICA projects that was assumed at the time of the project planning phase or initiated at the project implementation phase, and synergistic effects such as capacity building of PWD staff and mutual complementarity due to clear segregation of the projects were observed.

3.1.2.3 External Coherence

The Comprehensive Disaster Management Programme (CDMP) by UNDP, which was implemented at the same time as CNCRP, conducted risk assessments of buildings in three cities, Dhaka, Chittagong, and Sylhet. Information on building risk assessment and earthquake damage estimates, which were part of the CDMP project's results, were also used for building vulnerability assessment and other work in CNCRP. In addition, CDMP provided CNCRP with information on the ground in Bangladesh, which led to the development of liquefaction maps, an outcome of the project carried out by CNCRP.

Although there was no prior coordination between CNCRP and the CDMP to collaborate in some way, the exchange of information during the implementation of the project clarified the need for disaster risk response in urban areas of Bangladesh, and this is considered to have contributed to the development of the project results.

The Urban Resilience Project (URP), which was implemented by the World Bank at the same time as BSPP, carefully avoided duplicating the content of the manuals prepared by URP and BSPP. In fact, while manuals created by URP were mostly analytical in accordance with U.S. standards, BSPP manuals described practical reinforcement methods and how to use materials. In addition to the content of the manuals, URP targeted private buildings, while BSPP targeted public buildings, and the two projects were complementary to each other in terms of the project scope. Furthermore, during the implementation of the project,

[15] Refers to the Science and Technology Research Partnership for Sustainable Development (SATREPS).
It is a program in which the Japan Science and Technology Agency (JST) and the Japan Agency for Medical Research and Development (AMED), in cooperation with JICA, respectively, promote international joint research between Japan and developing countries to solve global-scale issues.

BSPP visited private building sites and provided technical advice, and URP collaborated with BSPP in promoting the dissemination of the manual.

The relevant international framework such as SDG11 "Make cities and human settlements inclusive, safe, resilient and sustainable," SDG13 "Take urgent action to combat climate change and its impacts," *the Sendai Framework for Disaster Risk Reduction*, and *the Dhaka Declaration 2015 Plus* are also consistent with BSPP in the context of disaster risk reduction and sustainable development.

Although collaboration and coordination with other international organizations' projects were not expected at the time of the ex-ante evaluation, collaboration in the preparation of deliverables such as building vulnerability assessments and segregation in the preparation of manuals were addressed at the project implementation stage, and their complementarity was confirmed. The project is also considered to be consistent with international frameworks. Therefore, external coherence is believed to be present.

At the time of the planning of both CNCRP and BSPP projects, Japan's Country Assistance Program and project development plans mentioned assistance for earthquake countermeasures, including strengthening the earthquake resistance of buildings. Regarding internal coherence, it was found that both projects were coordinated with other JICA projects in advance and during implementation, and that there were synergies and mutual complementary effects. As for external coherence, it was also deemed that there was prior coordination, collaboration during project implementation, and mutual complementary effects between the two projects and projects with other international organizations. As for the related international frameworks, it is recognized that the two projects are consistent with SDG 11 "Make cities and human settlements inclusive, safe, resilient and sustainable" and SDG 13 "Take urgent action to combat climate change and its impacts," *the Sendai Framework for Disaster Reduction*, and *the Dhaka Declaration 2015 plus*. Therefore, its relevance and coherence are high.

3.2 Effectiveness and Impacts[16] (Rating: ③)

3.2.1 Effectiveness

3.2.1.1 Project Output

The achievement of the following outputs set in CNCRP is shown in Table 4.

[16] When providing the sub-rating, Effectiveness and Impacts are to be considered together.

Table 4 Status of Achievement of Outputs in CNCRP as of the Project Completion

Output and Indicator	Status of the achievement as of project completion
Output 1: The capacity to do inventory, vulnerability assessment (seismic evaluation) of the existing public buildings is developed.	Partially not achieved
Indicator 1: Volume of building inventory data	Achieved
Indicator 2: Vulnerability assessment (Seismic evaluation) manual is prepared.	Achieved
Indicator 3: Roadmap for retrofitting public buildings is prepared.	Not achieved
Output 2: The design methods for new building designing as well as retrofitting the public buildings against natural disasters are established.	Achieved
Indicator 1: Design manual for new building designing as well as evaluating and retrofitting the public buildings against natural disasters is prepared.	Achieved
Indicator 2: Design documents for retrofitting the selected buildings are prepared.	Achieved
Output 3: The capacity to manage retrofitting works of the public buildings is developed.	Achieved
Indicator 1: Management manual for seismic retrofitting works is prepared.	Achieved
Output 4: Quality control process is developed.	Achieved
Indicator 1: Checklist and judgement guidelines for quality control are prepared.	Achieved
Indicator 2: Training materials on quality control are prepared.	Achieved
Indicator 3: Monitoring database is prepared.	Achieved
Output 5: The technologies on construction and retrofitting for new building design and retrofitting design of public buildings which PWD gets by the Project are succeeded within PWD as well as are disseminated to relevant engineers of other organizations.	Not achieved
Indicator 1: Training curriculum materials, plan (budget) and schedule are prepared.	Not achieved
Indicator 2: Number of seminars on the trainings for external dissemination	Cannot be measured
Indicator 3: Number of certificates given to the trainees who completed the seismic evaluation course, new building designing as well as retrofitting of the public buildings	Cannot be measured
Indicator 4: Number of certificates given to the trainees who completed the construction supervision course and quality control course of public buildings	Cannot be measured

Source: External evaluator created the table based on information from implementing agency.

Output 1 was to establish a system for acquiring inventory data on public buildings and assessing their vulnerability, including their seismic resilience. Under Output 1, manuals for inventory data and vulnerability assessment including earthquake resistance were prepared for the three target cities in the project area, but the roadmap for the retrofitting project has not yet been prepared, so the output was partially unaccomplished.

In Output 2, the goal was to enhance design methods for both new construction and the

retrofitting of public buildings to make them more resistant to natural disasters. To this end, design manuals for new construction, seismic diagnosis, and retrofitting of public buildings were prepared, along with specific manuals for retrofitting selected buildings. Output 3 focused on improving technical capacity for retrofitting public buildings, leading to the development of a construction management manual for this purpose. Output 4 aimed at establishing a quality control process, resulting in the creation of a quality control checklist, determination guidelines, training materials on quality control, and a monitoring database. Output 5's objective was to ensure the internal inheritance of technical knowledge related to the construction and retrofitting of public buildings, which was acquired by PWD during CNCRP, and to disseminate this knowledge to technical personnel in other organizations. However, at the time of project completion, approvals for the budget and schedule for training had not been obtained. Additionally, numerical targets for the number of seminars for external dissemination and the number of completion certificates awarded for each training course were not set[17]. This made it impossible to measure the level of achievement for Output 5, leading to its classification as not achieved. Considering the overall output of CNCRP, therefore, it is generally deemed to have been achieved.

In BSPP, the following two outputs were established with emphasis on preserving the technology acquired in CNCRP within PWD and disseminating the technology to the outside parties. The status of achievement of each output is shown in Table 5, and was confirmed to have been achieved at the time the project was completed.

Table 5 Status of Achievement of Outputs in BSPP as of the Project Completion

Output and Indicator	Status of the achievement as of project completion
Output 1: Human resource development system for seismic building safety is enhanced.	Achieved
Indicator 1: 300 engineers in PWD, 30 architects in Department of Architecture (DoA), National Housing Authority (NHA), Urban Development Directorate (UDD) and Housing and Building Research Institute (HBRI), 300 engineers in private sector / other departments complete training program about seismic techniques.	Achieved
Indicator 2: 10 engineers are competent to train other engineers about seismic techniques as a trainer.	Achieved
Output 2: Manuals/handbooks prepared to promote the seismic related techniques are applied to actual implementation works for public buildings in urban area.	Achieved

[17] It was difficult to accurately identify training needs at the time of the introduction of new technology in Bangladesh, namely earthquake retrofitting technology, and it was decided by those involved not to place too much emphasis on the target number itself.

Output and Indicator		Status of the achievement as of project completion
	Indicator 1: 10 cases of seismic evaluation, seismic design, retrofitting design, construction supervision following the prepared manuals and handbooks are implemented for public buildings.	Achieved
	Indicator 2: Prepared manuals and handbooks through activities are approved by PWD.	Achieved

Source: External evaluator created the table based on information from implementing agency.

Output 1 aimed to strengthen the human resource development system to enhance building safety through seismic retrofitting, and the number of participants in the seismic retrofitting program completed by PWD, other related organizations, and engineers in private sector, as well as the number of training instructors, exceeded the target. Output 2 aimed to develop manuals and handbooks to promote the technology of earthquake-resistant buildings and to be used in actual new construction and retrofitting work on public buildings in urban areas. The various manuals and handbooks were approved by PWD. The number of cases of seismic evaluation, seismic design, retrofitting design, and construction management conducted in accordance with the manuals and handbooks was 9. The target of 10 cases was not reached because the budget for seismic retrofitting, which had already been secured, was suddenly shifted to measures against the spread of the COVID-19. Considering this background, output 2 is considered to have been mostly achieved. Therefore, the overall output of BSPP is deemed to have been mostly achieved.

3.2.1.2 Achievement of Project Purpose

In both CNCRP and BSPP, it was anticipated that the project purpose would also be achieved with the accomplishment of each output. The project purposes, their indicators, and results for both projects are shown in Table 6.

Table 6 Achievement of the Project Purposes for both CNCRP and BSPP

Project Purpose	Indicator	Actual
CNCRP: The capacity of PWD for the construction and retrofitting works of the public buildings against natural disasters is developed.	Indicator 1: Number of engineers in PWD who can execute the activities of output 1 to Output 4 by the Project is more than half of the counterparts (C/P), and number of engineers in PWD who are trained by the Project trainees is more than 100.	Indicator 1: At the time of the completion of the project, the knowledge and skills of almost all PWD personnel who participated in the project had improved. However, the number of PWD engineers trained by CNCRP-trained instructors was 45.
	Indicator 2: Action plans of seismic retrofitting program are prepared by PWD.	Indicator 2: At the time of completion of the project, no action plan for seismic retrofitting of public buildings owned by PWD itself has been prepared.
BSPP: Capacity	Indicator 1:90-100% of	Indicator 1: The indicator has been

Project Purpose	Indicator	Actual
for promoting seismic safety in public buildings of urban area is enhanced.	construction works including retrofitting works of most recent public building in urban area follow “Bangladesh National Building Code.”	achieved at project completion.

Source: External evaluator created the table based on information from implementing agency.

In general, the overall outputs of CNCRP have been mostly achieved as described above, and the capacity of PWD for seismic retrofitting has certainly improved. However, the indicator of the number of PWD engineers trained by the instructors through the project has not been achieved, and no action plan for seismic retrofitting projects by PWD has been developed. Based on these factors, the project purpose is deemed to be partially not achieved.

Each of BSPP outputs has been achieved entirely. In addition, more than 90% of construction works, including retrofitting of public buildings in urban areas, are in accordance with BNBC. Therefore, the project objectives are considered to have been achieved.

It is clear that the achievement of outputs in both CNCRP and BSPP leads to the achievement of the project purposes. In addition, indicators of project purposes for both projects are considered necessary to measure the degree of achievement of the project purposes. As a result of verifying the degree of achievement of the project purposes from these aspects, it is considered that the overall outputs of both projects were generally achieved, although there were some outputs for which the degree of achievement could not be clearly measured due to the existence of some unclear numerical targets in each output. The project mostly achieved its purpose as the implementation capacity of PWD and other stakeholders in promoting the strengthening of safety in public buildings in urban areas is considered to have been steadily improved.

3.2.2 Impacts

3.2.2.1 Achievement of Overall Goal

The overall goal of CNCRP was “Construction and retrofitting of public buildings which are strong against natural disasters are promoted” and BSPP aimed at “Seismic disaster risk in urban areas is reduced.” The status of achievement of the overall goals and each indicator are shown in Table 7.

Table 7 Achievement of Overall Goal in CNCRP and BSPP

Overall Goal	Indicator	Actual
CNCRP:	Indicator 1: Number of	Achieved: Prior to project implementation,

Overall Goal	Indicator	Actual
Construction and retrofitting of public buildings which are strong against natural disasters are promoted.	seismic projects for public buildings including retrofitting will increase by 2020 comparing with that at the time of the project termination.	the number of seismic retrofit projects was 0, but at the time of the ex-post evaluation, the number of projects was 10, and this indicator was achieved.
	Indicator 2: Manuals and the concepts prepared through the Project are incorporated in future edition of Bangladesh National Building Code (BNBC)	Not achieved: BNBC primarily defines content related to design standards for new construction. BNBC, as revised in 2020, includes content on earthquake and other disaster risk reduction, including seismic technology for new building design, but has not incorporated content on seismic retrofitting of existing buildings.
BSPP: Seismic disaster risk in urban area is reduced.	Indicator 1: Number of seismic and other disaster resistance building in urban area will increase.	Achieved: Since the completion of the project, one seismic retrofitting project of the underground parking of Petrobangla, a public enterprise, has been started, and the project has been accumulating results of seismic retrofitting of existing public buildings. The number of new buildings, both public and private, constructed in accordance with BNBC has been increasing, and the need for seismic retrofitting is becoming more recognized than before the project was implemented.

Source: External evaluator created the table based on information from implementing agency.

The number of seismic retrofitting projects was 0 before CNCRP was implemented, but at the time of the ex-post evaluation, the total number of seismic retrofitting projects including both public and private was 10, thus Indicator 1 was achieved. On the other hand, Indicator 2 was not attained because BNBC did not incorporate any content related to seismic retrofitting of existing buildings. Looking at the status of each output and the continuation of the project purpose, at the time of the ex-post evaluation, the various manuals prepared through the project had been updated appropriately, and training related to seismic techniques had been organized by PWD Training Academy (PWDTA). Thus, it was confirmed that efforts were being made to ensure that the knowledge and experience gained in the project related to seismic techniques were not lost. Therefore, it is deemed that the overall goal has been partially achieved.

Even after the completion of BSPP, there has been a steady accumulation of results in the seismic retrofitting of existing public buildings, and the promotion of seismic retrofitting projects by PWDs continues. The need for seismic retrofitting of new buildings, both public and private, is now more widely recognized than before the implementation of BSPP. According to the implementing agency and private engineers, the number of construction projects complying with BNBC has been steadily increasing, although this has not been

quantitatively measured. Therefore, by 2025, the target year of overall goal in BSPP, it is highly likely that the number of public and private buildings in urban areas that are resistant to disasters, including earthquakes, will have increased, and therefore the project has achieved its overall goal.

3.2.2.2 Other Positive and Negative Impacts

1) Impacts on the Environment

No environmental impacts were foreseen when CNCRP was planned, and no information on categorization based on *the Guidelines for Environmental and Social Considerations* set by JICA could be obtained. According to the implementing agency and Japanese experts, the main purpose of CNCRP was to improve the capacity of the implementing agency, and no specific negative environmental impacts were observed at the time of the ex-post evaluation.

BSPP was determined to have minimal undesirable impacts on the environment, as it did not fall under the sensitive sectors or characteristics, or sensitive areas listed in *the Guidelines for Environmental and Social Considerations* (promulgated in April 2010). The project was classified as Category C, and according to the implementing agency, no negative environmental impacts were identified during or after the project implementation.

2) Resettlement and Land Acquisition

According to the implementing agency, no resettlement or land acquisition occurred for both CNCRP and BSPP, and no negative impacts occurred.

3) Gender Equality

According to the implementing agencies, Japanese experts, and the staff members of private garment factories where seismic retrofitting work was implemented in CNCRP , the seismic retrofitting and installation of doors for fire protection implemented in CNCRP were effective in terms of reducing disaster damage, regardless of gender. No other negative impacts were identified. Therefore, it is considered that there was a positive impact regardless of gender through both projects.

4) Marginalized People

According to the implementing agency, the implementation of the seismic retrofitting of the public hospital, which provides inexpensive medical care, was effective in reducing disaster damage to the poor. No other negative impacts were identified; therefore, it can be concluded that both projects had a positive impact on people, including the poor.

5) Social Systems and Norms, Human Well-being and Human Rights

According to the implementing agency, during the implementation of both projects, evacuation training at schools, announcements of evacuation sites, and other awareness-raising activities were conducted. After the completion of the projects, the Ministry of Disaster Management and Relief, which is responsible for disaster management and prevention, and local administrative agencies continue to implement the activities. Other than that, no particular problems have been observed, and therefore, no specific negative impact on disaster management and prevention is considered to have occurred.

Through both projects, PWD's own capacity building and dissemination of technology and knowledge to non-PWD related organizations and private sector engineers have been implemented, and it is expected that the number of disaster-resistant public and private buildings compliant with BNBC will increase in urban areas in the future. Therefore, the overall goal of BSPP, "Seismic disaster risk in urban areas is reduced" is highly achievable. The benefits of seismic and fire protection design will be equally available regardless of gender in the event of a disaster. In addition, seismic retrofitting for public hospitals that provide inexpensive medical care contributes to the living conditions of the poor. In these respects, the positive impact is recognized. No specific negative impacts were identified with respect to the environment, resettlement and land acquisition, and social systems, norms, and people's well-being. Based on the above, the impact of both projects is high.

The implementation of the two projects, CNCRP and BSPP, will contribute to the overall goals of "The capacity of PWD for the construction and retrofitting works of the public buildings against natural disasters is developed" and "Capacity for promoting seismic safety in public buildings of urban area is enhanced." The number of buildings in urban areas that are resistant to disasters, including earthquakes, has increased, and there is a high likelihood that the planned effects will be realized. Both projects have generally achieved the project purposes and the overall goals. Therefore, effectiveness and impacts of the projects are high.

3.3 Efficiency (Rating: ③)

3.3.1 Inputs

The planned and actual inputs for both projects are shown in Table 8.

Table 8　Planned and Actual Inputs in CNCRP and BSPP

Project	Inputs	Plan	Actual (as of project completion)
CNCRP	(1) Experts	7 experts (Breakdown of long and short term is unknown)	2 for long term 20 for short term

Project	Inputs	Plan	Actual (as of project completion)
	(2) Trainees received	Unknown	30 persons
	(3) Equipment	Equipment required for GIS operation, equipment required for structural survey, software for structural design and equipment required for its operation, PC, etc.	Rebar probe, deep rebar probe antenna, calibration anvil, laser range finder, concrete core sampling equipment, GIS software, Schmidt hammer, rebound test hammer, digital camera, video camera, portable cone penetrator, plotter, desktop PC, etc.
	Japanese Side Total Project Cost	Original plan: 290 million yen After additional support provided: 543million yen	725 million yen
	Bangladesh Side Total Project Cost	1) Counterparts 1 project director, 1 project manager, and other required number of counterparts 2) Office space 3) Pilot project (3 million taka per year) 4) Other necessary expenses (amount unknown)	1) 23 counterparts assigned (PWD staff) 2) Office space 3) Other necessary expenses (7 million taka for pilot project, 13 million taka for equipment maintenance, etc.)
BSPP	(1) Experts	14 experts (Breakdown of long and short term is unknown)	5 for long term 10 for short term
	(2) Trainees received	Unknown	25 persons
	(3) Equipment	GIS software, rebar probe (shallow and deep depth, concrete core sampling machine, concrete neutralization depth meter, Schmidt hammer, laser range finder, structural design software, materials and equipment for structural experiments (dial gauge, displacement gauge), building foundation ground strength, simple measuring instruments, etc.	Portable cone penetrators, rebar penetrators, extraction testing equipment (8t and 20t), fixtures for extraction testing, GIS software, in-situ direct shear testing equipment, microtremor measurement equipment, structural design software ETABS, composite laser printer, desktop PC, power supply equipment, projector, etc.
	Japanese Side Total Project Cost	700 million yen	912 million yen
	Bangladesh Side Total Project Cost	1) 6 counterparts 1 PWD Project	1) Counterpart (number of persons unknown)

Project	Inputs	Plan	Actual (as of project completion)
		Director, PWD Senior Engineer (1 Project Manager, 1 Deputy Project Manager, 3 Team Leaders per output) 2) Office space 3) Project activity expenses (amount unknown), maintenance of provided equipment, supplies, etc.	2) Office space 3) Others (equipment maintenance, etc.)

Source: External evaluator created the table based on information from implementing agency and a Japanese expert.

3.3.1.1 Elements of Inputs

Each of CNCRP's inputs increased significantly compared to the original plan. This is because of the additional expansion of support due to the Rana Plaza collapse that occurred in 2013 during the implementation of the project, additional components after the start of the project, and the deteriorating security situation. In particular, an additional budget of approximately 253 million yen was allocated to support the expansion of private garment factories due to the event of the Rana Plaza collapse, which led to an increase in the number of experts dispatched and in the amount of equipment and materials. Given that the expansion of support was mutually agreed upon by JICA, PWD, and other related organizations[18], the ex-post evaluation is to be based on the revised plan. Consequently, the actual results will be compared against this revised framework. In addition, although there are some uncertainties, such as the number of participants in the training program in Japan, considering the achievement of the project purpose and the outputs, it is considered that the activities and input elements for the activities were almost as expected.

Regarding BSPP, the number of input elements, such as the dispatch of experts, also increased. This is because of the terrorism occurred in Dhaka city in 2016 and the event of the pandemic of the COVID-19 in 2020. Although the number of participants in the training program in Japan is unknown, considering the achievement of the project purpose and the outputs, it is considered that the activities and inputs for these activities were almost as expected.

3.3.1.2 Project Cost

[18] In 2013, a Memorandum of Understanding for RMG Sector Safe Working Environment Program was signed with JICA, PWD, Bank of Bangladesh, and Bangladesh Garment Manufacturers and Exporters Association.

Project cost for CNCRP were estimated to be 290 million yen at the time of the planning stage, but actual amount was 725 million yen. As mentioned above, the main reasons for the increase in project cost were additional support to private garment factories, additional post-contract components, and the deteriorating security situation. In particular, the major excess over the project cost was due to the additional personnel costs for experts and additional equipment and materials resulting from the additional support to private garment factories. Based on the Memorandum of Understanding (MOU) for "RMG Sector Safe Working Environment Program" signed between JICA and related organizations in Bangladesh in November 2013, it was also confirmed that a total of 253 million yen was additionally budgeted for additional support for the garment factory. For this reason, it is appropriate to compare actual results with the revised amount, which is 543 million yen after considering 253 million yen of additional support, instead of 290 million yen, which was the planned amount for the project cost. Therefore, the actual project cost amounted to 725 million yen, surpassing the revised planned amount of 543 million yen. This actual cost represents 134% of the post-adjustment planned amount, thereby exceeding the revised budget.

The Project cost for BSPP was anticipated to be 700 million yen at the time of the plan However, the actual cost amounted to 912 million yen, representing 130% of the planned budget and thus exceeding it. According to information from PWD and an expert, the increase in project costs is mainly due to the impact of terrorism in Dhaka city in July 2016, which resulted in a ban on staying in the city for more than two weeks, and the resulting significant operational inefficiencies and increased travel costs. In addition, the spread of the COVID-19 infection since March 2020 caused delays in project progress and an increase in the COVID-19 countermeasure costs. However, the increase in the amount of project costs caused by these external factors could not be confirmed in the document, which is why the evaluation decision was made without considering the impact of external factors.

3.3.1.3 Project Period

The project period of CNCRP was estimated to be 4 years at the time of the plan, but the actual period was 4 years and 11 months. This was 123% of the plan, slightly exceeding the plan. As mentioned above, the project period is considered to have increased due to additional support for the Rana Plaza collapse accident and the deteriorating security situation. However, since the increase in the project period due to these external events could not be confirmed in the documents, the evaluation was made without considering these effects.

The project period of BSPP was assumed to be 4 years and 1 month at the time of planning, but the actual project period was 6 years and 1 month. As mentioned above, the project period was extended due to the terrorism in Dhaka City in July 2016 and the impact

of the spread of the COVID-19 infection after March 2020. According to the report of the Joint Coordination Committee (JCC[19]), at the 3rd JCC, it was decided to extend the project period by 18 months to June 2021 due to the terrorism in Dhaka City. Furthermore, a 6-month extension was also decided at the 5th JCC after the spread of COVID-19 infection, for a total of 24 months as an extension of the project period due to the external factors mentioned above. Since the extension was caused by external factors that could not be foreseen at the time of planning and could not be controlled during the project implementation, it is appropriate to compare the actual period excluding this part of the project period, total of 24 months. Therefore, the project period at the time of planning was 4 years and 1 month, and the actual result was likewise 4 years and 1 month. The actual results are 100% of the planning, and are considered to be within the plan. The factors that caused the excess of project cost and project period for both projects are summarized in Table 9.

Table 9 Main Reasons for the Excess of the Project Cost and Project Period for CNCRP and BSPP

	CNCRP	BSPP	
Main External Factors	Support of seismic retrofitting for private garment factories (from November 2013)	Terrorism incident in Dhaka (occurred in July 2016)	Spread of COVID-19 infection (from March 2020)
Project cost	Additional amount: 253 million yen Contents added: Personnel expenses for experts (seismic diagnosis, seismic retrofitting and public relations), materials and equipment (items required for seismic diagnosis, such as rebar search equipment and simple measuring instruments for ground strength of building foundations), and enlightenment and public relations activities (e.g., preparation of enlightenment and public relations	Exceeded amounts: No clear excess amounts were identified from historical records or interviews with experts. Reason for excess: After the terrorist attacks, travel restrictions were placed on each trip with a maximum stay of two weeks. The number of trips during the first period (February 2016-June 2017) was originally planned to be 75 before the terrorist incident, but the actual number of trips was 95.	Excess amount: No definite excess amount could be identified from historical records or interviews with experts. Reason for Excess: Increased costs for countermeasures against the COVID-19 infection.

[19] It is the decision-making body for the project where all parties involved in the project, including high officials of the central government and JICA officials, gather to report on the progress to date and plans, etc., and to obtain approval。

	CNCRP	BSPP	
	materials for the media, sewing businesses, etc.)		
Project period	Additional period: No clear excess period could be identified from historical records or interviews with experts.	Exceeded period: 18 months Reason for the excess: The period was extended because there was a ban of more than 2 week stay after the terrorist attacks and a significant decrease in operational efficiency was observed.	Exceeded period: 6 months Reason: Significant delay in progress due to the spread of the COVID-19
Source Materials	・ Approval document for third year plan amendment and project implementation plan in JICA (dated November 7, 2013) ・ Budget execution request form in JICA (dated November 7, 2013) ・ MOU for "RMG Sector Safe Working Environment Program" ・ Interviews with experts	・ Project Completion Report ・ Materials for discussion at the 3rd JCC meeting ・ Work plan and progress report in the first year ・ Work plan and progress report in the second year ・ Interviews with experts	・ Project completion report ・ Materials for the 5th JCC meeting ・ Meeting minutes ・ Interviews with experts

Source: External evaluator created the table based on information provided from implementation agency, an expert and JICA

Overall, although the project cost and project period were exceeded the plandue to the occurrence of external factors that impeded efficiency, it is considered that the necessary inputs were made to realize the expected outputs. As shown in Table 9, when it was confirmed in documents that those external factors were the cause of the excess of project cost and project period for CNCRP and BSPP, and that the excess was agreed upon in consultation with the implementing agencies, those factors were taken into account in making the evaluation. Therefore, the efficiency of both projects is high.

3.4 Sustainability (Rating: ②)

3.4.1 Policy and System

At the time of the ex-post evaluation, the NPDM (2021-2025) has disaster risk reduction as a core objective. In particular, it identifies seismic risk reduction as a key action plan. BNBC which was revised in 2020, also includes "Earthquake-Resistant Design Provisions" for the seismic design and construction of new buildings, with the aim of minimizing damage

to buildings in the event of an earthquake. The SOD which amended in 2019, defines the roles and responsibilities of each ministry and agency in the event of disasters, including earthquakes, and the establishment of an earthquake response committee. Thus, the development policies and regulations at the time of the ex-post evaluation on disaster management include the importance of disaster risk reduction and disaster management such as earthquake damage. Therefore, the sustainability in terms of policy and system is high.

3.4.2 Institutional/Organizational Aspect

Both projects contributed to the capacity building of PWD staff in seismic technology. It was also confirmed that the training provided by PWDTA related to seismic technology has continued after the completion of BSPP. However, PWD has not developed a business plan to carry out the seismic retrofitting project, forcing well-experienced staff to transfer to other departments or engage in other tasks. Although there has been an attempt to create a specialized unit for seismic retrofitting within PWD during the implementation of both projects, this has not been realized at the time of the ex-post evaluation, and the organization is not yet sufficiently structured to carry out the seismic retrofitting projects. Therefore, the sustainability of the institutional and organizational aspect is deemed to be moderately low.

3.4.3 Technical Aspect

PWDTA is holding training on seismic construction and supervision and fire protection design in May 2023, and there is still an opportunity to learn about seismic-related technologies after the completion of BSPP. However, according to interviews with PWDTA, the priority of holding this training is lower than that of PWD's training for new employees and other training programs. There has been one seismic retrofit project since the completion of BSPP, and although efforts are being made to obtain seismic retrofit projects, it is not clear that opportunities to continuously gain project experience will be secured in the future. While PWD staff's knowledge and field experience related to seismic retrofitting projects has certainly improved through both projects, it cannot be assured that opportunities to gain project experience and knowledge to technically sustain these experiences will continue to be secured in the future. Therefore, the sustainability of the technical aspect is deemed to be moderately low.

3.4.4 Financial Aspect

The budget of PWD in FY2019/2020 onwards is shown in Table 10.

Table 10 The budget of PWD

Fiscal year	Total budget (million taka)
2021-2022	16,109
2020-2021	14,983
2019-2020	16,141

Source: Information provided by PWD

The above budget does not include a budget for seismic retrofitting, and at the time of the ex-post evaluation, PWD has not retained a budget for seismic retrofitting projects. According to MoHPW, although they understand the importance of earthquake retrofitting of existing buildings, the priority for new buildings is higher, and there is no high prospect of obtaining a budget for earthquake retrofitting in the short term. The creation of a specialized unit for seismic retrofitting is also not expected to be approved in the near future. In addition, the budget acquisition process for seismic retrofitting of public buildings remains unchanged, with each ministry and agency generating funds for seismic retrofitting based on requests from the ministry or agency that owns the building. Therefore, financial sustainability is deemed to be moderately low.

3.4.5 Environmental and Social Aspect

According to the implementing agency, no particular concerns in terms of environmental and social considerations are expected. Therefore, the sustainability of the project in terms of environmental and social aspect is deemed to be high.

3.4.6 Preventative Measures to Risks

Currently, the Retrofitting Schedule of Rates (RSoR) developed by the project has been used to improve the accuracy of estimates, although only for small-scale structural reinforcement projects. It is anticipated that RSoR will also be used for large-scale seismic retrofitting and construction projects in the future, thus reducing the risk from inaccurate estimates. No other specific risks are anticipated. Therefore, the sustainability of the risk response is considered to be high.

3.4.7 Status of Operation and Maintenance

The manuals and guidelines prepared and updated through both projects are uploaded on

PWD's website[20] and have been referenced, including those related to seismic retrofit and construction, more than 1,300 times by PWD and private engineers, university officials, and others in the six months since October 2022. On the other hand, there are no plans to regularly update the manuals and guidelines, and their contents may become obsolete. In addition, as noted above, it is unclear whether seismic retrofitting projects will be continuously secured in the future, and there remains concern whether the knowledge and experience accumulated within PWD will be maintained in the future. Training on seismic retrofitting is not a high priority compared to other training programs, such as training for new PWD employees, and the human resource development system has not been adequately secured. Therefore, the sustainability of the operation and maintenance aspects is deemed to be moderately low.

Some minor issues have been observed in terms of the institutional/organizational, technical, financial aspect and the current status of operation and maintenance. They are not expected to be resolved. Therefore, the sustainability of the project effects is moderately low.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

CNCRP and BSPP aimed to reduce disaster risks in urban areas in Bangladesh through technology transfer of seismic retrofitting and construction to Public Works Departments (PWD) in charge of management for public buildings and knowledge dissemination to related organizations and private engineers. CNCRP aimed to promote the construction and retrofitting of public buildings to resist natural disasters by improving the capacity of PWD in charge of management of public buildings in the country for seismic retrofitting and earthquake-resistant construction. BSPP also aimed to reduce the risk of natural disasters in urban areas by improving the capacity of PWD and disseminating knowledge to relevant departments and private sector engineers in order to promote the strengthening of safety in public buildings in urban areas. Both projects were consistent with the development policy and development needs in Bangladesh both at the time of planning and at the time of completion of the both projects. The consistency with Japan's ODA policy at the time of planning was also confirmed. Furthermore, the collaboration, synergy, and complementarity with JICA's related projects and other international organizations were also confirmed. Therefore, the relevance and coherence of the project are high. The project purpose and outputs of both projects were generally achieved and contributed to the achievement of the overall goals. Hence, the effectiveness and impact are also high. Regarding efficiency, both project cost and project period exceeded the plan due to external factors such as the Rana

[20] http://m.pwd.gov.bd/download/, August 2, 2023

Plaza collapse during the implementation of CNCRP, terrorism as well as the spread of COVID-19 infection during the implementation of BSPP. However, it is appropriate to exclude the impact of these external factors from the evaluation if the details of the exceedances can be confirmed in the document. The increase in project cost and project period is considered to be a necessary input to achieve the expected outputs, and therefore, the overall efficiency of the project is high. Regarding the sustainability of the effects of the two projects, some issues were found in terms of institutional/organizational, technical, financial aspect, and the current status of operation and maintenance. Therefore, the sustainability of the project effect is moderately low.

In light of the above, this project is evaluated to be satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Implementing Agency

To ensure that the experience and knowledge gained in both projects are preserved, the implementing agency must continue to secure sites for seismic retrofitting projects and maintain the skills of PWD staff. One PWD seismic retrofit project has been implemented since the completion of BSPP, and steady efforts are being made to raise awareness of the ministries and agencies that own public buildings to secure seismic retrofit projects. On the other hand, the allocation of seismic retrofitting budgets is still left to the decisions of each ministry and agency. In addition, it was found that many PWD staffs who gained experience in both projects have been moved away from the field of seismic retrofitting projects due to transfers or other assignments. If this situation continues, it will be difficult to maintain and pass on the on-site experience accumulated in PWD through the two projects, and there is concern that the seismic retrofitting of public buildings will not progress. Therefore, it is necessary for PWD to first fully explain the necessity of seismic retrofitting projects to MoHPW, which is one of the ministries with the authority to compile PWD's budget and is also a superior organization to PWD. Furthermore, it is important to promote understanding throughout the government, including the departments involved in budget decision-making, to secure a budget for seismic retrofitting within PWD, and to establish a system that enables PWD to promote seismic retrofitting of public buildings at its own discretion.

4.2.2 Recommendations to JICA

None.

4.3 Lessons Learned

Importance of flexible coordination with other projects in response to changing circumstances during project implementation

Both projects were designed to reduce disaster risks in urban areas by improving the implementation capacity of public buildings in urban areas to resist earthquakes through technology transfer to the implementing agency and other related organizations, including earthquake retrofitting and construction and fire protection technologies.

CNCRP, in collaboration with another JICA's ODA loan "Financial Sector Project for the Development of SMEs," the implementing agency carried out seismic retrofitting of private garment factories using the experience gained from CNCRP. The Rana Plaza collapse in Dhaka in 2013 had heightened the need for earthquake retrofitting of buildings, including those in Bangladesh's key industry, the garment industry. The implementing agency, which at the time was transferred the technology related to earthquake resistance through CNCRP, therefore undertook seismic retrofitting work on a garment factory, a private building that was originally outside of its jurisdiction.

This flexible and timely response not only directly resulted in the seismic retrofitting of the garment factory, but also enhanced the capacity of the implementing agency itself through the accumulation of on-site experience in seismic retrofitting projects. This is an example of a project that was able to meet the development needs in Bangladesh by taking remedial measures, such as linking up with other projects at the appropriate time, even in the event of a sudden external event.

In the future, when implementing a technology transfer project like CNCRP, which is the first trial for the target country, it is important to keep in mind that it is difficult to set an appropriate project scope in the project planning stage due to time constraints, and to establish a system that allows for flexible responses during the project implementation. In addition, it is important to conduct appropriate surveys to accurately understand the needs of subsequent projects, since the situation is already known to some extent.

Furthermore, when highly necessary and urgent needs are identified during project implementation, it is necessary to seek effective ways to respond to them, including collaboration with other projects, even if they are outside the scope of the project or outside the jurisdiction of the implementing agency.

5. Non-Score Criteria

5.1 Performance

5.1.1 Objective Perspective

During the long period of the project, 11 years in total for both projects, three external factors occurred that significantly affected the execution of the project. These were the Rana Plaza collapse in 2013 during the implementation of CNCRP, the terrorism in Dhaka in 2016 and the spread of the COVID-19 infection in 2020 during the implementation of BSPP. In particular, after the terrorist attack in 2016, JICA made the decision to continue the project,

although there was an option to cancel the project itself. According to the experts, most of BSPP period was spent working under conditions that severely restricted travel, which significantly affected the efficiency of the operations. Even under such difficult circumstances, JICA provided proper project management until the completion of the project, after thorough discussions and agreement with the implementing agency to commit additional resources necessary for the full realization of the project results. As a result, it can be said that the project was able to realize the initially expected results.

5.1.2 Subjective Perspective (retrospective)

None.

5.2 Additionality

None.

End