

**The Basic Study on
the Construction Safety Management of
Grant Aid Project
in
the Whole World**

**Final Report
(Summary)**

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Japan International Cooperation Agency (JICA)

**Yachiyo Engineering Co., Ltd.
Overseas Construction Association of Japan, Inc.**

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1 Outline of the Project

1.1 Background of the Project

In an effort to improve the safety of construction work, JICA established the “Safety Measures Committee for Facility Construction Projects” in 2008, and has been working to improve safety measures. Furthermore, in 2015, JICA formulated the “Construction Safety Policy for ODA Projects Involving Facility Construction,” and is working to promote construction that prioritizes safety and to spread a safety culture.

In addition, in 2014, “The Guidance for the Management of Safety for Construction Works in Japanese ODA Projects” (hereinafter referred to as the “Construction Safety Guidance”) was published for the implementation of grant aid projects. The Construction Safety Guidance stipulates that a “Safety Plan” and a “Method Statements on Safety” should be formulated for all grant aid projects. It also provides the “Technical Guidance for Safe Execution of Works.” The General Terms and Conditions for Japanese Grant (GTC) includes provisions that necessitate safety in construction work. Furthermore, in order to promote safety awareness and strengthen safety measures for construction workers, JICA is actively working on construction safety management by formulating ODA construction safety seminar implementation guidelines, implementing construction safety seminars, and formulating systems for on-site patrols at overseas offices and construction company managing office patrols.

Despite these safety measures, there is still an issue with the frequency of accidents that occur. In view of the fact that, in addition to accidents that occur at construction sites, traffic accidents involving vehicles transporting construction materials and equipment occur off-site, that improvements to safety and working environments are required from the perspective of occupational health, and that there is a need to utilize new technologies that contribute to safety measures such as ICT and VR, it is necessary to respond to a variety of changes over time in connection to ODA construction projects. Ten years have passed since the establishment of the Construction Safety Guidance, and it is necessary to revise the Construction Safety Guidance to reflect institutional reforms and changes that occur over time, as described above.

1.2 Purpose of the Project

Based on 1.1, in this study, a joint venture (hereinafter referred to as the “JV Team”) between Yachiyo Engineering Co., Ltd. (hereinafter referred to as “YEC”) and Overseas Construction Association of Japan, Inc. (hereinafter referred to as “OCAJI”) collected information on the systems and initiatives for safety management in ODA projects and other countries' donors. The JV Team also obtained and analyzed information on construction safety in ODA, other overseas construction projects and the domestic construction industry, the use of VR as teaching materials for construction safety, and information relating to the use of ICT toward improving construction

safety. The results of this study are used to (1) revise the Construction Safety Guidance and reorganize the construction safety management system of JICA grant aid projects with a focus on the Construction Safety Guidance, (2) consider occupational health initiatives that contribute to the safety of construction work, and (3) propose measures to reflect the results in ICT initiatives, such as VR, in occupational safety education.

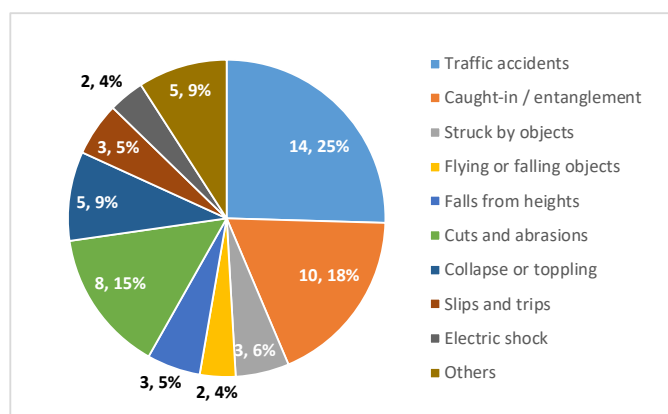
2 Current State of Construction Safety and Issues

2.1 Current State of Construction Safety and Management System in Grant Aid Projects and Loan Projects

(1) Status of accidents

Construction work involves many hazardous tasks, and there is a greater risk of industrial accidents in comparison to other industries due to the frequent entry and exit of personnel and changes in work details and workforce size depending on project progress. Additionally, accidents occur during the transportation of materials and machinery and when driving vehicles. There have also been cases of fatalities and injuries involving individuals not directly involved in construction work. In the 10-year period between FY2014 and the first half of 2024, a total of 520 accidents were recorded in JICA projects, including 84 incidents in grant aid projects alone.

Figure 2-1 presents accident statistics for grant aid projects by type from FY2021 to FY2024, based on JICA seminar materials. Rather than major incidents such as falls or collapses, the majority of accidents were traffic-related, collisions with other vehicles, or incidents that could have been prevented with greater attention from those involved.



[Source] Compiled by JV Team based on JICA seminar materials

Figure 2-1 Accident Statistics in Grant Aid Projects (FY2021-FY2024)

(2) Methods of safety management

On-site safety is managed by contractors primarily engaged in construction based on their own regulations and rules. These rules are developed in accordance with the Industrial Safety and Health Act in Japan, related regulations, and countermeasures based on past accidents. They are also updated flexibly and promptly in response to legal amendments and new accident cases. Compared to the requirements outlined in the Construction Safety Guidance, these internal rules tend to be more detailed. Additionally, personnel responsible for safety management have a strong awareness of compliance with

these rules and regulations, which helps to maintain a high standard of safety management activities.

On the other hand, consultants and contractors who are not primarily engaged in construction often do not have detailed internal regulations or manuals similar to those established by specialized construction contractors. As a result, these consultants and contractors use the Construction Safety Guidance as a reference for safety management activities and as a resource for checking safety conditions on-site.

There are also cases where companies voluntarily translate “Chapter 5 Technical Guidance for Safe Execution (by the Type of Work)” and “Chapter 6 Technical Guidance for Safe Execution (by the Type of Accident)” of the Construction Safety Guidance into English, which are then distributed to relevant personnel to enhance their understanding of the safety management activities conducted by local construction companies. This is particularly useful for local companies with limited experience in JICA projects, as it helps them understand the expected standards for occupational safety and health activities.

Contractors who are primarily engaged in construction sometimes dispatch contract employees with experience in construction and safety management to project sites. Before deployment, these employees are required to review the content of the Construction Safety Guidance.

(3) Safety management systems

The General Conditions of Contract (hereinafter referred to as “GCC”) for Construction and Civil Engineering Works stipulate that personnel should be assigned to prevent accidents. Furthermore, in order to promote safety activities, the establishment of a transversal safety committee made up of members from the contractor, client and consultants is required. For any other safety management systems, as long as there are no special provisions in the contract, the necessary personnel will be assigned with respect to the experience of the contractor. In addition, local subcontractors and workers will be incorporated into the safety management system under the direction of the contractor.

(4) Laws and regulations concerning safety management

In Japan, it is compulsory to submit a plan to the Labour Standards Inspection Office before using cranes and setting up scaffolding. The safety of workers is ensured by this prior inspection. In addition, the construction system implementation status is confirmed through on-site inspections and surveys by the government. If a violation of the Construction Business Act is found, the business operator will be subject to supervision and punishment, and information on the punishment will be made public and inferior or unqualified businesses will be excluded.

However, in many developing countries, there are no such systems. Additionally, one of the issues in developing countries is the lack of a qualification system for heavy machinery operators. Since there are no qualification systems for operating heavy machinery in many developing countries, systems have been introduced whereby only those who meet the qualification requirements set by contractors are allowed to operate heavy machinery. Furthermore, on-the-job training (OJT) and other methods are used to improve the skills of operators and to teach them how to operate the machinery safely.

(5) Status of ICT and Use of DX

In grant aid projects and loan projects, the most commonly used ICT and DX are messaging apps. In some cases, groups were created, and photos were used in order to identify unsafe areas in a timely manner. The results of improvements were then shared in photos in the group. There were also projects where photos and videos of project sites were taken from above using drones.

However, there are few other examples of the use of ICT and DX. The main reasons given for limited use of ICT and DX are budget shortages, network issues and licensing support.

2.2 Construction Safety and Management System Issues

Issues related to construction safety and management systems in grant aid projects were organized based on a comparison of safety initiatives in grant aid projects and those of the construction industry in Japan. Table 2-1 shows the results of the comparison.

Table 2-1 Comparison of Construction Safety and Management Systems in Japan and Grant Aid Projects, and Identification of Issues

	Construction Work in Japan	Construction Work in Grant Aid Projects
Related laws and regulations	- Thorough safety management in accordance with the Industrial Safety and Health Act in Japan is required. - Prior notification to the Labour Standards Inspection Office is required for the installation of cranes and temporary scaffolding, etc. - Detailed regulations are in place regarding the licenses and qualifications required for operating heavy machinery, depending on the type and size of the machinery, etc.	Implementation of safety management with reference to the Industrial Safety and Health Act in Japan, or make reference to the relevant laws and qualification systems of the target countries (in some countries, there may be no such laws or systems in place).
Management System	- Under the Industrial Safety and Health Act in Japan, the implementation of measures to prevent occupational	- Contracts specify that a person in charge of accident prevention must be assigned. In addition, the

	Construction Work in Japan	Construction Work in Grant Aid Projects
	accidents is obligatory for employers, prime contractors, specified prime contractors and clients, and this is clearly stated in the contract. - It is required to establish a system in accordance with the Industrial Safety and Health Act in Japan and to set up a safety committee. - The government department that has jurisdiction over the construction work conducts a fact-finding survey and an on-site inspection to check the construction system and the status of implementation of subcontracting contracts. Contractors who violate the Construction Business Act are subject to supervisory measures, and are punished by having their information made public and inferior or unsuitable contractors are excluded.	establishment of a transversal safety committee made up of members from the contractor, client and consultants is required. - In addition to the above, a system based on the experience of each company is established unless otherwise specified in the contract. - The roles of JICA, consultants, contractors and clients are sometimes unclear or do not function. In particular, there are cases where the client is reluctant to participate in the project.
Education for Workers	- The Ministry of Health, Labour and Welfare in Japan, the Ministry of Land, Infrastructure, Transport and Tourism in Japan, and related associations have published educational textbooks and videos that can be used free of charge (some are available in multiple languages). - In the process of studying to obtain a qualification, the certification and qualification system enables each individual to deepen their knowledge of safety.	- The educational textbooks listed above are used, but it is necessary to translate them to local languages in some cases. - Since some workers cannot read, the textbooks may not be very useful. - In many developing countries, there are no certification and qualification systems related to construction work, so there are limited opportunities for the systematic improvement of the skills of local workers.
Use of ICT and DX	- In view of the shortage of manpower in the construction industry, etc., the aim is to resolve this issue by introducing ICT and DX. - By replacing tasks previously handled manually with ICT and DX solutions, efforts are being made to improve efficiency and reduce labor requirements. Additionally, the adoption of automated and autonomous construction methods aims to minimize human involvement, thereby reducing the risk of accidents.	- The introduction of ICT is limited to easy-to-implement, highly convenient technologies such as messaging apps and drones. - In many cases, the introduction of ICT technology has not progressed due to factors such as the telecommunications situation in the developing countries, restrictions on use due to licensing, and project costs.

3 Efforts to Systematize Construction Safety in Grant Aid Projects

3.1 Items to be Added to the Construction Safety Guidance and the Orientation of Revisions

(1) Alignment with Standard Bidding Documents and Contracts

Under the GCC, which is included among the contracts for construction work, contractors are required to prepare a Health, Safety, and Environment Plan (hereinafter referred to as "HSEM Plan"). However, the Construction Safety Guidance currently does not include any provisions related to the HSEM Plan. Similarly, there are no provisions related to the HSEM Plan in Procurement of Equipment projects. This inconsistency among the documents related to grant aid projects needs to be addressed.

Of the GCC, Instructions to Bidders (ITB), and Construction Safety Guidance, the Construction Safety Guidance is relatively easy to revise. Therefore, the Construction Safety Guidance should first be revised for consistency with the other documents by incorporating provisions related to the HSEM Plan. The GCC for Construction Works requires contractors to submit a HSEM Plan within 28 days of contract signing. Based on risk assessments conducted at each construction site, the HSEM plan must organize the safety management policies for each site. By explicitly including a similar submission requirement in the Construction Safety Guidance, alignment with the GCC for Construction Works can be ensured. This will enable a three-stage submission process for safety management plans in line with project progress, as shown in Figure 3-1.

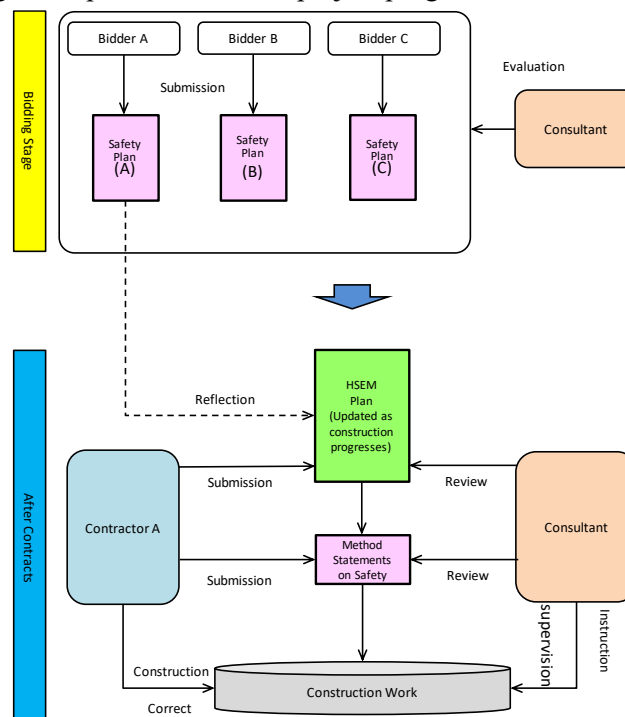


Figure 3-1 Submission Flow for each Plan

(2) Addition of Occupational Health and Safety Requirements

Since 10 years have passed since the formulation of the Construction Safety Guidance, it needs to be updated to reflect changes over time. In Japan, since the issuance of the Construction Safety Guidance, the Act on Promotion of Ensuring Safety and Health of Construction Workers was enacted in March 2017, and a revised Basic Plan for Ensuring Safety and Health of Construction Workers was approved by the Cabinet in June 2023. In view of the trend toward revising and issuing laws and regulations to improve occupational health and safety in Japan, enhancing occupational health and safety in grant aid projects has become an urgent issue.

Currently, the Construction Safety Guidance does not address occupational health and safety, but the inclusion of these aspects could lead to improvements in working conditions, enhance worker efficiency, and ultimately help prevent accidents.

By adding occupational health and safety provisions to the Construction Safety Guidance, improvements to the on-site environment can be made, as illustrated in Figure 3-2.

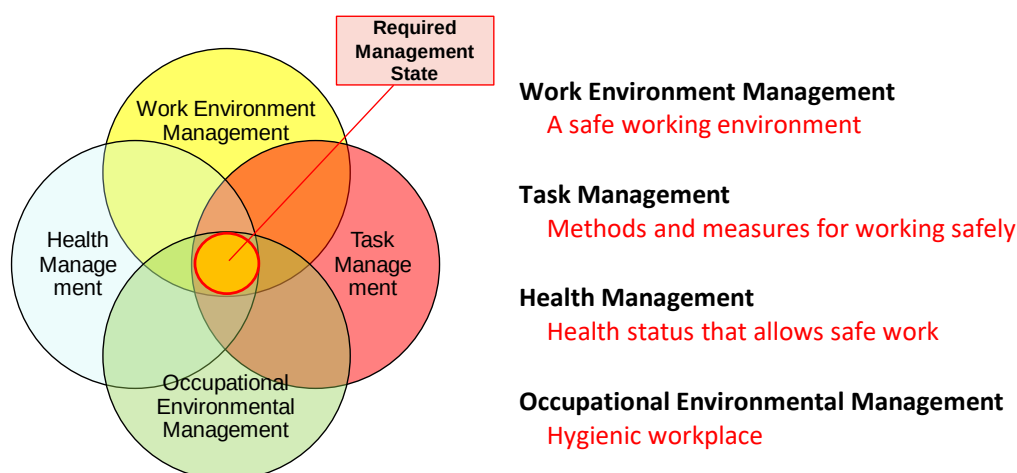


Figure 3-2 Concept of Occupational Health and Safety

(3) Addition of Environmental Preservation Requirements

Along with the inclusion of provisions related to the HSEM Plan, it is essential to consider environmental protection measures at construction sites and in surrounding areas. Currently, the Construction Safety Guidance does not address environmental and social considerations, but incorporating these aspects would help facilitate the efficient and effective implementation of environmental protection measures. It should be noted that these provisions pertain to general environmental and social considerations relevant to construction projects and are distinct from JICA's Environmental and Social Considerations.

(4) Education and Awareness to Promote a “Safety Culture” Among Stakeholders

Safety should be the highest priority in construction projects, and protecting human lives takes precedence over everything else. One of the most important roles for JICA is the establishment and dissemination of Japan’s safety-first “Safety Culture” among all organizations and individuals involved in ODA projects. Since the promotion of a “Safety Culture” requires education and awareness-raising initiatives, a section emphasizing the importance of education and awareness should be added at the beginning of the Construction Safety Guidance.

At the same time, education remains one of the greatest challenges at construction sites. Contractors are implementing various initiatives to educate and raise awareness among local workers. Supporting these activities through the development of educational and awareness-raising materials is also considered an important role for JICA. It has been confirmed in questionnaires and interviews that a compilation of Good Practices from various project sites would serve as a useful reference. On this basis, a Good Practices Collection will be compiled as an annex to the guidance. A document of that nature will achieve a better understanding of the content of the Construction Safety Guidance among not only trading firms that do not specialize in construction but also local and third-country workers and clients. Additionally, there is a demand for illustrated versions of the Construction Safety Guidance. The Good Practices Collection could contribute to meeting this need.

3.2 JICA's Construction Safety System, and Roles of each Actor

3.2.1 Construction Safety Systems Implemented and Established by JICA

Table 3-1 shows the systems and activities related to construction safety implemented and established by JICA.

Table 3-1 JICA Activities for Safety Management in Grant Aid Projects

Activity (Year started/Year established)	Summary	Organization Involved in the Activity	Remarks
Establishment of the Safety Measures Committee (2008)	Safety-Related Committee Activity Led by JICA. Since the establishment of the Safety Measures Committee for Facility Construction Projects in April 2008, regular committee meetings have been held to review construction accident occurrences, discuss improvements to safety measures, and assess the status of safety management.	JICA	
Publication of Construction Safety Guidance (2014)	The Construction Safety Guidance aims to prevent occupational and public accidents in the construction of public facilities, etc. in ODA projects by formulating the basic safety management policies and specific technical guidelines for safe construction practices.	Parties involved in the construction of public facilities, etc. through technical cooperation projects, loan projects, and grant aid projects implemented by JICA	
Formulation of construction safety policies for ODA projects involving facility construction, etc. (2015)	This is a fundamental policy for safety measures in construction projects. It serves as the basis for implementing various construction safety initiatives.	Implementing organization: JICA Target: Parties involved in the construction of facilities, etc., in ODA projects	
Safety measures awareness campaign (site patrols) (2015)	JICA Overseas Office staff visit construction sites to inspect safety measures and to raise the awareness of construction safety among staff. They also encourage construction staff to re-evaluate safety practices.	JICA Overseas Offices	
Implementation status survey (2016)	In supervising grant aid project implementation, Project Formulation Advisors are dispatched to ongoing grant aid project sites. They review literature and documents, interview consultants and conduct site inspections to assess the following:	Implementing organization: JICA Target: Consultant (including contractors)	

Activity (Year started/Year established)	Summary	Organization Involved in the Activity	Remarks
	➤ Project quality and compliance with contract documents (e.g., specifications and drawings). ➤ Whether the consultant is appropriately managing construction in accordance with contract documents and intent. ➤ The status of safety management at the construction site.		
Construction Quality Control Meeting (2016)	These meetings aim to facilitate information sharing among the implementing agency, consultants, contractors, and JICA to ensure construction quality. The implementing agency hosts the meetings, while consultants serve as the secretariat, handling preparation and coordination. Project stakeholders convene regularly from the project preparation phase onward to share awareness of key considerations from the preparatory survey and detailed design stages. After construction begins, periodic monitoring of site improvements is conducted to maintain a common understanding. In addition to quality assurance, these meetings also serve as a platform to discuss necessary safety measures for construction.	- Implementing Agency (Host) - Consultants - Contractor - JICA	Target projects are civil engineering projects in Africa and large-scale civil engineering projects in other regions (with a grant amount of around 3 billion yen).
Construction safety management seminar (2017)	In line with the Construction Safety Policy for ODA Projects Involving Facility Construction (March 30, 2015), which emphasizes “Promoting Safety-First Construction” and Spreading a "Safety Culture,” JICA strives to enhance understanding and safety awareness among implementing agencies, consultants, and contractors regarding: ➤ Basic safety management policies ➤ Specific safety measures ➤ JICA’s role and initiatives	Implementing organization: JICA Overseas Offices (JICA Headquarters and Project Formulation Advisor support the event) Target: - Implementing Agency - Consultants - Contractor	Often held jointly with implementation status surveys.

Activity (Year started/Year established)	Summary	Organization Involved in the Activity	Remarks
Establishment of JICA Standard Safety Specification (JSSS) (2021)	JSSS is included in the technical specifications for bidding and contract documents for loan projects. These specifications outline the minimum occupational health and safety requirements that contractors must adhere to when executing construction projects. The application of these specifications is determined on a case-by-case basis.	Parties related to loan projects.	
Sharing of accident information (2021)	Since FY2021, JICA has implemented a measure to share information on accidents occurring in ongoing grant aid projects via email among relevant stakeholders.	Implementing organization: JICA Target: Parties related to grant aid projects.	
Overseas construction site patrols by construction company (managing office) (2022)	To encourage contractors to take the lead in occupational safety awareness, consultants and construction companies (managing offices) dispatch safety officers to assess the implementation of safety management on-site. This includes verifying adherence to the Safety Measures Plan and the Safe Construction Plan. By fostering the involvement of the managing office in safety management beyond mere self-management at the site level, this initiative aims to heighten awareness of construction safety.	- Contractor (safety officer at managing office) - Consultant (supervisor or safety officer)	During the preparation survey stage, the number of times the patrol is carried out (up to 2 times) and the timing of the patrol need to be considered and reflected in the cost estimation.
Online construction safety seminar for Japanese stakeholders	JICA organizes online safety management seminars for Japanese stakeholders. These seminars analyze accident cases and provide feedback on findings to raise awareness and prevent similar incidents in future projects.	Implementing organization: JICA Target: Japanese officials.	

3.2.2 Safety and Health Management PDCA Cycle

In order to prevent accidents from occurring and to ensure the safety of construction work in grant aid projects, it is essential that all actors (JICA, consultants, contractors and clients) work together and systematically promote the project. It is expected that the sustainable and healthy development of grant aid projects will be achieved by effectively implementing a safety and health management PDCA cycle in each area of work.

(1) Overall PDCA cycle for Grant Aid Projects

Figure 3-3 shows the PDCA cycle for safety and health management in grant aid projects as a whole. JICA aims to effectively implement this PDCA cycle and to ensure the healthy development of grant aid projects.

In the planning stage (PLAN), JICA formulates a construction safety policy and draws up various activity plans with the aim of establishing and spreading a “safety culture.” In addition, JICA announces individual grant aid projects and plans the details of the projects with consultants. In the implementation stage of each project (DO), contractors and consultants carry out on-site activities based on the plan. In response, JICA provides support for safety management through a wide range of activities and supervises individual projects. Evaluations of on-site activities (CHECK) are carried out through implementation status surveys and reports from JICA Overseas Offices, etc. JICA implements improvements (ACTION) to higher-level policies, guidance, forms, and implementation guidelines, etc., based on the evaluation results obtained.

JICA is required to establish a PDCA cycle to achieve accurate and efficient implementation of the “DO” phase, which is carried out mainly by contractors and consultants.

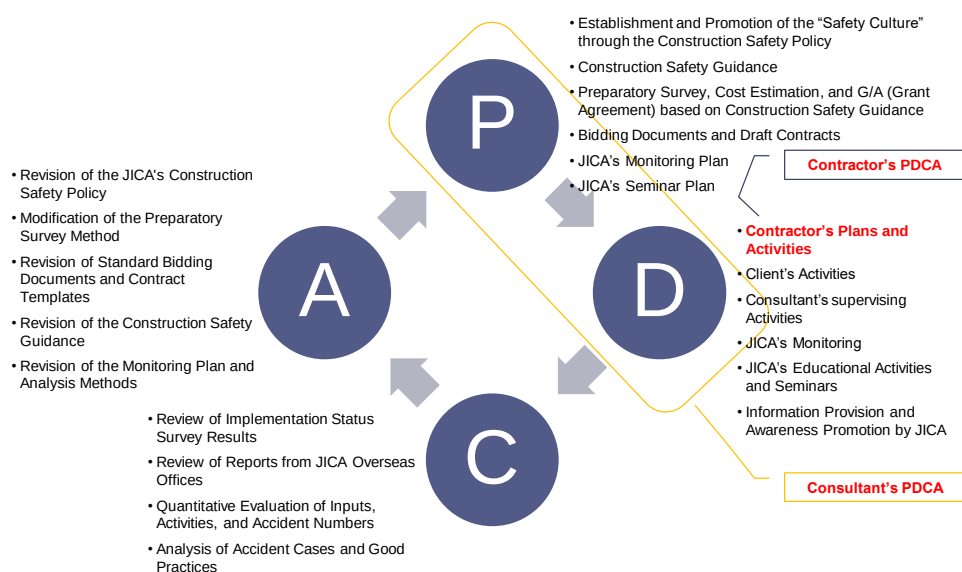


Figure 3-3 Overall PDCA Cycle for Grant Aid Projects

(2) PDCA Cycle for Contractors

The contractor's activities fall under the DO phase of the overall PDCA cycle for grant aid projects, as shown in Figure 3-3. Throughout the period from construction preparation to project completion, contractors operate a PDCA cycle for occupational health and safety management. This process is illustrated in Figure 3-4.

Contractors develop various plans, such as the Safety Plan and Method Statements on Safety (PLAN). During this phase, they conduct risk assessments to identify potential hazards and establish specific countermeasures. Based on these plans, they carry out site construction and procurement management (DO). As part of these activities, they provide safety training for workers and improve labor conditions to mitigate the risk of occupational accidents. These activities are continuously evaluated through daily site inspections and safety patrols conducted by representatives from the managing office, JICA, consultants and others (CHECK). The results of these evaluations are then used to update the various plans (ACTION). This entire process constitutes the PDCA cycle for occupational health and safety management implemented by contractors on-site.

For the contractor's PDCA cycle to function effectively, it is essential that the client fully understands the contents of the Construction Safety Guidance and actively participates in the project in an appropriate manner. By proactively engaging in on-site safety activities and promptly fulfilling their responsibilities, the client helps create an environment for the smooth progress of contractor site operations. Proper client involvement in the contractor's PDCA cycle enhances its effectiveness, ultimately contributing to improved overall construction safety.

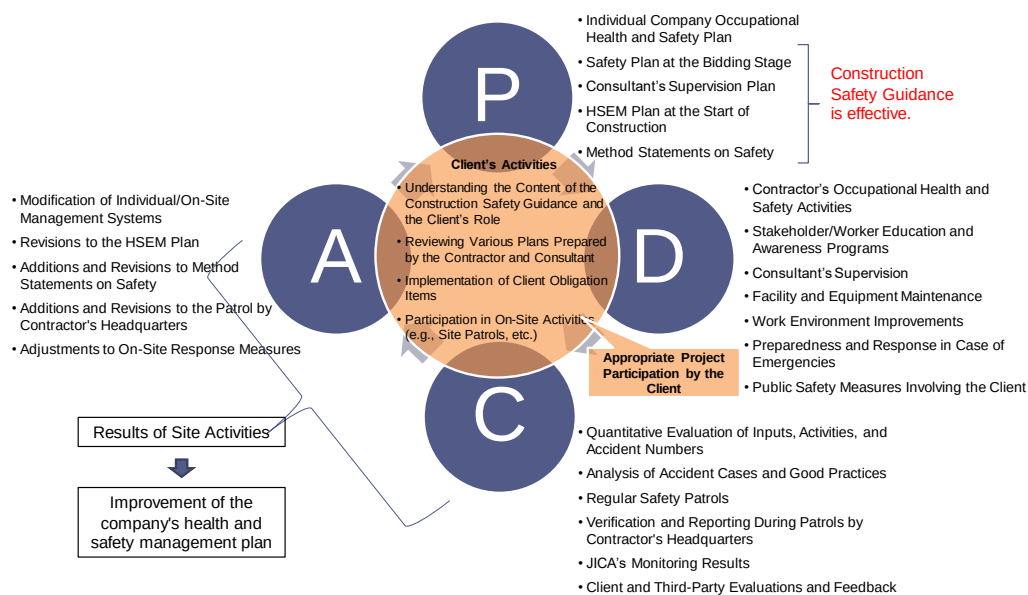


Figure 3-4 PDCA Cycle for Contractors

(3) PDCA Cycle for Consultants

The work of the consultant is incorporated into both the PLAN and DO phases of the overall PDCA cycle for grant aid projects, as shown in Figure 3-3. From the preparatory survey stage (preliminary design and cost estimation) to project completion, consultants operate their own PDCA cycle for occupational health and safety management. This process is shown in Figure 3-5.

During the preparatory survey phase, consultants plan the overall project through preliminary design and cost estimation while organizing the necessary safety management elements. Based on these considerations, they prepare bidding documents and conduct contractor selection (PLAN1). In the implementation phase, consultants concretize their supervision policies into a Supervising Plan (PLAN2), which serves as the basis for site supervision (DO). In their site supervision role, consultants assess the contractor's construction progress and verify the client's fulfillment of their obligations (CHECK). Based on these evaluations, consultants update the Supervising Plan and request revision instructions for the various plans prepared by the contractor (ACTION). This entire process constitutes the PDCA cycle for occupational health and safety management implemented by consultants.

Additionally, after project completion, consultants accumulate insights gained throughout the project for application in future projects to improve the accuracy of design and cost estimation. Through these efforts, consultants effectively operate the PDCA cycle for occupational health and safety management in grant aid projects.

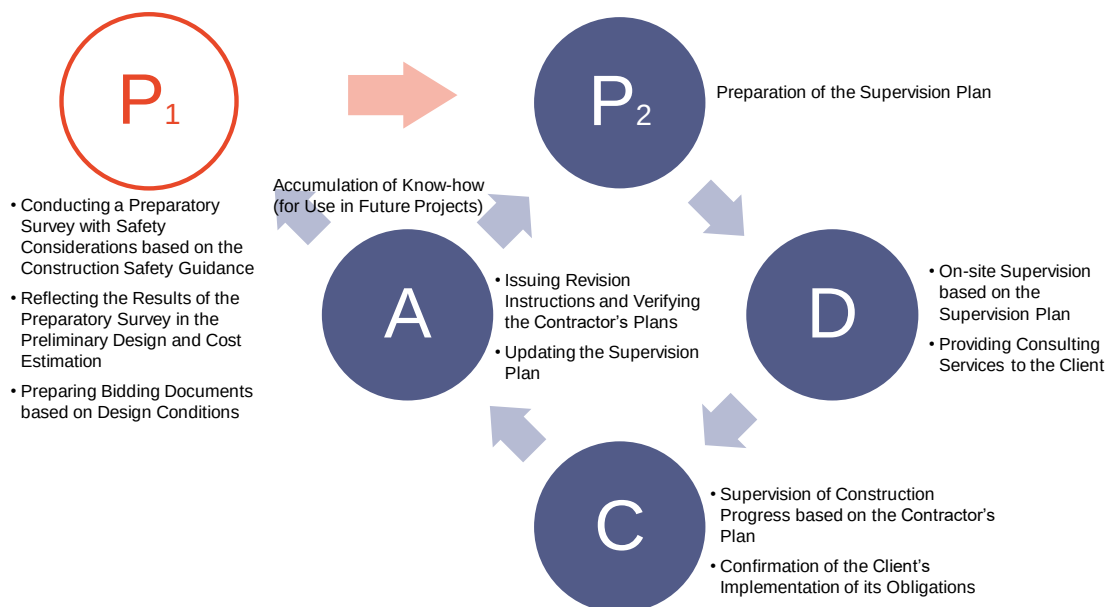


Figure 3-5 PDCA Cycle for Consultants

3.2.3 Roles of Each Actor in Grant Aid Projects

The roles of each actor based on the PDCA cycle mentioned earlier are outlined below. In grant aid projects, it is essential that all actors fulfill their respective roles while ensuring safety in the execution of their duties.

(1) Roles of JICA

JICA's primary roles in grant aid projects are as follows:

- (a) Conducting preparatory surveys (preliminary design studies).
- (b) Implementing project supervision to ensure that grant aid provided to the government of the recipient country is used smoothly and appropriately.

In fulfilling these roles, one of JICA's key missions is to establish and promote Japan's "Safety Culture" among all organizations and individuals involved in construction works within cooperation projects. Various activities are being undertaken to achieve this objective. Likewise, JICA staff and related personnel are also expected to understand and practice "Safety Culture."

Additionally, given that grant aid projects are implemented in developing countries, JICA Overseas Offices, which are closer to project sites, play a crucial role in safety management. By actively participating in on-site activities, overseas staff can reinforce safety awareness among project stakeholders, fostering a heightened sense of responsibility. However, according to a survey conducted among JICA staff, some staff feel hesitant about visiting construction sites due to a lack of technical expertise in construction safety. Nonetheless, ensuring on-site safety requires a multifaceted approach and does not necessarily demand specialized knowledge in construction or civil engineering. The perspective of JICA Overseas Offices differs from that of contractors and consultants, allowing for site inspections from alternative angles. This can contribute to identifying safety hazards that have been overlooked. Therefore, close collaboration between JICA headquarters and JICA Overseas Offices is indispensable for ensuring construction safety. Therefore, it is important to clearly define the role of JICA Overseas Offices / branches in Grant Aid Projects and to support staff who feel uncertain about site visits by organizing seminars and developing guidelines for on-site inspections, enabling them to carry out their duties with confidence.

Furthermore, JICA headquarters and overseas offices maintain strong long-term relationships with counterpart institutions in recipient countries, giving them significant influence over clients. Encouraging recipient countries and clients to actively engage in project implementation is also considered a critical role of JICA.

(2) Roles of consultants

During the preparatory survey phase of a grant aid projects, consultants propose a survey methodology based on the project specifications and conduct activities in the recipient country accordingly. Throughout the survey process, consultants identify issues that require special consideration in terms of safety management and discuss them with JICA during the Design and Cost Estimation Policy Meeting. The results of these discussions are then reflected in the project's cost estimation. According to the Preparatory Survey Design Cost Estimation Manual (Trial Version) published by JICA (hereinafter referred to as the "Cost Estimation Manual" including the additional Civil Engineering and Construction sections, and the Equipment section), consultants are required to "understand the system of grant aid projects and its principles, and conduct surveys, designs, and cost estimations on their own responsibility based on technical knowledge, experience, and accurate information." Consultants must continuously review the validity of their findings and results at an organizational level to prevent omissions, errors, or miscalculations in documentation, ensuring that cost estimations are neither excessive nor insufficient. Therefore, it is crucial to incorporate safety management considerations into design and cost estimation during the preliminary design stage to avoid budget shortages that could compromise safety measures during the construction and procurement phases.

Additionally, during the preliminary survey stage, the consultant organizes the safety measures that the recipient country must undertake, and calculates the necessary costs for these counterpart obligations. The results are then discussed in a Draft Outline Design (DOD) among JICA, the recipient country, and the consultant to secure a firm commitment from the recipient country for their implementation.

During the construction and procurement phases, the consultant provides technical services (consulting services) to the implementing agency in the recipient country. These services include detailed design, cost estimation, preparation of bidding documents, bid assistance, construction and procurement supervision, and soft components. When preparing the bidding documents, it is essential to accurately reflect the design and cost estimation conditions established during the preliminary survey stage. Furthermore, as the representative of the client, the consultant is responsible for supervising the contractor to ensure that the work is executed in accordance with the contract, technical specifications, design drawings, and the specified as-built management and quality control standards. To that end, the consultant prepares a Supervision Plan that outlines the approach to supervision in construction work and procurement, and ensures that work is carried out based on a shared understanding among all stakeholders.

Based on the contents of the Supervision Plan, the consultant verifies that the

contractor's activities align with the contract and the relevant plans and designs. Regarding safety management, in particular, the consultant ensures consistency between the contractors' various plans and the project's safety requirements. If discrepancies or deviations are identified, the consultant issues corrective instructions.

(3) Roles of contractors

Based on the contract with the implementing agency, contractors are responsible for site operations and safety management. Safety and health considerations are translated into specific plans, and various plans such as the Safety Plan and Method Statements on Safety are formulated to guide the construction of facilities and procurement of equipment.

Additionally, depending on the scale and nature of the project, the contractor participates in Construction Quality Control Meetings and safety officers of managing offices conduct construction site patrols to continuously improve on-site safety conditions and ensure that safety is prioritized in work activities. The contractor also provides safety training to subcontractors and workers to reinforce strict safety management. Furthermore, during the construction process, the contractor must ensure that construction work is executed with full consideration for the safety not only of project stakeholders but also of third parties.

(4) Roles of clients

Clients are required to provide appropriate cooperation to ensure the smooth progress of the projects. During the Preparatory Survey stage (O/D), the client must disclose key safety-related matters. During construction, the client must comply with the relevant laws, regulations, and guidelines of the recipient country to ensure the safety of project stakeholders and protect third parties, including local residents, from risks associated with construction activities. Additionally, in coordination with the consultant, the client must verify that the contractor is carrying out work in accordance with the various plans that have been prepared and, when necessary, issue corrective instructions and guidance.

3.2.4 Measures for Improving Construction Safety in Grant Aid Projects

To prevent accidents and ensure safe site operations in grant aid projects, it is crucial to strive for and maintain the following conditions in each project. These conditions are defined as the “Ideal State” of grant aid projects.

- ✓ JICA’s construction safety policy is well understood and firmly established among all stakeholders.
- ✓ Safety measures are implemented in accordance with Japanese standards rather than local standards or customs being viewed as acceptable.
- ✓ During the Preparatory Survey (O/D), items requiring special attention for safety management are identified as far as possible, and corresponding countermeasures and budget allocations are incorporated into the design and cost estimation.
- ✓ The various plans formulated by the contractor are reviewed and improved based on the consultant’s expertise and are finalized through mutual agreement between both parties.
- ✓ Any obstacles hindering the contractor’s activities are eliminated by the client.
- ✓ JICA headquarters and JICA Overseas Offices collaborate closely in supervising project implementation.
- ✓ JICA assesses the effectiveness of the overall PDCA cycle and implements necessary adjustments.

There are gaps between the “Ideal State” and actual site conditions, which is an issue that needs to be addressed. Considering the PDCA cycle of grant aid projects and the roles of each actor, the following section outlines the challenges and corresponding measures to achieve the “Ideal State.”

(a) Promotion of a “Safety Culture” and Proper Information Disclosure

JICA’s Construction Safety Policy for ODA Projects Involving Facility Construction emphasizes that “human security” and “respect for fundamental human rights” should be the highest priorities. It also shows that one of JICA’s key responsibilities is the establishment and dissemination of Japan’s “Safety Culture,” which prioritizes safety above all else, among organizations and individuals involved in construction works within ODA projects. However, the Construction Safety Guidance and the concept of Safety Culture have not been sufficiently embedded among JICA staff and stakeholders. There are noticeable differences in safety awareness among personnel involved in grant aid projects, with safety-related tasks and responsibilities often concentrated within specific departments or individuals. Such an imbalance could lead to inconsistencies and reduced effectiveness in overall organizational safety measures.

Moreover, in some cases, local and third-country workers, as well as clients of ODA projects, exhibit a low awareness of conducting activities that prioritize safety (Safety

Culture). These issues increase the risk of on-site accidents and could negatively impact the smooth execution and credibility of grant aid projects.

Additionally, the results of questionnaires and interviews have revealed that many contractors are unaware of JICA activities, which indicates the need for enhanced information dissemination among contractors. For example, the implementation guidelines for construction site patrols by safety officers of managing offices, which are primarily contractor-led, are only included in the Consultant Service Manual, demonstrating inadequate communication of relevant information to contractors.

Proposed countermeasures for these challenges are summarized in Table 3-2.

Table 3-2 Proposed Countermeasures for Promotion of a Safety Culture and Proper Information Disclosure

	Countermeasure	Outcomes
a-1	Ensure consistency among various related documents, regulations, and JICA activities, clarify the respective roles and interconnections, and systematize them to establish a foundation for the dissemination and reinforcement of a “Safety Culture.”	Revised versions of related documents and regulations
a-2	Internally disseminate the Construction Safety Policy for ODA Projects Involving Facility Construction within JICA and introduce training programs and learning tools such as e-learning.	Educational portal site (for JICA staff)
a-3	Clearly define the roles of JICA Overseas Offices/branch offices and encourage active participation in various activities such as safety patrols and safety meetings.	• Project participation guidance for JICA Overseas Offices/branch offices • Site checklists
a-4	Revise the Standard Bidding Documents to promote (or mandate) the application of the Construction Safety Guidance in bidding processes, thereby ensuring that the guidance is reviewed by bidders advance.	Revised versions of standard bidding documents
a-5	Create a dedicated page on the JICA website that provides information on grant aid projects for contractors.	Establishment of a special page on the website
a-6	Translate accident reports into multiple languages to facilitate early distribution to on-site workers. Accident information should be stored for distribution by email and archived on the JICA website for easy access (with keyword search functionality).	Establishment of a special page on the website

(b) Ensuring an Adequate Budget for Safety Management

To ensure appropriate budget allocation for safety management, challenges can be broadly categorized into three key processes: Preparatory Survey (O/D), Cost Estimation, and Bidding. The details of each challenge are outlined below.

i. Conducting a Comprehensive Preparatory Survey (O/D)

Based on the results of on-site investigations during the Preparatory Survey (O/D), it is necessary to appropriately reflect safety management measures and costs in design and cost estimation. However, due to limited personnel and survey periods, it can be difficult to comprehensively collect all of the necessary information. Additionally, in many developing countries, the available data may lack accuracy or be poorly organized, making it challenging to obtain information of the same precision as in Japan. As a result, certain project conditions that impact implementation may only become evident during the construction or procurement period.

ii. Accounting for Safety Management Costs in Cost Estimation

Under the current Cost Estimation Manual, safety management costs are categorized into the following three estimation methods:

- Costs of temporary works (e.g., scaffoldings)
Estimated on the basis of Japanese cost estimation standards with adjustments based on a Labor Person-day Factor.
- Costs of common temporary works (e.g., installation costs for safety signboards and fire extinguishers)
Estimated using a percentage-based calculation.
- Costs of site management (e.g., costs related to managing office patrols and the assignment of full-time safety engineers)
Estimated using a bottom-up approach.

For example, for scaffolding under the cost of temporary works, Japanese cost estimation standards are applied. These standards are used to calculate the cost of temporary materials by multiplying unit prices for labor and machinery rental fees by a specific coefficient. This coefficient is based on the costs generally required in Japan. However, in developing countries, labor and machinery rental costs tend to be lower. As a result, in many cases, sufficient funds to meet safety standards are not secured due to the application of the same coefficients to local unit prices. To address this, the budget is adjusted by applying a Labor Person-day Factor to ensure that necessary

safety standards are met.

In Japan, scaffolding can be easily reused, allowing for lower procurement costs. In contrast, in developing countries, the availability of scaffolding that meets safety standards is limited, leading to higher costs.

Given these circumstances, it is necessary to assess whether the current cost estimation methods adequately reflect necessary safety management costs.

iii. Fair Bidding When Securing Safety Management Costs

Contractors include safety management costs in their bid amounts. However, in cases of participation by bidding companies that do not specialize in construction, such as trading firms, it is likely that there will be differences in the understanding of safety management and cost estimation. This often results in significant variations in bid amounts.

Consequently, in bid evaluation methods that prioritize selecting the lowest bidder, there is a risk that contracts are awarded to bidders who fail to adequately consider safety management costs.

To address this issue, it is necessary to enhance the awareness of safety management among all companies participating in bidding while establishing a system that ensures fairness and maintaining competitiveness.

Proposed countermeasures for these challenges are summarized in Table 3-3.

Table 3-3 Proposed Countermeasures for Ensuring an Adequate Budget for Safety Management

	Countermeasure	Outcome
b-1	In collaboration with related departments of headquarters and the JICA Overseas Office of the recipient country, JICA compiles the anticipated key safety and health concerns based on lessons learned from similar projects and past experiences in the country. These are utilized as part of the project's public announcement information.	Reflecting special safety-related provisions in public tender specifications for grant aid projects (Preparatory Survey)
b-2	JICA considers the necessary man-month allocation for safety and health investigations according to the scale of the Preparatory Survey. Consultants evaluate the need for deploying specialized experts and, from a safety perspective, investigate the key safety concerns and risks. The consultant assesses their impact on project progress and proposes specific countermeasures accordingly.	Increasing the estimated workload in public tender specifications for grant aid projects (Preparatory Survey)
b-3	Based on the impact assessment conducted during the Preparatory Survey, the consultant incorporates identified risks into the safety plan as key considerations. If percentage-based estimation is deemed inappropriate for	Increasing the safety measures budget as a proportion of the total

	Countermeasure	Outcome
	cost estimation, additional costs are calculated using a bottom-up estimation approach.	project budget
b-4	JICA periodically reviews the Labor Person-day Factor, as well as the cost rates for common temporary works and general administrative expenses. The inclusion of project costs for consultant personnel dispatch of the consultant and the deployment of Japanese skilled workers by the contractor, as deemed necessary for safety management, shall be allowed. The inclusion of project costs for newly added items (e.g., occupational health and safety) resulting from the revision of the Construction Safety Guidance shall be allowed.	Increasing the safety measures budget as a proportion of the total project budget
b-5	In the bidding process, safety-related equipment costs are estimated separately in order to eliminate price competition over safety measures. The separately estimated equipment costs shall be paid based on work completion (performance-based payments), and the consultant shall verify the installation status of the equipment.	Increasing the safety measures budget as a proportion of the contract amount

(c) Education for Local and Third-Country Workers

A common challenge at construction sites across projects is the education of local and third-country workers. Proper training for these workers is required in order to implement safety management that matches Japanese levels. However, three key challenges have been identified:

i. Safety Awareness among Workers

The level of safety awareness among local and third-country workers varies from site to site. In many cases, their awareness is low in comparison to Japan. Workers often fail to recognize what is safe and what constitutes a hazardous act, leading to a tendency to engage in unsafe behaviors.

Contractors have implemented various initiatives and innovative approaches to enhance the skills and awareness of workers. However, establishing a strong foundation for safety education and instilling a Safety Culture takes considerable time.

ii. High Turnover Rate of Local Workers

Interviews with contractors revealed that the turnover rate of local workers is high. As in i., above, contractors provide various forms of training for new workers entering the site. However, due to frequent turnover, training must be conducted repeatedly, placing a significant burden on manpower and time resources.

iii. Limited Dissemination of Safety Culture After the Completion of Grant Aid Projects

Due to the nature of grant aid projects, on-site activities are often short-term and one-off. As a result, the safety training provided to local workers may only have a temporary impact, raising concerns that Safety Culture will not take root in the recipient country in a sustainable manner.

Proposed countermeasures for these challenges are summarized in Table 3-4.

Table 3-4 Proposed Countermeasures for Education for Local and Third-Country Workers

	Countermeasure	Outcomes
c-1	Develop illustrated educational materials for clients and local/third-country workers (e.g., creating an illustrated version of the Construction Safety Guidance).	Illustrated version of construction safety guidance, etc.
c-2	Facilitate easy access to accident information by distributing it via email to relevant stakeholders and publishing it on the JICA website.	- Active use of accident information for safety management - Establishment of a special page on the website
c-3	Compile a Good Practice Collection and update the information regularly. Collect Good Practices through reports from consultants or insights gained during on-site visits by JICA personnel.	- Active use of Good Practice for safety management - Establishment of a special page on the website
c-4	Create a resource page on the JICA website with links to construction safety education materials, similar to the “Workplace Safety Website” published by Ministry of Health, Labour and Welfare in Japan.	Publication of a collection of links on the special page on the JICA website
c-5	Implement projects such as capacity development to support the continuous promotion and establishment of a Safety Culture in recipient countries.	Implementation of projects related to construction safety

(d) Client Participation in Projects

The appropriate participation of the client (implementing agency) in on-site activities significantly impacts the smooth execution of work and the effectiveness of safety management. The client’s involvement is crucial for ensuring smooth coordination with local residents and relevant institutions, as well as for the timely completion of client-responsible tasks. Therefore, it is essential for the client to participate in safety

patrols, safety meetings, and other activities to stay informed about project progress and challenges and to take the lead in actions that solve those challenges.

However, some clients show limited interest in the project. In such cases, mechanisms must be established to encourage their understanding of the Construction Safety Guidance and active participation in the project. Additionally, since many clients lack specialized knowledge in construction and civil engineering, another issue is to define how they should engage in on-site safety management.

Proposed countermeasures for these challenges are summarized in Table 3-5.

Table 3-5 Proposed Countermeasures for Client Participation in Projects

	Countermeasure	Outcomes
d-1	To promote an understanding on the part of the client with regard to the “Roles and Responsibilities of Project Stakeholders” section in the Construction Safety Guidance, JICA will utilize opportunities such as DOD and G/A signings to explain the content of the Construction Safety Guidance to the clients.	Client understanding of the Construction Safety Guidance
d-2	Clients will be encouraged to participate and attend site visits by JICA Overseas Office staff and safety seminars.	Active project participation by the client
d-3	Consultants will highlight the specific benefits of the client’s involvement in the projects (e.g., smooth completion and handover, improved local reputation) to enhance motivation for active participation.	Active project participation by the client
d-4	JICA will increase the frequency of construction safety seminars or organize seminars specifically targeted at clients.	Increase in the number of participants in seminars on construction safety

3.2.5 Systematization of Construction Safety System Based on Current Challenges

Building on the discussions in the previous sections, the roles of each actor have been redefined and organized. The responsibilities of each actor at different phases of the overall Grant Aid Project have been structured into a Safety and Health Assurance Flow, as shown in Figure 3-6 and Figure 3-7. Figure 3-6 shows the flow from the pre-implementation phase of grant aid projects to the outline design stage. Figure 3-7 shows the flow from the detailed design stage to project completion. Each phase systematically presents how JICA, consultants, contractors, and clients collaborate to establish and strengthen the safety management system.

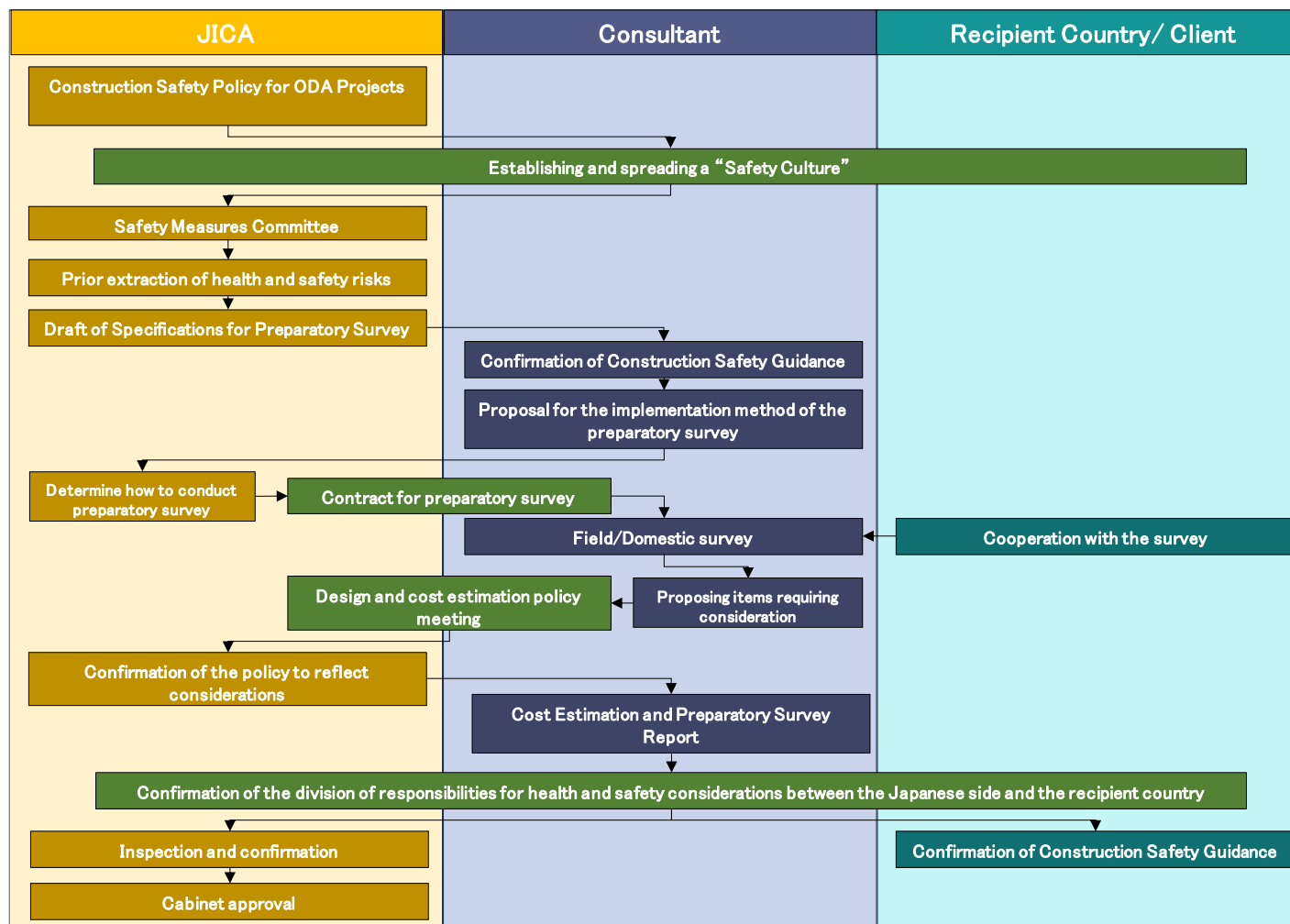


Figure 3-6 Flow of Safety and Health Assurance for Grant Aid Projects: From Pre-implementation Phase of Grant Aid Projects to Outline Design Stage

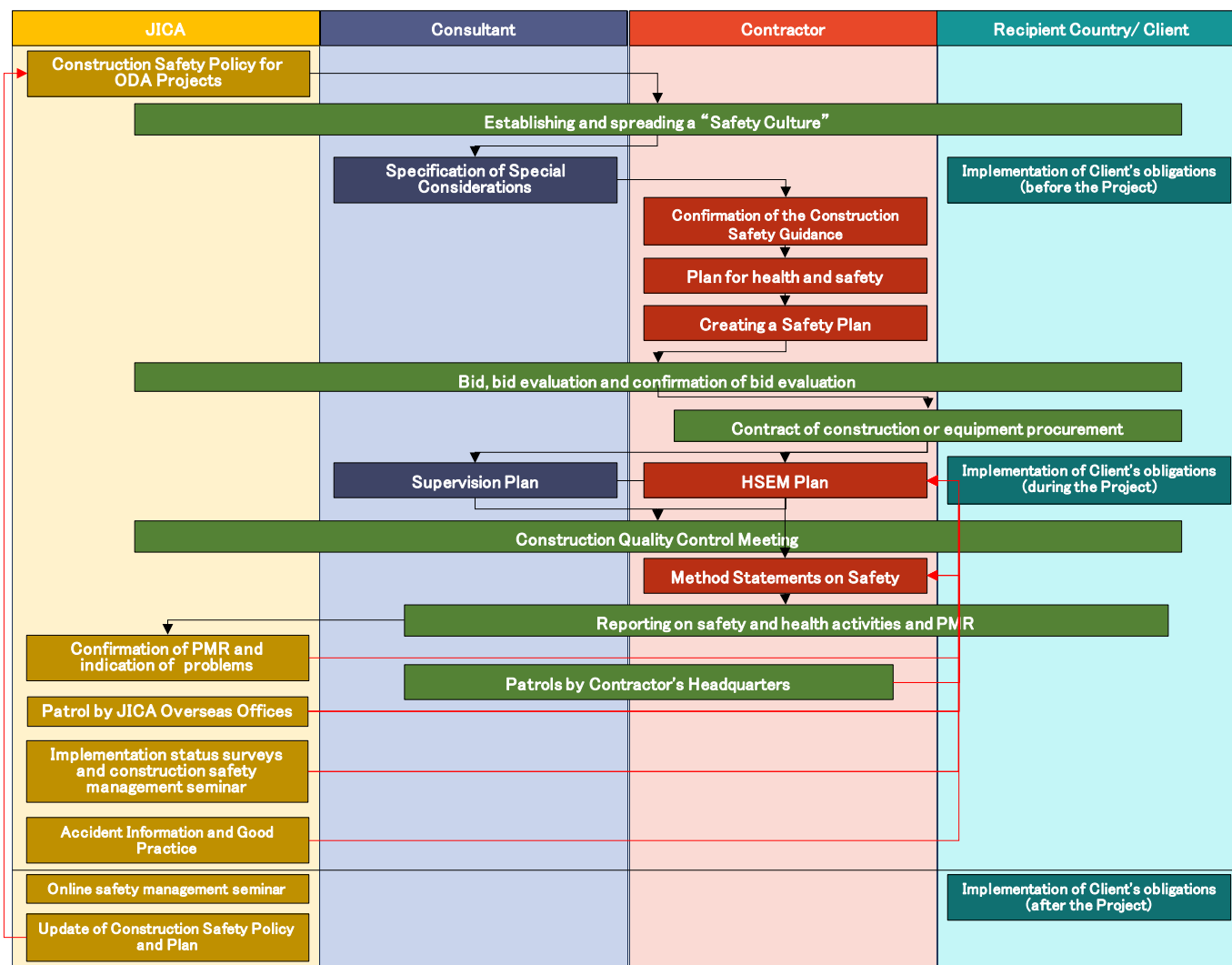


Figure 3-7 Flow of Safety and Health Assurance for Grant Aid Projects: From Detailed Design Stage to Project Completion

3.3 DX Initiatives Applicable to Construction Safety

In the construction industry in Japan, the rapid adoption of ICT and DX is being driven by labor shortages and challenges in the work environment. Many companies are actively utilizing ICT and DX to address workforce shortages, improve on-site efficiency, and enhance productivity.

Given these trends in Japan, it is also expected that ICT- and DX-based construction management will be introduced in ODA projects. In international construction projects, incorporating technological innovations is crucial for improving safety and maximizing productivity.

Table 3-6 summarizes the ICT and DX applications expected to be utilized in Grant Aid Projects.

Table 3-6 Expected ICT and DX Applications

No.	Type	Overview	Usage
1	VR (Virtual Reality)	A technology that allows users wearing a head-mounted display to experience an immersive virtual world created with CG or real-life footage.	Construction safety education through simulated accident experiences
2	MR (Mixed Reality)/AR (Augmented Reality)	A technology where a head-mounted display is used to perceive the shape of real-world environments and to visualize virtual holograms within that space.	Inspection training and visualization of structures
3	Metaverse	A virtual space technology that enables communication between multiple users wearing head-mounted displays.	Pre-training for collaborative work involving multiple workers
4	Drones	A rotary-wing aircraft with multiple propellers that can be flown remotely or autonomously by attaching equipment suited to various applications, such as cameras.	Aerial photography and site perimeter monitoring
5	IoT Devices (Wearable Devices)	A technology that enables data collection and transmission using various internet-connected devices, such as smartwatches and cameras.	Worker health management and remote site monitoring
6	Sensors	A sensor or device that detects information such as temperature, light, color, pressure, magnetism, and speed, converting it into signals for machine processing.	Prevention of access to heavy machinery and hazardous areas
7	Applications	Software used on PCs, smartphones, and tablets to help users complete specific tasks or achieve certain goals.	Digitization and management of documents, etc.

No.	Type	Overview	Usage
8	Communication Tools	A means or technology that facilitates communication and information exchange, including messaging apps and web conferencing systems.	Improving the efficiency of information sharing and communication
9	QR Codes	A two-dimensional barcode technology that can encode large amounts of information into a compact code, making it resistant to dirt and easy to read.	Dissemination, collection, and management of information
10	AI (Artificial Intelligence)	A technology that has the capacity to operate according to the situation without human intervention with the aim of accurately performing advanced reasoning by extracting features from vast datasets and by means of self-learning.	Analysis of inspection images and streamlining of report creation
11	Satellite Communication	A communication method that utilizes artificial satellites to enable information transmission and reception even in areas where terrestrial networks are difficult to reach.	Ensuring a stable communication environment at the construction site
12	3D Printers	A general term for digital manufacturing machines that melt resin or metal to create three-dimensional objects in arbitrary shapes.	Visualization of completed structures
13	BIM (Building Information Modeling)	A technology that represents structures in three-dimensional models in each stage of construction with the aim of enhancing and optimizing construction production and management systems.	Visualization of construction information and shared understanding among stakeholders
14	Digital Twin	A technology that creates a digital twin—a virtual replica—based on real-world data, allowing for various simulations.	Securing evacuation routes and shelters in case of disasters
15	Remote-Controlled Construction Machinery / Autonomous Construction Machinery	A technology that enables the remote operation of construction machinery without an onboard operator or autonomous operation based on pre-programmed instructions.	Partial or complete automation of on-site work

4 Issues and Recommendations

4.1 Summary of Study Results

Contractors engaged in Grant Aid Projects employ innovative approaches to ensure construction safety despite various constraints in developing countries. Particularly in facility and civil engineering projects where construction companies serve as the main contractors, safety management is provided on the basis of the Construction Safety Guidance along with the contractors' own safety management systems. Specifically, contractors conduct regular site inspections and patrols, provide training for third-country and local workers, and implement daily activities such as organizing and tidying work areas. Through these measures, they operate a PDCA cycle to improve on-site conditions and reduce accident risks.

On the other hand, for equipment procurement projects that involve installation, it is trading companies, not construction companies, that often take on the role of the main contractor. The safety management level of trading companies tends to be lower than that of construction companies. While these contractors engage in safety management through trial and error, there are disparities in management structure and experience levels. Additionally, in some cases, the Construction Safety Guidance is not contractually applicable. As a result, safety management levels are directly impacted by differences in construction and civil engineering experience, which sometimes unintentionally leads to inadequate safety measures. Another challenge is that, in comparison to construction and civil engineering projects, bidding documents for equipment procurement projects contain fewer references to safety measures. This leads to variations in safety management levels depending on the contractor's capabilities and awareness of safety.

More than 10 years have passed since the formulation of the Construction Safety Guidance. Therefore, revisions are needed to align the guidance with changing times and technologies. However, simply updating the Construction Safety Guidance alone will not prevent accidents. To enable contractors to effectively implement safety management activities, JICA must strengthen its support by improving regulatory frameworks, institutionalizing safety measures, and other measures. These efforts will further promote construction safety.

Based on the above, in addition to revising the Construction Safety Guidance, it is crucial to develop practical policies and manuals that can be implemented on-site. Furthermore, providing stakeholders with access to information and educational opportunities will enhance safety awareness and technical standards, ensuring effective accident prevention.

4.2 Identification of Challenges

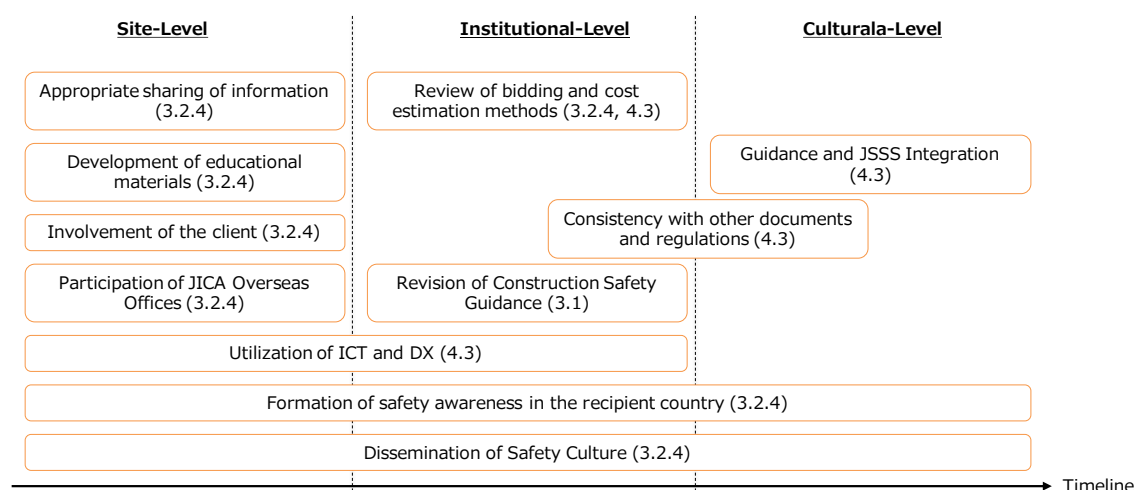
This study examined three key perspectives:

- I. Consideration of revision policies for the Construction Safety Guidance
- II. Systematization of construction safety systems for Grant Aid Projects
- III. Potential use of ICT and DX

Through this process, the identified challenges were categorized into three levels, which are summarized in Figure 4-1:

Site-Level:	Specific safety management challenges that are common across individual projects and construction sites.
Institutional-Level:	Systemic challenges that need to be addressed within the framework of Grant Aid Projects.
Cultural-Level:	Challenges beyond the framework of Grant Aid Projects that require solutions by instilling safety awareness and values to drive changes in norms and practices among all stakeholders.

While some site-level issues can be addressed individually, fundamental solutions often require reforms at the institutional level. Furthermore, for a sustainable transformation of existing norms and systems, a long-term and strategic approach is necessary. This is defined as a cultural-level challenge.



Note: The numbers in parentheses indicate the corresponding chapter for details.

Figure 4-1 Challenges for Strengthening Construction Safety in Grant Aid Projects

4.3 Recommendations for Strengthening Construction Safety

Enhancing construction safety in Grant Aid Projects cannot be achieved solely through the efforts of contractors who manage construction sites. It is essential for all stakeholders to work together with a shared understanding and collective commitment.

To address these challenges, the following approaches are necessary:

Short-Term Measures (Site Level)	Rapidly address site-specific issues and implement measures to reduce accident risks (PDCA cycle for on-site safety and health management).
Mid-Term Measures (Institutional Level):	Review safety management standards and contract conditions to design more effective regulatory frameworks.
Long-Term Measures (Cultural Level):	Foster a Safety Culture among all stakeholders and establish a system where safety management is continuously recognized as a valuable and integral component.

These are not independent initiatives but rather they are interconnected and mutually influential. Some challenges require a simultaneous approach from short-term, mid-term, and long-term perspectives. In particular, JICA's overarching ODA policy of fostering a Safety Culture is a long-term initiative, yet it serves as the fundamental element that supports all safety measures. It provides the foundation for both short-term and mid-term strategies.

Among the challenges summarized in Figure 4-1, the issues that JICA should systematically address are discussed in the following section.

(1) Revision of Standard Bidding Documents and Other Related Documents alongside Construction Safety Guidance Update

As a result of this study, revisions to the Construction Safety Guidance will be initiated. However, to effectively enhance construction safety, it is important to simultaneously revise other related documents, such as the Standard Bidding Documents. This approach is expected to ensure consistency in on-site safety management systems and responses.

JICA has established various safety management systems, some of which have been incorporated into the respective system as needed over time. Consequently, inconsistencies have emerged between these systems and actual on-site safety management activities. Figure 4-2 shows an overview of the relationships between these systems and activities, with arrows indicating the connections between actions specified in different systems, policies, and documents.

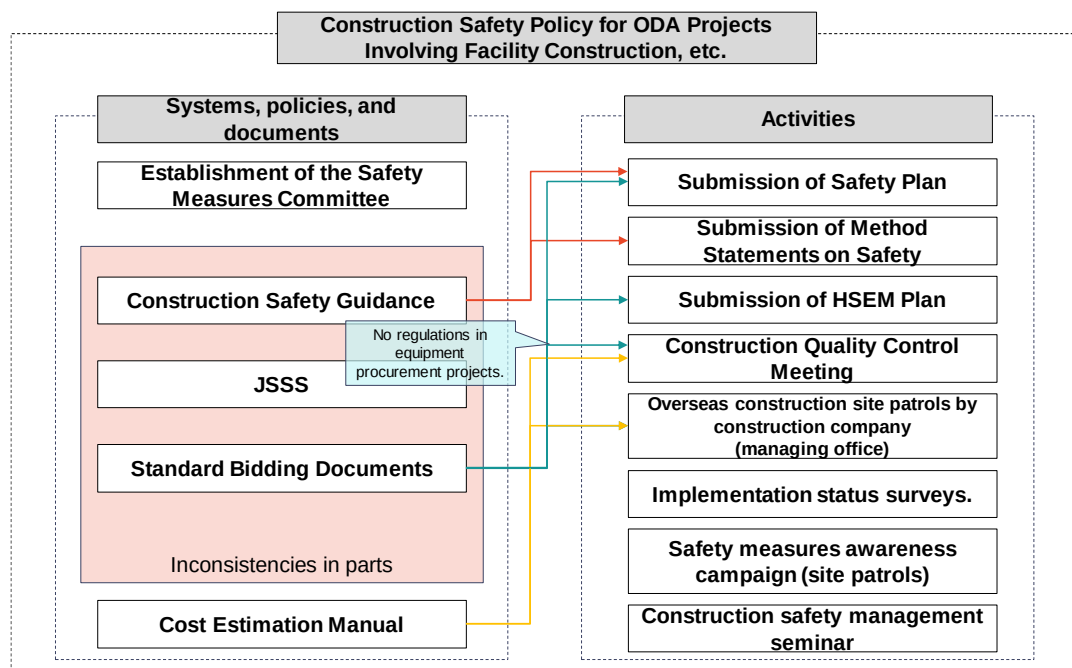


Figure 4-2 Current Relationships between Systems and Activities

Specifically, for equipment procurement projects, the current Standard Bidding Documents do not require the submission of a Safety Plan at the bidding stage. However, equipment procurement projects that involve installation also involve construction work, regardless of their scale. Therefore, it is essential for bidders to consider safety measures for the procurement stage during the bidding stage. This process helps ensure the appropriate allocation of safety management costs in bid pricing. To facilitate this, revisions to the Instructions to Bidders (ITB) are necessary.

Similarly, the Standard Bidding Documents for equipment procurement projects currently do not include specific references to the Health, Safety, and Environment Management Plan (HSEM Plan). To address this, depending on whether installation work is involved, it is advisable to revise the Particular Conditions of Contract (PCC) to guide bidding document preparers so that submission of an HSEM Plan is mandatory.

Furthermore, none of the Standard Bidding Documents contain provisions related to construction site patrols by safety officers of managing offices. It is necessary to add a section on the implementation of the patrols to prevent inconsistencies in application across different projects.

To ensure consistency between various documents, systems, and activities, an organized framework, as outlined in Figure 4-3, is required (Changes are indicated by solid arrows).

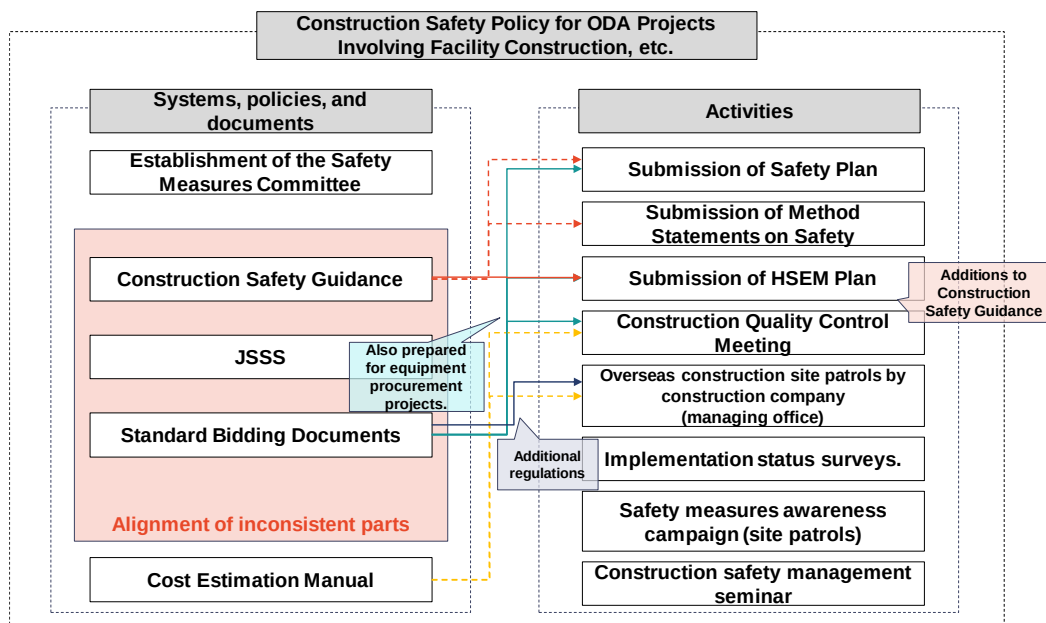


Figure 4-3 Proposal for Improving Systematization of Programs and Activities

(2) Future Integration of the Construction Safety Guidance and JSSS

The current Construction Safety Guidance applies to Yen Loan (Project-Type) Projects, but during this study, JICA clarified that it has a policy of excluding Loan Projects from the Construction Safety Guidance. As a result, after the revision of the Construction Safety Guidance, it will continue to be referenced for Grant Aid Projects, while JSSS will be applied to Loan Projects. Although this revision will clarify the applicable scope, it effectively creates a double standard for safety management in ODA projects. Therefore, while gradually ensuring consistency between the two systems, the long-term goal should be the integration of the Construction Safety Guidance and JSSS into a unified framework.

(3) Ensuring Proper Allocation of Safety Management Costs

It is necessary to secure an adequate budget for safety management by reviewing cost estimation methods and bidding processes.

By collecting and comparing estimated safety management costs and actual safety management expenses incurred in recent Grant Aid Projects, any discrepancies can be identified.

If there is a significant gap, the cause needs to be analyzed. The gap is likely due to either cost estimation methods or bidding processes. If actual safety management costs exceed estimated costs, the issue might lie in the cost estimation method. Since the required safety management budget is not adequately secured in the current estimation method, the estimation method should be revised, and updates to the Cost Estimation Manual should be made to ensure proper budgeting.

If actual safety management costs are lower than estimated costs, the issue might lie in the bidding process. In competitive bidding, safety management costs tend to be the first area to be reduced. As a result, the safety management budget planned during estimation may be undervalued in the bidding process. To maintain competition in bidding while securing the necessary safety budget, the bidding process should be revised to prevent unnecessary reductions in safety costs. It is necessary to evaluate the impact of the current bidding process on safety budget allocation and determine whether changes to the process are required.

(4) Utilization of ICT and DX in Grant Aid Projects

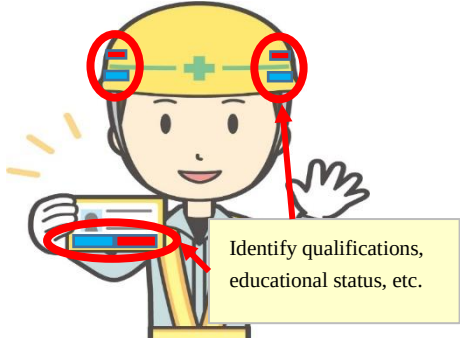
Currently, the use of ICT and DX in Grant Aid Projects is limited to easily implementable tools such as messaging apps. Based on questionnaires and interviews with contractors, the biggest barrier to adoption is cost-effectiveness. Since Grant Aid Projects are often short-term and one-time initiatives, the scope of ICT/DX utilization is limited, making the cost of implementation unjustifiable in many cases. Contractors remain skeptical about whether there would be a sufficient return from ICT/DX implementation in developing countries. In this situation, it is necessary to secure the budget to promote the introduction of ICT/DX. By introducing a dedicated budget category when estimating overall project costs, such as “Digital Technology Implementation Costs,” funding can be allocated through percentage-based calculations, making it easier for contractors to integrate digital technologies.

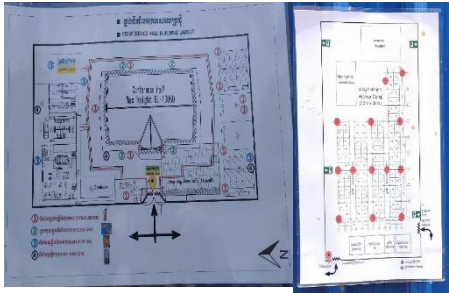
In Japan, in view of the labor shortage, an urgent issue is the improvement of productivity at construction sites, which has led to the promotion of automation in construction work. In developing countries, securing a workforce is a relatively easy matter and there are few cases in which labor shortage is an issue. However, an increase in the number of personnel on site increases the risk of personal injury, so replacing certain manual tasks with automated machinery can be a viable option from a safety improvement perspective. Additionally, automated and autonomous construction technologies represent the cutting-edge of digital technology utilization in the construction industry. Deploying these technologies in Grant Aid Project construction sites not only showcases Japan’s advanced engineering capabilities internationally but also enhances the quality of infrastructure development in developing countries. However, at the moment, labor costs remain low in developing countries, making automated and autonomous construction less attractive for contractors. As a result, contractors are unlikely to voluntarily adopt these technologies. By taking the lead in providing support, including budgeting, JICA can establish a feasible path for the implementation of automation and autonomy in construction.

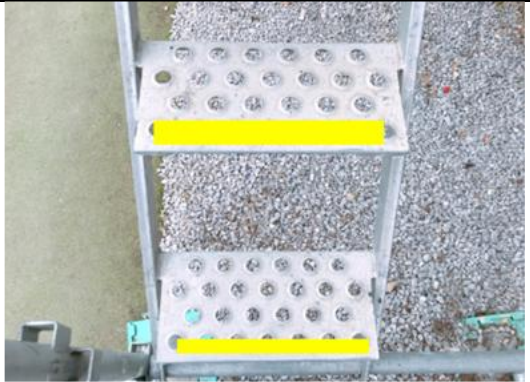
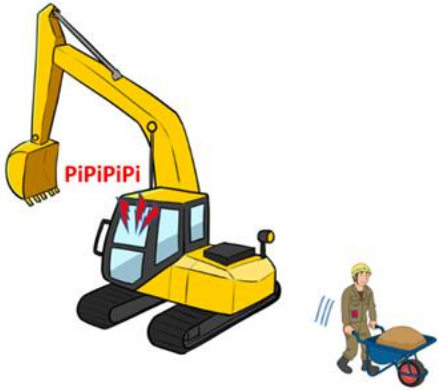
5 Document Collection

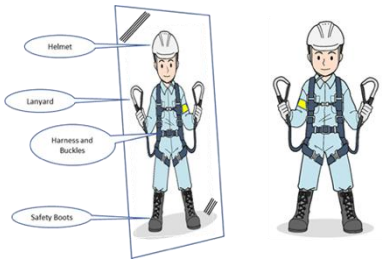
➤ Good Practice Collection

Examples of health and safety at construction sites in Japan and overseas are shown below.

Theme	Summary	Situation
Visualization	Attach a label indicating the operator responsible for the distribution board in a clearly visible location on the board.	
	Place stickers on helmets and ID cards to indicate training status, assigned tasks, and on-site qualifications.	
	When working inside a pit, hang the ID card at the entrance to clearly identify who has entered.	

Theme	Summary	Situation
	Since curing sheets can obscure the shape of stairs, apply tape after covering to maintain visibility of the stair shape.	
	Color-code scaffolding materials to clearly mark entry points.	
	Use illustrations to indicate the locations of fire extinguishers and emergency exits for worker awareness.	
Measures to prevent falls and trips	Mark areas for hook replacement in high-altitude work with color coding or colored tape to encourage proper hook switching.	

Theme	Summary	Situation
	Apply colored tape or paint on stairs and steps to enhance visibility and encourage caution.	
	Place water buckets and brushes near the entrance of scaffold stairs for shoe sole cleaning.	
Measures to prevent contact and collisions	Equip workers with sensors so that a warning alarm is triggered to make heavy machinery operators aware that a worker is approaching.	

Theme	Summary	Situation
	Attach warning tape to protrusions on-site to alert workers.	
Checking the use of personal protective equipment (hereinafter referred to as “PPE”)	Install full-length mirrors at the entrance for workers to check their PPE before entering sites.	
	Install sensors on scaffold stairs that triggers an alarm when workers approach, reminding them to check their PPE.	
Safety signs	Use illustrations for safety signs and caution notices (ensuring text is still included alongside prominent illustrations).	
	Display safety instructions in both the local language and English.	
Fostering safety awareness	Establish an award system to recognize and commend workers who contribute to on-site safety initiatives.	-