Practical Approaches to Build Back Better with Inclusive Recovery from Earthquake Disasters: A Discussion Based on the 2015 Nepal Earthquake Recovery Project by JICA

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Abstract

The 2015 Nepal Earthquake was the first devastating disaster after the Sendai Framework for Disaster Risk Reduction (SFDRR) was adopted in 2015. The Build Back Better (BBB) concept was approved as one of the SFDRR priority actions under the active initiatives program of the Japanese government. Against this backdrop, the Nepal Earthquake recovery process, particularly in the most heavily damaged housing sector, should have been the first proving case for BBB.

However, in a situation where consensus on the detailed requirements of BBB is yet to be formulated, and common understanding of BBB has not been globally attained, the emerging concept of Inclusive Recovery (IR) is gaining more attention in the global arena. From the IR perspective, BBB might leave behind the most vulnerable people since BBB requires universal vulnerability reduction across social groups and thus society as a whole. In the BBB framework, consideration on the most vulnerable, i.e., those who do not have enough socio-economic capacity to meet the requirement for BBB, is a potential challenge. BBB and IR can complement each other from their respective perspectives under certain operational arrangements and, as such, "BBB with IR" would materialize a more desired disaster recovery process.

This paper proposes a practical coherence between BBB and IR while referring to the actual practices JICA has experienced in Nepal in the Emergency Housing Reconstruction Project (EHRP) to clarify the logical relations between them. Here, it was found that JICA's EHRP could not perfectly exhibit the coherence of BBB and IR as hypothesized in this paper, but it was clearly confirmed that JICA's EHRP could incrementally minimize the left behind vulnerable people by

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step by step enhancement of the facilitation to beneficiaries with the Community Mobilization Program (CMP).

Nonetheless, we also found that CMP itself is basically a facilitation measure for households with self-help capacity, but it is not enough for the most vulnerable. As a lesson, we learned that the disaggregation of the most vulnerable who would eventually be left behind even with facilitation such as CMP is highly important, and we have to simultaneously initiate separate additional support activities for the most vulnerable from the beginning to attain the true BBB with IR.

Keywords: Build Back Better (BBB), Inclusive Recovery (IR), Disaster Risk Reduction (DRR), Leave no one behind (LNOB), Housing recovery after the earthquake

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1. Introduction

"Build Back Better (BBB)" has been recognized as one of the priority actions in the Sendai Framework for Disaster Risk Reduction (SFDRR) (UNDRR 2015) adopted in March 2015. According to the UNDRR (2017a), BBB is defined as *"the use of the recovery, rehabilitation and reconstruction phases after a disaster to increase the resilience of nations and communities through integrating disaster risk reduction measures into the restoration of physical infrastructure and societal systems, and into the revitalization of livelihoods, economies and the environment."*[i] However, what disaster risk and resilience specifically mean has long been discussed, with different views depending on academic fields, countries, regions, languages, cultures, nature-views, and religions being put forward. Also, the definition of BBB does not say anything about the threshold beyond which the efforts for reducing disaster risks can be deemed to be BBB. Suppose if a house made of straw, which had collapsed in a disaster, were reconstructed as a house made of wood that is still not enough strong to withstand future possible disasters, should we regard this as BBB? Thus, it should be no surprise that the various subjects such as governments, NGOs, and the private sector have interpreted BBB differently. There is also a big question whether BBB should be granted only for efforts achieving certain criteria or for any efforts achieving any improvement, literally "better," from pre-disaster situations. No international criteria to evaluate the validity for BBB actions have been fully established.

Given the limited development of criteria for international standardization of BBB, there have been discussions on a new concept for disaster recovery called "Inclusive Recovery (IR)"[ii] in recent years. In the 4th World Reconstruction Conference (WRC4) held in May 2019, IR was

[i] Textual quotation
[ii] The term of "Inclusive Recovery" is use in this paper as a synonym of "Inclusion for Resilient Recovery" used in the GFDRR (2019).

one of the main themes of the discussion. Although IR is a new concept that has not been officially defined by UNDRR, IR requires that no one is left behind in recovery processes according to the GFDRR (2019). In other words, it can be said that IR is a concept that puts particular focus on recovery processes but is unclear about what kind of results or outcomes of such recovery processes it needs to achieve, whereas BBB requires the reduction of the vulnerability of the whole society regardless of the differences in socio-economic status of the people involved. But, from the viewpoint of IR that puts particular focus on the participation of individual people and households, BBB recovery tends to be criticized as leaving people in the socially vulnerable groups behind that do not have sufficient resources for recovery. However, BBB and IR should be complementary by nature when implemented with proper consideration and arrangements.

The Nepal earthquake that occurred on April 25, 2015 with a magnitude of 7.8 Mw was centered in Gorkha district about 77km northwest of the capital city of Kathmandu and caused considerable damage to the country. Together with succeeding aftershocks, the earthquake left 8,790 people dead, more than 22,300 injured, about 500,000 houses completely destroyed, and about 260,000 houses partially destroyed (NPC 2015). The Nepal earthquake was the first major disaster in the world after the adoption of the SFDRR and the recovery work after the earthquake is of significant importance in developing an international consensus about the direction of disaster recovery in the future.

This paper first overviews the concepts and requirements of BBB and IR and their relationship in the housing reconstruction work during the disaster recovery from the earthquake and proposes a practical approach for achieving both BBB and IR. This paper argues that it is certainly possible to overcome the contradiction between BBB and IR, and that achieving both BBB and IR can lead to the most preferable disaster recovery that cannot be achieved by BBB or

IR singly. Then, this paper refers to the reconstruction project implemented by the government of Nepal and JICA to extract lessons learnt on how to practically achieve BBB and IR on the ground.

In addition to this section, this paper comprises the following sections. Section 2 reviews a framework called the MOVE (Method for the Improvement of Vulnerability Assessment in Europe) advocated by Birkmann et al (2013) to review the concepts of "disaster risk" and "vulnerability" which have been used differently depending on the academic fields and contexts. Section 3 looks into the subjects of "vulnerability." While the framework of the MOVE only recognizes nations and communities as the subjects of vulnerability, this section explores the vulnerability of individuals and households. And it also discusses what would constitute a set of possible measures to alleviate the "vulnerability" associated with not only the vulnerability subjects but also different hazard types. Section 4 discusses how to achieve both BBB and IR, especially in the recovery from earthquake disasters and the difficulties associated with these. Section 5 chronologically overviews the progress of the housing reconstruction project in the areas supported by JICA after the Nepal earthquake. On the basis of the theoretical discussions in Sections 2 to 5, Section 6 overviews the desired approach to achieve both BBB and IR and evaluates the housing reconstruction project supported by JICA in Nepal from the viewpoint of the desired approach. Then, Section 7 summarizes all the discussions made in the previous sections.

2. The Concepts of Disaster Risk and Vulnerability on the Basis of the MOVE Framework

UNDRR (2017) defines BBB as the increase in the resilience of nations and communities from integrating disaster risk reduction measures. In this paper, however, resilience is considered to be

one of the risk factors of disasters on the basis of the concept advocated by Birkmann et al (2013). Resilience is not increased by disaster risk reduction. Instead, there is an inverse causal relation where disaster risks are reduced as a result of increasing resilience. That is, it can be said that BBB is employed "to achieve a recovery state where the risks of nations and communities have been reduced through recovery processes." Thus, in what follows, the discussion is made as to what are "disaster risks" in the definition of BBB and how reduction in these risks can be achieved.

"Disaster risks (R)" and "vulnerability (V)" have been defined in many ways and in a broad or narrow sense. As one of the solutions for this issue, Birkmann et al (2013) advocated a framework called the MOVE which tries to facilitate a certain level of consensus about the vulnerability assessment. Specifically, the MOVE proposes to breakdown vulnerability (V) into three component factors: exposure (E); susceptibility (S); and lack of resilience which is also called response capacity (C); and additionally uses adaptation (A) as the fourth component factor affecting hazard (H) and vulnerability (V).

On the basis of the MOVE, the component factors of disaster risks are summarized in Table 1.

Table 1: Component Factors of Disaster Risks on the Basis of the MOVE Model

	Wisner (2004)	MOVE (Birkmann et al. 2013)	
		Component factor	Detailed description
Disaster Risk (R)	Hazard (H)	Hazard (H)	- Natural events - Socio-natural events
	Vulnerability (V)	Exposure (E)	- Temporal - Spatial
		Susceptibility (S)	- Physical - Economic - Social - Cultural - Ecological - Institutional
		Lack of Resilience / Response Capacity (C)	- Capacity to anticipate - Capacity to cope - Capacity to recover
		Adaptation (A)	- Hazard intervention - Vulnerability intervention, Exposure reduction, Susceptibility reduction, Resilience improvement

Hazard (H) is used to describe the potential occurrence of natural, socio-natural, or anthropogenic events that may have physical, social, economic, and environmental impact in a given area and over a given period of time. Exposure (E) describes the extent to which a unit of assessment falls within the geographical range of a hazard event. For example, spatial exposure can be reduced by limiting the in-migration to and encouraging relocation from the areas with high risk of disasters due to floods and landslides. Susceptibility (S) describes the predisposition of elements at risk (social and ecological) to suffer harm. Depending on communities and systems, the degrees of disaster damage (adverse direct effects or short-term effects after the occurrence of a hazard) vary even when exposed to the same hazard. Because hazards can cause diverse damage to communities and systems, Birkmann et al (2013) classifies susceptibility into six aspects depending on the type of damage experienced.

Table 2: Six Aspects of Susceptibility (S)
(based on Birkmann et al 2013)

Aspect of susceptibility	Content
Physical (S1)	Potential for damage to physical assets including built-up areas, infrastructure, and open spaces.
Economic (S2)	Propensity for loss of economic value from damage to physical assets and/or disruption of productive capacity.
Social (S3)	Propensity for human well-being to be damaged by disruption to individual (mental and physical health) and collective (health, education services, etc.) social systems and their characteristics (e.g. gender, marginalization of social groups).
Cultural (S4)	Potential for damage to intangible values including meanings placed on artefacts, customs, habitual practices and natural or urban landscapes.
Environmental (S5)	Potential for damage to all ecological and bio-physical systems and their different functions. This includes particular ecosystem functions and environmental services but excludes cultural values that might be attributed.
Institutional (S6)	Potential for damage to governance systems, organizational form, and function as well as guiding formal/legal and informal/customary rules—any of which may be forced to change the following weaknesses exposed by disaster and response.

According to the MOVE, resilience has two aspects: one is passive capacity; and the other is the capacity to actively adjust to future changes. The former capacity comprises capacity to cope, capacity to recover and capacity to anticipate and the lack of these three types of passive capacity leads to vulnerability. The latter capacity, adaptation (A), is considered to include the capacity of communities and systems to learn from the experience of past disasters and improve existing methods in preparation for future disasters.

In this paper, the three types of capacity constituting resilience are collectively called response capacity (C), and response capacity (C) and adaptation (A) are collectively redefined as

"Resilience (Re)" (Re = C x A).[iii] That is, the situations with high risks of disasters are those high in hazard, exposure, and susceptibility and low in response capacity and adaptation. The numerical expression of what discussed above can be as follows:

Disaster risk (R) = Hazard (H) x Vulnerability (V) = Hazard (H) x Exposure (E) x Susceptibility (S) / Response capacity (C) x Adaptation (A):

$$R = H \times E \times \frac{\sum_{i=1}^{6} Si}{C \times A}$$

As stated above, on the basis of the concept that resilience is one of the risk factors in disasters advocated by Birkmann et al (2013), this paper supports the concept that disaster risks are reduced as a result of increasing resilience.

3. Measures to Reduce Disaster Risks by Subject of Vulnerability and Hazard Type

Following the concept of MOVE, the discussion above has been made with social systems as the subject of vulnerability. This is considered important because in the field of disaster prevention research there is a tendency to discuss disaster risks as one of the problems of social systems as a whole. However, the factors causing vulnerability can be classified according to a variety of subjects (such as individuals and households) constituting a social system. Also, there are diverse types of natural hazards and the effectiveness of resilience against disasters is supposed to vary depending on the types of natural hazards.

[iii] However, there have been considerably diverse discussions on the relation between response capacity (C) and adaptation (A) and, therefore, it should be noted that these two factors cannot be definitely said to be components of resilience in general.

3.1 Classification of Measures to Reduce Disaster Risks by Subject of Vulnerability and Type of Measure

According to Shimada (2009), natural hazards associated with physical shocks first undergo alleviation and attenuation by public infrastructures owned by social systems and then affect individuals and households. In contrast, economic, social, and political shocks do not have physical characteristics and these changes are considered to directly affect the smallest units of social systems such as individuals and households. Then, vulnerability can be classified by the types of subjects such as "(1) nations and communities" and "(2) individuals and households"; and the causes of vulnerability whether they are structural or non-structural. Accordingly, the measures to reduce disaster risks can be classified as shown in Table 3 and the items and actions that respective measures need to address, including infrastructures and social systems, may be summarized as in Table 4.

As an example, to reduce physical susceptibility (S1), both the improvement of individual houses, which are of course individual properties, and infrastructure which belongs to society are effective. Thus, for former physical private assets physical susceptibility varies depending on individuals even in identical societies. In contrast, for latter physical public assets infrastructure and social functions work to reduce disaster risks not for individuals and households but for society. As to economic susceptibility (S3), the measures to reduce disaster risks for individuals and households need to address the susceptibility of respective occupations, but those for nations and communities need to focus on and address industrial structures or the susceptibility of each industry against external shocks.

Table 3: Classification of Measures to Reduce Disaster Risks by Subject of Vulnerability and Type of Measure

Disaster risk factor				Type of measure	Nations and communities	Individuals and households
Disaster risk (R)	Hazard (H)			Structural measures	Reinforcement of disaster infrastructures and critical infrastructures	NA
	Vulnerability (V)	Exposure (E)				Reinforcement of assets (houses, etc.)
		Susceptibility (S)	Physical (S1)			
			Social (S2)	Non-structural measures	Reinforcement of social systems	Reinforcement of capacity to cope
			Economic (S3)			
			Cultural (S4)			
			Ecological (S5)			
			Institutional (S6)			
		Resilience (Re)	Response capacity (C)			
			Adaptation (A)			

Table 4: Items and Actions that Respective Measures to Reduce Disaster Risks Need to Address

				Nations and communities (Vx)	Individuals and households (Vy)
Disaster risk (R)	Hazard (H)			Hx: Disaster prevention infrastructures	
	Vulnerability (V)	Exposure (E)		Ex: Public evacuation and relocation	Ey: Voluntary evacuation and relocation
		Susceptibility (S)	Physical (S1)	S1x: Critical infrastructures (road, railroads, water and sewerage, power supply, schools, hospitals, etc.)	S1y: Personal assets (houses, etc.)
			Social (S2)	S2x: Social service delivery system including education, health, etc.	S2y: Personal social capacity (education level, etc.)
			Economic (S3)	S3x: Economic systems	S3y: Occupations, savings, incomes
			Cultural (S4)	S4x: Regional traditional art	S4y: Custom, tradition
			Ecological (S5)	S5x: Ecological systems	
			Institutional (S6)	S6x: Government systems and social capital	
		Resilience (Re)	Response capacity (C)	Cx: Government systems and social capital	Cy: Self-help capacity
			Adaptation (A)	Ax: Government systems and social capital	Ay: Awareness and knowledge about disaster prevention and adaptation

3.2 Effective Measures to Reduce Disaster Risks for Various Types of Hazards

What follows is an additional discussion about using structural and non-structural measures to reduce disaster risks. The first significant point about the structural measures is that the contents and the range of effects of the measures for "nations and communities" vary depending on the type of hazards. For example, in the case of hazards like floods and landslides, their source origins can be geographically limited and their generation mechanisms are often known and, therefore, it is highly likely that they can be prevented with physical infrastructure (such as dikes, retaining walls and dams). In contrast, it is difficult to control the generation or attenuate the magnitude of earthquakes. Thus, the role of structural measures to reduce disaster risks for "individuals and households" is larger for those hazards for which the effectiveness or disaster control capability of disaster prevention infrastructure is low. In the case of floods and landslides, such disaster prevention infrastructures as the measures for nations and communities are effective but the measures for individuals and households are limited to the renovation to stilt houses using pilotis, or voluntary relocation to safer places, etc. In contrast, in the case of earthquakes, the quite effective and critical measures are those for individuals and households such as the earthquake retrofitting of houses.

The second significant point to be emphasized about the structural measures is the importance of reinforcing "critical infrastructures." The "critical infrastructures" like lifelines including water supply networks, roads, and power supply networks as well as basic social service facilities including hospitals and schools, do not control hazards at the origin but reinforcing those critical infrastructures allows them to play a protective role against hazards in terms of not only saving human lives but also helping to control the damage to social, economic, and administrative systems. Thus, "critical infrastructures" are indispensable for reducing disaster risks and vulnerability regardless of the nature of hazards.

The above discussion can be summed up in the important reinforcement points to be

considered when establishing effective structural or non-structural measures to reduce disaster risks. These differ depending on the anticipated external shocks and whether the measures are for "(1) nations and communities" or "(2) individuals and households", and can be classified as shown in Table 5.

Table 5: Difference in the Effectiveness of Measures to Reduce Disaster Risks by the Type of External Shock

		Natural hazard			
		Controllable		Uncontrollable	
Structural measure	Nations and communities	◎ ○	Reinforcement of disaster prevention infrastructures Reinforcement of critical infrastructures	△ ○	Reinforcement of disaster prevention infrastructures： Reinforcement of critical infrastructures
	Individuals and households	△	Reinforcement of personal assets	◎	Reinforcement of personal assets
Non-structural measure	Nations and communities	○	Reinforcement of social systems	○	Reinforcement of social systems
	Individuals and households	○	Reinforcement of capacity to cope	○	Reinforcement of capacity to cope

(where ◎ means “very effective”, □ means “effective”, and △ means “not very effective”).

4. Achievement of both BBB and IR through Housing Reconstruction in the Recovery from Earthquake Disasters

As previously mentioned, this paper redefines BBB as seeking "to achieve a recovery state where the risks of nations and communities have been reduced through recovery processes," and shows that the main measures to reduce disaster risks differ depending on the controllability of natural disasters. This section discusses how to incorporate the concepts of BBB and IR in recovery work,

with particular focus on that from earthquakes, as the basis to conduct the verification analysis of BBB and IR in the recovery from the Nepal earthquake. In the Nepal earthquake, private houses suffered the severest damage. About 80% of private houses were identified as being completely destroyed in the 14 districts designated as serious disaster areas (Nagami 2018). Thus, the fulfillment of the situations where the disaster risks of nations and communities have been reduced through recovery processes to reconstruct destroyed houses is set as the requirement to achieve BBB. It was anticipated that the particularly critical external shocks for each disaster-hit-area were also earthquakes even in the future. Because earthquakes are uncontrollable as previously mentioned, reconstructing destroyed houses into more earthquake resilient ones was the prioritized issue of the recovery work.

4.1 Difficulty in Achieving BBB during Recovery Work after Earthquakes

The fact that houses are the private assets of individuals and households makes achievement of BBB difficult. The first reason for the difficulty is the social and economic disparities between individuals and households as house owners. Such disparities result in large differences in the financial capacity to reconstruct earthquake resilient houses. Also, there exist different views and opinions with respect to their houses, and it is therefore difficult for nations and communities to set a uniform standard for the reconstruction of earthquake resilient houses.

The second reason for the difficulty is the problem with defining the "state fulfilling BBB." When evaluating "vulnerability" or physical susceptibility (Sly) of housing, the simplest valuation is an average of the whole society and this can be defined as "$\mathrm{S1y} = \sum_{i=1}^{P} S1yi\ /\mathrm{P}$," where $S1yi$ is the physical susceptibility of each household and P is the number of households in a social system. However, $S1yi$ is randomly distributed and, when assuming that such

distribution follows the normal distribution, it can be expressed as a blue line in the distribution map of Figure 1 Although "to achieve a recovery state where the risks of nations and communities have been reduced through recovery processes." is required for achieving BBB, the problem here is that there has been no indication of the target level of disaster risks with which the achievement of BBB is granted. Thus, when literally interpreting the definition of BBB, even slight improvements in vulnerability compared to previous situations can be considered as achievement of BBB. However, to prevent the recurrence of similar disasters, it is necessary not only to simply reduce disaster risks from the previous level but also to set a standard level of disaster risks enabling the vulnerability of individuals to be sufficiently reduced in consideration of potential hazards in the future. That is, the requirement to achieve BBB needs to be set so as to alleviate the vulnerability of disaster victims to the level that enables all disaster victims to be resilient to potential hazards and thereby improving the physical susceptibility (Sly) of society. Figure 1 illustrates how setting the requirement to achieve BBB works. Setting the requirement is to shift the distribution of Sly from the blue line to the green line throughout nations and communities.

However, it is highly likely that the population segment living in houses easily damaged by earthquakes actually overlaps with the socio-economically vulnerable. Thus, implementing disaster restoration in a manner that uniformly applies support systems and standards throughout social systems may cause some population segments to be unable to carry through the reconstruction of earthquake resilient houses. Similarly, achieving BBB poses a dilemma as setting higher target levels for potential hazards may expand the population segments left behind.

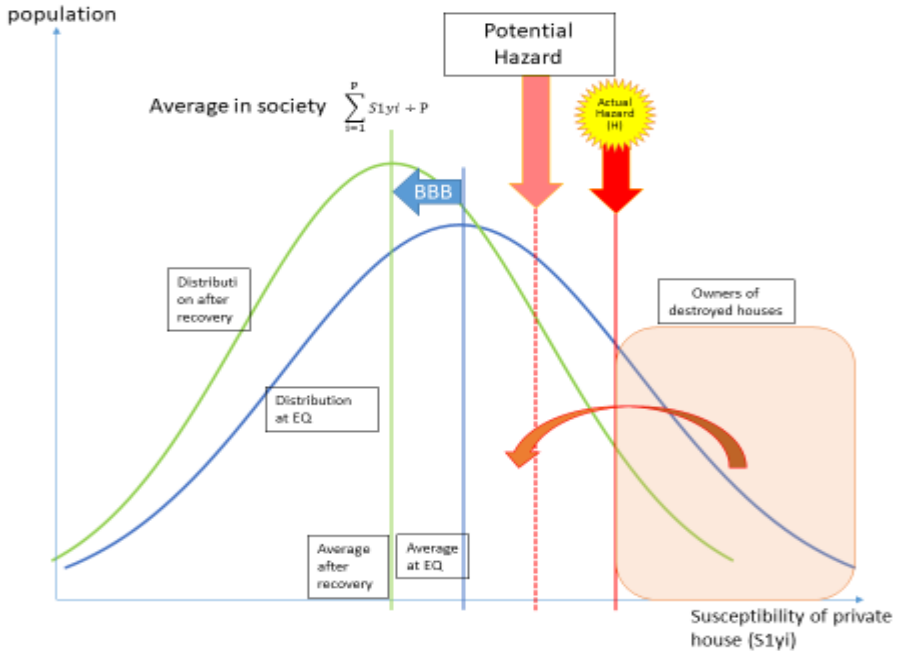

Figure 1: Approach to Reinforce Personal Assets (Ideal Form)

Lastly, it should be noted that the discussions in this section have been made with a focus on the measures to secure the reduction in disaster risks in terms only of physical susceptibility and, as shown in Tables 3 and 4, there are many other measures contributing to the reduction in disaster risks. As previously mentioned, it is difficult to control the hazard at its origin in earthquakes and, therefore, reinforcing respective houses, personal assets, is inarguably an important measure to achieve BBB. The measures to reduce disaster risks through the reduction in the vulnerability of social systems (nations and communities) and individuals are summarized in Table 6. It is necessary to make it sure that physically safe housing reconstruction should be accompanied by the additional improvement of the items listed in Table 4 to the extent possible through the simultaneous implementation of the measures listed in Table 6 with the housing reconstruction. Or at least, the housing reconstruction should be made with full consideration not to produce adverse influences on the items listed in Table 4. That is, the achievement of BBB cannot be granted for the mere fulfillment of physically safe housing reconstruction.

Table 6: Specific Measures to Reduce Disaster Risks Related to Urgent Housing Reconstruction

	Nations and communities	Individuals and households
Hazard (H) prevention	- Disaster preventive measures against hazard generation sources of landslide, floods, etc.	
Exposure (E) reduction	- Development of residential areas for relocation - Restriction of construction activities in dangerous areas	- Permanent voluntary relocation - Temporal voluntary relocation
Physical susceptibility (S1) reduction	- Development and reinforcement of critical infrastructures (roads, waterworks, power supply, schools, hospitals, health care centers, etc.) - Development of other infrastructures	- Redevelopment of safe personal assets (houses, etc.) - Reinforcement of safety at places to store assets (ground improvement, etc.)
Social susceptibility (S2) reduction	- Reinforcement of social systems such as health care, medical and educational services in disaster areas and the reduction of physical susceptibility	- Enhancement of social capability of individuals (education, health care, etc.)
Economic susceptibility (S3) reduction	- Reduction of the physical susceptibility of production, processing, and logistic bases	- Reinforcement of occupational capability, occupational conversion, etc. - Relocation of agricultural land from hazard areas
Cultural susceptibility (S4) reduction	- Turning implicit knowledge on cultural activities into explicit knowledge - Recording of custom, tradition, etc. and dissemination as well as promotion of folklore - Reduction of physical susceptibility at cultural bases	- Regeneration and maintenance of custom and tradition
Ecological susceptibility (S5) reduction	- Conservation and reinforcement of ecological systems (afforestation, etc.)	
Institutional susceptibility (S6) reduction	- Improvement and reinforcement of intangible assets such as personnel structures of administrative organizations, personnel capability, legal structures, and regulations - Reduction of physical susceptibility at government administrative facilities	
Response capacity (C) enhancement	- Reinforcement of administrative systems - Reinforcement of emergency rescue systems - Reinforcement of mutual assistance - Dissemination of the awareness of disaster risks - Reinforcement of financial service	- Reinforcement of self-help capability
Adaptation (A) enhancement	- Reinforcement of disaster research functions	- Enhancement of the awareness for disaster prevention

4.2 How to Ensure Inclusiveness based on the IR concept

It is necessary to review the concept of IR in this section. Although the UNDRR has not given any official definition of IR, the GFDRR (2019) made the following statement about IR (Inclusive Recovery: Inclusion for resilient recovery):

> *Inclusion in disaster recovery and reconstruction is a key condition for the people's resilience. A more inclusive recovery fosters equal rights and opportunities, dignity, and diversity, guaranteeing that nobody from a community is left out because of their age, gender, disability, or other factors linked to ethnicity, religion, geography, economic status, political affiliation, health issues, or other life circumstances. The international frameworks set up by the Agenda 2030 for Sustainable Development Goals, the Sendai Framework for Disaster Risk Reduction, the Paris Agreement on Climate change all advocate for an increasing focus on resilience and inclusion*[iv].

The point in the above statement is that IR is a concept designed to increase understanding of the conditions of "people;" that is individuals and households, not the average condition of society.

Recently, "Leave No One Behind (LNOB)" has often been mentioned as the concept related to IR. In this paper, IR is considered to be the condition satisfying LNOB in recovery processes. The UNDP (2018) mentioned that people get left behind when they lack the choices and opportunities to participate in and benefit from development progress. All people living in extreme poverty can thus be considered 'left behind', as can those who endure disadvantages or

[iv] Textual quotation.

deprivations that limit their choices and opportunities relative to others in society. Thus, it can be summarized that "the condition of being left behind" is the isolation of particular individuals or groups from society in a manner that keeps them from social systems and benefits because of their characteristics (such as personal capability, socio-economic statuses) and identities.

In addition, the UNDP (2018) advocated that empowering and enactment are necessary to satisfy LNOB. That is, IR is not simple inclusion of vulnerable people in recovery processes so as not to leave them behind but stepwise implementation of the identification of population segments with high risks of being left behind, enhancement of capability of such population segments and promotion of actual recovery processes. It is difficult to completely eliminate disadvantages rooted by the factors that people with high risks of being left behind have. Thus, what counts in satisfying LNOB is to prevent them from being overwhelmed by the hardships due to the characteristics and to enable them to cope with and eventually overcome such hardships. Thus, it is necessary to understand that LNOB and IR are not the concepts to advocate the necessity of humanitarian protection and rescue but the concepts to advocate the necessity of reducing vulnerability of individuals by empowering them. It is obvious that short-term assistance such as simple provision of monetary and physical supplies does not lead to fundamental solutions for LNOB and IR.

4.3 Simultaneous Achievement of BBB and IR, a Method for Saving the Underclass

When reinforcing personal assets, uniform support may be insufficient to enable houses of socio-economically vulnerable people to be reinforced against earthquakes. And setting higher safety targets has a risk of increasing the percentage of houses that cannot achieve the targets.

Nonetheless, lowering the target level of vulnerability of society to a level appropriate for socio-economically vulnerable people lacking financial capability to reconstruct houses means the inclusion of the underclass at the cost of the vulnerability of society. Lowering the target level is also inappropriate in that it may deliver a wrong message to individuals and households that have excess capacity to further reduce vulnerability. In addition, discriminately setting low target levels only for the underclass is against the principle of IR since such a measure leaves the problems with the vulnerability of many households due to weak physical structure resistance to external shocks unsolved, which is one of the factors causing people to be left behind.

In summary, it is necessary to deliberate on the possibility of additional implementation of special assistance only for the underclass so as to encourage their self-help enhancement of capacity building without compromising on lowering the target level of the reduction of vulnerability of society. In extending additional assistance to the underclass, it is necessary to pay attention to the following two points: "fair and honest identification of people classified as the underclass"; and "appropriate provision of effective assistance to the disaster victims in the underclass."

5. Outline of the Housing Reconstruction Process in the Recovery Work after the Nepal Earthquake

The previous sections summarize the measures to achieve BBB taking into consideration IR on the basis of discussion results with respect to the inclusive assistance for housing reinforcement in the recovery process after earthquakes. What follows in this section is an evaluation of how efficient the Emergency Housing Reconstruction Project implemented jointly by the government of Nepal and JICA with the support from the project management consultant was in terms of BBB

and IR.[v]

In the recovery work after the Nepal earthquake, housing reconstruction was the biggest challenge in terms of the severity of damage to houses, and a great number of donor countries including emerging countries like India and China, international NGOs and private companies participated in housing reconstruction there. Housing reconstruction in Nepal was characterized by the implementation of the processes under a strictly unified mechanism, which was not the case in housing reconstruction after the Indian Ocean Tsunami. However, although the modalities of the housing reconstruction processes by a large number of participants were unified in a broad sense, the specific assistance extended to local people in respective areas largely varied depending on the donors and the consultants implementing on-site activities. Thus, it should be noted that what follows is applicable only to the housing reconstruction processes implemented in the areas supported by JICA.

As previously mentioned, the Nepal earthquake in 2015 left more than 750,000 houses completely or partially destroyed and caused particularly severe damage to private houses. Most private houses located in the hilly and mountainous areas were masonry ones constructed by piling pieces of shaped stones with mud mortar in between, and such masonry houses accounted for more than 90% of the houses completely or partially destroyed by the earthquake (Nagami 2018)). Being afraid that houses reconstructed with the same traditional masonry structure would be subject to similarly severe damage on the occurrence of major earthquakes in the future, the government of Nepal determined to introduce a Housing Reconstruction Program to promote the reconstruction of houses satisfying certain seismic standards (which are defined as the Minimum Requirements) by granting the owners of houses completely or partially destroyed 300,000 rupees

[v] Oriental Consultants Global Co., Ltd. was in charge of implementing the project.

on the condition of the compliance to the standards.[vi] The housing grant of 300,000 rupees was disbursed in three tranches of 50,000, 150,000 and 100,000 rupees according to the progress of the reconstruction. The housing grant program had been promoted on the basis of the principle of owner-driven housing reconstruction requiring owners of destroyed houses to be responsible for the reconstruction of their own houses into those resistant to earthquakes.

JICA's earthquake recovery assistance in the housing reconstruction field in Nepal comprises technical cooperation and financial assistance. The former of these was extended to the establishment of the Minimum Requirements for Housing Reconstruction and the training programs for house owners and masons. The latter was extended in the form of the Japanese Official Development Assistance (ODA) loan allocated to the part of the housing grant of the Nepal government for providing the housing grant and for hiring the project management consultant implementing the technical cooperation. For the implementation of the project, parts of Gorkha district and Sindhupalchowk district were assigned as the areas supported by JICA.

Figure 2 shows the progress of the housing reconstruction in the areas supported by JICA. Also, what follows summarizes the progress of the efforts by the government of Nepal and JICA, particularly on how the development of the housing reconstruction system and technical cooperation progressed chronologically.

[vi] Minimum Requirement is a set of technical features for seismic resilient houses. Only the house owners who reconstruct a house that has all the features defined in Minimum Requirement can receive the housing grant.

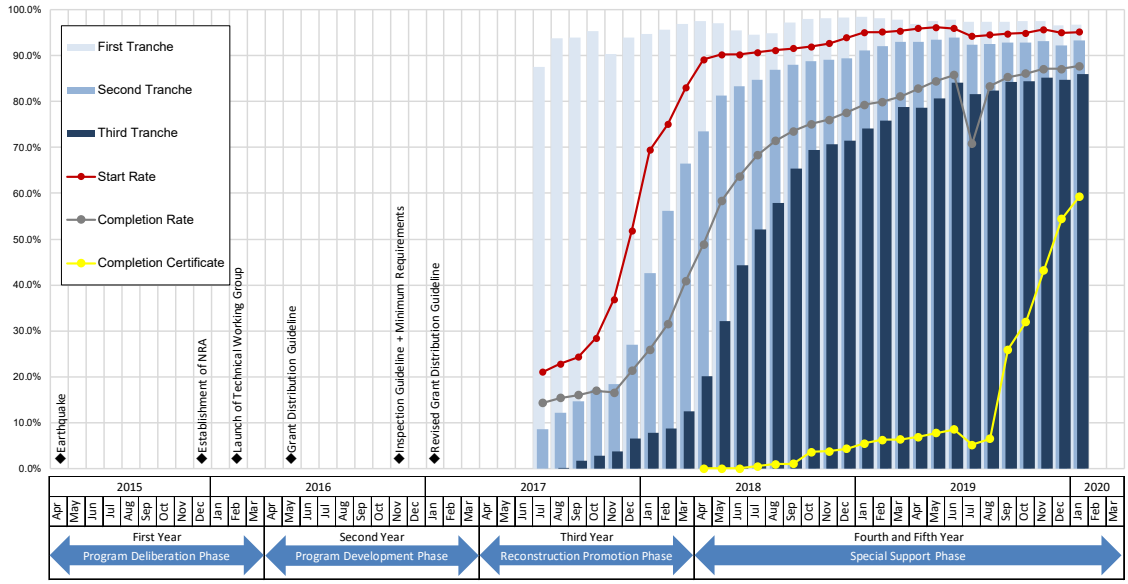

Figure 2: Chronological Overview of the Progress of Housing Reconstruction in the Areas Supported by JICA[vii]

First Year (April 2015 to March 2016): Program Deliberation Phase

Immediately after the earthquake, the government of Nepal and JICA jointly developed the Design Catalogue for houses to be reconstructed. Also, JICA started Mason Training on the basis of the curriculum set by the Department of Urban Development and Building Construction of the Ministry of Urban Development, and House Owner Training to enlighten house owners about the importance of building earthquake-resistant houses. Then, a Technical Working Group comprising the National Reconstruction Authority (NRA) newly established by the government of Nepal, JICA, and engineers of other donors and NGOs was organized in February 2016 and started the deliberation of the Minimum Requirements to be the condition for receiving grants for housing reconstruction. It was determined to establish the Minimum Requirements for BBB on the basis of the Nepal Building Codes (NBC) that have been adopted as the seismic standard in Nepal. In addition, the investigation of house damage was started from January 2016 and the first

[vii] The accuracy of data was temporarily reduced, when the areas supported by JICA were expanded in July 2019, because data on some households was not available.

enrolment camp to participate in the Housing Reconstruction Program was held in March 2016 immediately before the first anniversary of the Nepal earthquake. Distribution of the housing grant was also started, although the specific systems or the Minimum Requirements had not then been established.

Second Year (April 2016 to March 2017): Program Development Phase

Mason Training and House Owner Training was conducted and the enrolment camps were held in rural districts. At the central level, the Grant Distribution Guideline and the Inspection Guideline for reconstructed houses including the inspection of compliance with the Minimum Requirements were established in May 2016 and November 2016, respectively. Inspection Training for house inspectors was also conducted on the basis of the Inspection Guidelines.

In January 2017, the Grant Distribution Guideline was revised and the amount of the housing grant was increased from 200,000 rupees to 300,000 rupees. It can be said that the preparation for the Housing Reconstruction Program was completed at the same point of time as the housing reconstruction system and the Minimum Requirements were established, and Mason Training, House Owner Training and Inspection Training were almost completed by this time. However, two years after the earthquake it had become evident that only using the uniform system provided by the government could not produce sufficient housing reconstruction progress. The reconstruction start rate as of March 2017 in the areas supported by JICA was 21.3%, which was much lower than what was expected.

Third Year (April 2017 to March 2018): Reconstruction Promotion Phase

The survey of the reasons for not commencing the reconstruction identified that the most common problem was "insufficient financial resources," followed by "lack of masons," "expensive

building materials," "lack of building materials" and "expensive labor cost for masons." Some answers included a "wait-and-see attitude until confirming other beneficiary's successful cases" and "ignorance about the Housing Reconstruction Program and the Minimum Requirements." Based on the determination that these issues could be addressed to a large extent by the distribution of accurate information and the promotion of mutual cooperation among beneficiaries, the Community Mobilization Program (CMP) was started to accelerate housing reconstruction.[viii] The CMP contributed to enhancing information sharing, identifying the issues of communities and solving the issues through collaborative efforts of communities having similar issues and thereby significantly increasing the reconstruction start rate. In particular, the reconstruction start rate was rapidly increased from 30% to 80% in the dry season from October 2017 to March 2018.

This drastic change could be explained as follows: those type of people who had already possessed capacity and been ready for starting housing reconstruction on the basis of public assistance (housing grant) and self-help capacity (personal funds and loans) but hesitated to start housing reconstruction were motivated to do it through the mutual help (information sharing, collaborative efforts to solve issues and confidence building) among beneficiaries promoted by the CMP. Also, the Mobile Masons (skilled masons who travel around construction sites and provide technical assistance for house owners) was introduced as one of the components of the CMP. The Mobile Masons contributed to disseminating the Minimum Requirements into local construction sites, handholding support to the masons involved in reconstruction and thereby promoting the reconstruction of houses in compliance with the Minimum Requirements and accelerating the delivery of the housing grant to house owners.

[viii] Not all the earthquake victims but only households whose houses were completely damaged can receive the housing grant on the condition that they reconstruct houses in align with Minimum Requirement. In this paper, we call such households who are entitled to receive the housing grant "beneficiaries" or "project beneficiaries."

Fourth Year and Fifth Year (from April 2018 onward): Special Support Phase

In contrast to the drastic increase in the reconstruction start rate owing to the CMP, it was identified that a considerable number of the project beneficiaries had not started housing reconstruction or had suspended ongoing reconstruction works. As a result of the monitoring survey, it was identified that there were people in the vulnerable groups who were left behind, while gender difference did not cause any difference in the speed of reconstruction.

In response to the survey results, the project started Special Support targeting the vulnerable households as part of the CMP. The Special Support comprises the following 3 main components:

(1) Identification of "vulnerable" beneficiaries, in addition to "the vulnerable households" [ix] defined by the government (hereafter referred to as "government-defined vulnerable beneficiaries"), those who require additional support to complete the reconstruction, as the recipients of the Special Support;

(2) Extension of additional technical assistance by the Mobile Masons and labor supply in the form of collaborative work of community members to the households selected as the recipients of the Special Support; and

(3) Extension of additional support related to building materials in terms of their preparation, procurement on credit, and transportation.

As a result of the Special Support, the completion rate in vulnerable beneficiaries was gradually increased to the level of the rate for non-vulnerable beneficiaries.

[ix] The government of Nepal defines the vulnerable beneficiaries among the recipients of the housing grant as: (1) households headed by women of 65 years old or higher, (2) households headed by elderly of 70 years old or higher, (3) households headed by orphans of less than 16 years old, and (4) households headed by government-authorized disabled people. These vulnerable beneficiaries can receive an additional grant of 50,000 rupees.

Table 7: Completion Rates in the Areas Supported by JICA by Vulnerable and Non-vulnerable Beneficiaries

	April 2018	April 2019	January 2020
Vulnerable beneficiaries	31.1%	71.5%	80.1%
Nonvulnerable beneficiaries	49.2%	82.9%	87.8%
Difference	18.1%	11.4%	7.7%

In this project phase, along with the transition of the nation's administrative system to a federal one, municipalities had started to be responsible for housing reconstruction and, accordingly, mayors and municipal officials had started to play important roles in accelerating the housing reconstruction. Figure 3 shows the trends of the reconstruction start rate and the completion rate in the areas supported by JICA. In these areas, the period required until the completion rate reached 55.0% was eight months shorter than the average of 11 districts[x] that were not covered by the CMP. The data indicates the possibility that the CMP was indispensable for the promotion of the housing reconstruction in compliance with the Minimum Requirements. Also, it is considered that, in the four years after the earthquake, the CMP has produced effects on motivating the beneficiaries having the self-help capacity to start and to complete housing reconstruction. The gaps between the districts with and without CMP for the reconstruction start rate and the completion rate were 13.1% and 25.6% as of March 2019, respectively.[xi]

[x] Eleven districts obtained by excluding three districts (Kathmandu, Lalitpur, and Bhaktapur) located in the Kathmandu Valley where the commencement of the Housing Reconstruction Program was delayed, from the 14 most affected districts.
[xi] This is merely a gap without controlling for any attributes of the target and control districts.

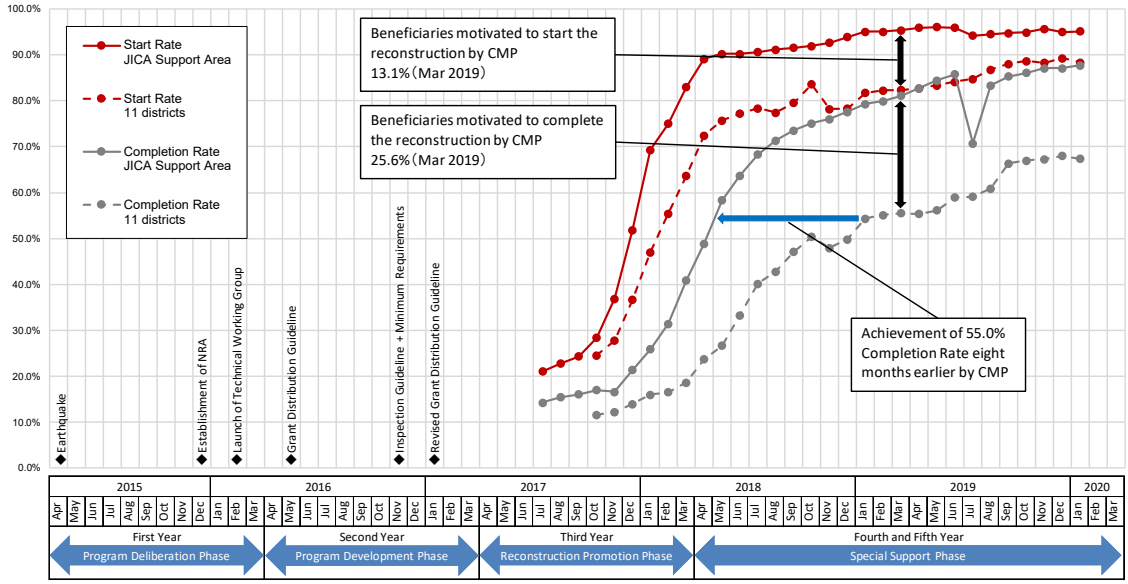

Figure 3: Comparison of the Reconstruction Start Rate and the Completion Rate between the Areas Supported by JICA and 11 Districts

In contrast, it gradually became evident that there were a certain number of beneficiaries who had not been able to commence or continue housing reconstruction only by the assistance of the original form of CMP which was for all community members. That is, the initial phase of CMP was not customized for the vulnerable beneficiaries unable to commence or continue housing reconstruction. However, the comprehensive assistance in the earlier stage of the CMP resulted in the identification of beneficiaries who need additional supports. That caused the CMP's purpose to be shifted from achieving BBB to achieving both BBB and IR.

6. Approaches for Achieving BBB with Inclusive Recovery in Housing Reconstruction

6.1 Efforts Considered to be Effective for Achieving both BBB and IR in the Housing Reinforcement

Based on what discussed in the previous sections, the assistance in housing reinforcement taking into consideration inclusiveness in the process of recovery from earthquake disasters needs to be implemented in stages as shown in Table 8.

Table 8: Staged Efforts Considered to be Effective for Assistance in Housing Reinforcement Taking into Consideration Inclusiveness in the Process of Recovery from Earthquake Disasters

	Name of stage	Content
First stage	Setting of potential hazards level	Setting of objective potential hazards with high reliability to the extent possible
Second stage	(1) Deliberation of Minimum Requirements	Setting of an adequate seismic standard to alleviate vulnerability to the level enabling houses to resist the potential hazards level
	(2) Identification of vulnerable groups	Identification of the population who are most vulnerable and are expected to have difficulty in achieving houses resistant to potential hazards level
Third stage	Deliberation of the contents of additional assistance	Determination of the contents of additional assistance
Fourth stage	Simultaneous initiation of all assistance programs	Implementation of disaster recovery programs universally across disaster victims
Fifth stage	Reinforcement of capacity to cope through housing reconstruction projects	Simultaneous reinforcement in every aspect, such as the administrative capability of government, the ability of local residents to cope with situations, and the capacity of economic as well as social systems through the housing reconstruction projects

First Stage: Setting of Potential Hazards Level

It is extremely difficult to set potential hazard levels that will occur in the future with high reliability. It is particularly so when setting potential hazard levels concurrently with recovery work immediately after disasters in the face of shortage in time and human resources. Accordingly, the severity of the hazards causing the existing disasters is often set as target levels of potential hazards in the future. That is, setting of potential hazards level is likely to be made on the basis of minimizing damage when facing the recurrence of disasters with severity equivalent to the latest one or the severity already considered in building standards. However, there are strong doubts about whether or not potential hazard levels set in these ways are appropriate for the prevention of damage due to the recurrence of disasters. Thus, it is ideally preferable to first

develop consensus about potential hazard levels in normal time in preparation for major disasters and then set them on the basis of scientific evidence obtained through the verification, even simple ones, of past disasters.

During the setting of reliable potential hazards level after major disasters, the most important point is that governments of disaster affected countries take the initiative and responsibility for determining the potential hazards level. They should evaluate and finalize the future possible levels of hazards after building consensus. They need to answer whether or not it is appropriate and realistic to assume that a more severe disaster than the latest one will happen.

In the system deliberation phase, the first year after the Nepal earthquake, revising the NBC so as to renew the setting values of seismic force according to potential hazards was deliberated as an option but the final decision on the seismic force was made on the basis of NBC 105, the existing seismic standards in Nepal. As of the end of 2014, before the Nepal earthquake, only 26 municipalities were subject to the NBC throughout the country and, therefore, it is considered that most of the houses destroyed by the earthquake were not compliant with the NBC. Thus, it is considered to be a realistic decision to put a higher priority on the dissemination of the existing NBC and setting seismic force on the basis of NBC 105 without renewing potential hazards.

Second Stage (1): Deliberation of Minimum Requirements

The second stage is to technically standardize houses with sufficient resistance to potential hazards and establish the Minimum Requirements. Although such Minimum Requirements basically need to provide detailed specifications for respective technical elements centering on structural members, if the specifications are too complicated this would make house owners unable to comply with them and make house inspectors unable to confirm or inspect the

compliance of a reconstructed house. Also, in this stage of the deliberation of the Minimum Requirements, there may be cases where not only disaster victims but donors and NGOs supporting housing reconstruction put a higher priority on the speed of housing reconstruction. Hence, they insist on relaxing the Minimum Requirements by saying that "the technologies and materials required in the Minimum Requirements are too strict for house owners to follow." It is necessary to pay attention to the fact that Minimum Requirements are likely to be subject to pressure on relaxing provisions.

In the system development phase, the second year after the Nepal earthquake, the Minimum Requirements for the Housing Reconstruction Program were established following the specified values of the NBC after verifying the safety of the masonry structures with cement mortar and mud mortar which have been commonly used in Nepal. The provisions in the Minimum Requirements have been directly used as inspection criteria. In the case of the masonry structure with mud mortar, the inspection criteria comprise 45 items in 10 categories. At the beginning, the inspection criteria included such unrealistic ones as the compressive strength of concrete and the bending strength of reinforcement, which are difficult to measure at housing construction sites in rural areas. Therefore, alternative criteria enabling the strength of concrete and reinforcement to be simply estimated have been introduced in "the Inspection Manual" established with the assistance of JICA.

In reality, however, there have been reports on cases where inspectors did not go through all the 45 criteria but passed houses, even when some criteria were left uninspected or confirmed to be non-conforming, on the basis of their determination of overall structural safety. Although unskilled inspectors were suspected to be the cause of improper inspection results, in the Emergency Housing Reconstruction Project, 311 inspection results by government inspectors were identified to be improper as of January 2020. The improper cases accounted for 0.3% of the

total beneficiaries of the project in the areas supported by JICA.

Second Stage (2): Identification of Vulnerable Groups

In the second stage, it is necessary to identify the existence of vulnerable groups among the victims of the earthquake disaster in detail to the extent possible concurrently with "(1) Deliberation of Minimum Requirements." However, it is practically difficult to select attributes to distinguish between vulnerable and non-vulnerable groups. Also, it is extremely difficult to set thresholds while ensuring equity among disaster victims so as to prevent disputes and criticisms in communities. The factors causing the issues of LNOB advocated by the UNDP seem to be useful for identifying "vulnerable groups" to some extent but again it is practically difficult to accurately define "vulnerable group" using appropriate attribute data at the site of implementing an actual policy.

Identification of vulnerable groups only becomes possible after accurately understanding the economic conditions of disaster victims, their statuses in communities and the cooperativeness of communities. However, in the areas supported by JICA, no investigation was conducted for such purposes before implementing the CMP.

Third Stage: Deliberation of the Contents of Additional Assistance

The third stage is to deliberate what kind of additional assistance is required and how to extend such assistance to disaster victims. As previously mentioned, the UNDP (2018) advocated that empowering and enactment are necessary to satisfy LNOB. That is, what counts is not to temporarily save vulnerable groups from their hardship due to disasters but to enhance their capacity to overcome hardship without being overwhelmed by difficulties they have been facing. For performing this task, producing physical outcomes such as housing reconstruction for disaster

victims is not sufficient. It is essential to enhance their capacity to cope with post-disaster difficulties including social and economic ones.

The government of Nepal decided to distribute an additional housing grant support of 50,000 rupees equivalent to the government-defined vulnerable beneficiaries satisfying certain conditions defined by them. But as of January 2020, the number of those households classified as government-defined vulnerable beneficiaries in the areas supported by JICA was only 1,375 (1.5%) in contrast to the 11,580 households (12.3%) classified as vulnerable beneficiaries who could not complete housing reconstruction. Thus, it is considered that the government-defined vulnerable beneficiaries did not include the vulnerable households that actually need further special assistance. In addition, complicated application procedures prevented some households in the vulnerable groups from receiving the additional housing grant. In the areas supported by JICA, the scope of assistance was centered on the extension of intensive technical support by Mobile Masons and building material procurement support to the evidently vulnerable beneficiaries but did not include special assistance such as the distribution of grant money. Not extending the special assistance for the enhancement of the capacity of disaster victims to cope with socio-economic difficulties, the project still aimed at completing the housing reconstruction.

Fourth Stage: Simultaneous Initiation of All Assistance Programs

The fourth stage is to universally extend assistance to all disaster victims regardless of their vulnerability. What counts in this stage is universality otherwise only the vulnerable groups are subject to prolonged hardship due to disasters and as a result being additionally subject to indirect damage associated with prolonged hardship.

Because the CMP was comprehensively implemented regardless of the vulnerability of beneficiaries, the existence of vulnerable beneficiaries that could not complete housing

reconstruction only by CMP became evident.

Fifth Stage: Reinforcement of capacity to cope through the Emergency Housing Reconstruction Project

As summarized in Table 6, during the implementation of the housing reconstruction project, the objects and items listed in Table 4 should be improved as much as reasonably possible. Otherwise, at least efforts to prevent housing reconstruction from causing adverse influences on disaster victims should be made.

The rapid increases in the reconstruction start rate and the completion rate as a result of CMP prove the effectiveness of mutual help in housing reconstruction. However, quantitative evaluation cannot be made for whether the capacity of beneficiaries and communities to cope with situations has been reinforced through the CMP. Still, it is considered that the CMP could reinforce the capacity of beneficiaries and communities to cope with disasters in the future at least in the form of accumulated knowledge on the importance of sharing accurate information and extending mutual help to promote recovery from disasters through their experience.

6.2 Summary

With respect to the practical approach for BBB with IR in the process of recovery from earthquake disasters, this paper systematically organized a variety of measures to reduce disaster risks from the viewpoints of the differences in the factors causing vulnerability, subjects of vulnerability and the types of hazards on the basis of the definition of BBB, and summarized the discussion results as "the staged efforts considered to be effective for assistance in housing reinforcement taking into consideration inclusiveness in the process of recovery from earthquake disasters" (Table 8).

In addition, this paper evaluated the implementation processes of the JICA's Emergency Housing Reconstruction Project in the recovery work from the Nepal earthquake from the viewpoint of the summarized staged efforts and evaluated whether or not the project simultaneously achieved BBB and IR. The evaluation result is summarized in Table 9.

Table 9: Evaluation Result of JICA's Emergency Housing Reconstruction Project

	Name of stage	Evaluation result of JICA's Emergency Housing Reconstruction Project	
First stage	Setting of potential hazards level	△ (Fair)	The project failed to deliberate on setting objective and reliable potential hazard levels in the real sense of the term but set the best potential hazards practically possible in the middle of the confusing period immediately after the earthquake for enhancing adherence to existing building standards.
Second stage	① Deliberation of Minimum Requirements	○ (Good)	The project established specific and detailed Minimum Requirements on the basis of scientific data and these were utilized as the standards for inspecting reconstructed houses with inspection errors in an allowably limited range.
	② Identification of vulnerable groups	× (Poor)	The project did not intend to disaggregate vulnerable beneficiaries from the initial stage but should have done it before starting the project.
Third stage	Deliberation of the contents of additional assistance	△ (Fair)	The project should have addressed this issue in its initial stage together with the identification of vulnerable beneficiaries but the implementation of the CMP can be regarded as ad hoc additional assistance.
Fourth stage	Universal implementation of all assistance programs	× (Poor)	The project took a long time until the identification of vulnerable beneficiaries in the end and failed to universally extend assistance across beneficiaries.
Fifth stage	Reinforcement of capacity to cope through housing reconstruction projects	△ (Fair)	Although the project paid attention to the reinforcement of capacity to cope in the course of its processes, that was not enough and the possibility to implement programs enabling beneficiaries and communities to enhance their capacity to cope and reinforce their social systems should have been intentionally implemented or deliberated.

In summary, the JICA's Emergency Housing Reconstruction Project could not fully go through the stages shown in Table 8 but could minimize the vulnerable beneficiaries who would have been gradually left behind in the recovery processes over time by implementing additional assistance at an appropriate time. In the recovery work from earthquake disasters in the future, it is preferable to intentionally plan assistance programs by introducing the staged implementation

of assistance from the very beginning of commencing it and to implement such assistance according to the stages of a project. The CMP itself is a measure accelerating the recovery processes of disaster victims having self-help capacity and, therefore, is considered to be a necessary and effective approach to satisfy BBB in the proper sense of the word. That is, in housing reconstruction projects in the future, it is necessary to implement programs like the CMP that can enhance mutual help right from the beginning, thereby overcoming several socio-economic and technical issues that are very complex and embedded in the community. Also, it deserves special consideration that additional assistance is still necessary as the preparation for the emergence of vulnerable groups who cannot catch up with recovery processes even with mutual help.

7. General Overview

This paper defined vulnerability so that such a definition is considered to be adaptable to wide fields beyond the academic one, with the MOVE framework advocated by Birkmann et al as a base. Although the MOVE framework focuses more on the vulnerability of a social system as a whole, this paper pointed out the importance of reinforcing personal assets owned by individuals and households in the case of those types of disasters like earthquakes for which measures to work on the generating sources of disasters are quite limited. Then, this paper discussed the ideal form of BBB in the recovery from earthquake disasters, and the difficulty as well as points of concern in achieving both BBB and IR. This paper introduced the JICA's Emergency Housing Reconstruction Project and evaluated it from the viewpoints of the ideal way of achieving both BBB and IR.

Based on the above considerations, this paper argues that BBB and IR are concepts that do not conflict with but complement each other. There has been no case of sacrificing one of the two concepts in exchange for the other. In the case of the approaches to assisting the vulnerable households, it is not appropriate to relax the target level of technical requirements, or Minimum Requirements in the context of Nepal. Instead of that, we have to effectively identify people who are likely to be left behind upfront, and extend additional necessary assistance intended to reinforce the capability of these people to reduce their own vulnerability. The measures considered to be effective for achieving both BBB and IR introduced in this paper were not taken in the JICA's Emergency Housing Reconstruction Project. This project could minimize the risks of the vulnerable households who would have been gradually left behind from the recovery processes over time by implementing additional assistance, key components of which were the CMP and additional support for vulnerable households. The CMP as the measure to reinforce the approach to disaster victims stimulated housing reconstruction by their self-help efforts.

However, the CMP is, by nature, a measure accelerating the recovery processes of disaster victims having self-help capacity and does not target vulnerable households. Thus, it is necessary to prepare additional assistance separately in anticipation of the emergence of vulnerable groups who cannot catch up with recovery processes even with mutual help. Ideally, such additional assistance should have been implemented concurrently with the main assistance project from the beginning.

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