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## Donor-driven resource procurement for post-disaster reconstruction: Constraints and actions

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Post-disaster reconstruction suffers bottlenecks and challenges due to the inadequacies of resource procurement. In the aftermath of the 2004 Indian Ocean tsunami, difficulties in acquiring resources compromised donors' efforts in achieving a successful recovery. By drawing on in-field observations and surveys in Banda Aceh, Indonesia, this paper identifies the key factors that obstructed the process for NGOs to procure building materials and labour. The result demonstrates that donor-driven resource procurement was primarily impeded by (1) NGO-related factors including: NGOs competency of resource procurement and competition for resources among aid agencies; (2) external hurdles in NGOs implementing environment including: low local transportation and supply capacity, incompetence of contractor, and insufficient government support; and (3) community-related factors including: local housing culture and lack of community influence and participation. Continuous capacity building in NGOs, proactive resource assessment and planning, strengthening relationships with local community and institutions, together with a collaborative resourcing approach are likely to address resourcing constraints faced by NGOs when rebuilding communities following a disaster.

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### Introduction

In most cases of post-disaster recovery and reconstruction, international aid agencies provide technical and financial assistance for the disaster affected populations. Regarding post-disaster reconstruction in developing countries, the *UNDRO (1982)* advocates the community participatory approach as a key to success. The donor-driven model was modified in the 1980s to mix the provision of rebuilding housing by outside contractors with locally managed self-help programs (*Comerio, 1998*), or to combine with an appropriate level of community participation (*International Recovery Platform, 2007*). According to *Choguill's (1996)* ladder of community participation for underdeveloped countries, the degree of the external institutional involvement can be classified into the following ways: empowerment, partnership, conciliation, dissimulation, diplomacy, informing, conspiracy and self-management.

However, *Davidson, Johnson, Lizarralde, Dikmen, and Sliwinski (2007)* point out that despite various ways in which people affected can participate in post-disaster housing reconstruction projects, not all types of participation ensure the best deployment of their capabilities.

In the aftermath of the 2004 Indian Ocean tsunami, the 'infusion of aid' model was preferred and encouraged by the majority of housing reconstruction projects. Under the donor-driven reconstruction approach, many humanitarian organizations pursued contractor-built implementation. For example, *CARE (2006)* used a combination of their engineers and several large housing contractors in housing projects. In comparison with contractor-built reconstruction, the owner self-built approach is empowering and participatory, and thus was popular among NGOs, such as *UNHCR (2006)*, *UNICEF (Jaspars, Harvey, Hudspeth, Rumble, & Christensen, 2007)*, *World Vision (Bailey, Savage, & O'Callaghan, 2008)*, which consider community redevelopment and participation as being among their main objectives. *UNDP (2007)* in conjunction with UN-HABITAT designed the *Aceh Nias Settlements Support Program (ANSSP)* by which self-construction was adopted with funding support from aid agencies in the form of cash grant or transfer.

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In spite of the various reconstruction approaches and initiatives in place in Aceh, the large-scale involvement of external aid agencies in post-tsunami recovery and reconstruction was not able to improve the local social conditions; rather it reinforced such concerns regarding Aceh's sustainable development as land venue (Nazara & Resosudarmo, 2007), environmental conservation (O'Brien, Ahmed, & Hes, 2008; Roseberry, 2008) and economic dislocation (Jayasuriya & McCawley, 2008). In pursuit of reconstruction speed, massive reconstruction demands led to competition among the implementing agencies for limited construction resources such as timber (Zuo, Potangaroa, Wilkinson, & Rotimi, 2009), bricks (UNDP, 2006), cement (ADB, 2007) and labour (Pathiraja & Tombesi, 2009), causing sharp escalation in construction costs and huge funding gaps (Nazara & Resosudarmo, 2007; Steinberg, 2007).

In response to the adverse conditions induced by resource shortages, some aid agencies turned to available inferior resources (Jayasuriya, Steele, Weerakoon, Knight-John, & Arunatilake, 2005; Kennedy, Ashmore, Babister, & Kelman, 2008), or sought to import materials from outside of Aceh and even further afield with long lead time (Dercon, 2007; Zuo et al., 2009). As could be expected, without appropriate site supervision and quality control in place, a variety of construction defects and failure associated with poor building materials and workmanship occurred, to a great extent undermining donors' contribution to tsunami recovery and reconstruction (Boen, 2008; Leitmann, 2007; Steinberg, 2007).

In 2008, three years after the Indian Ocean tsunami, the 'Resilient Organisations' research team were able to undertake field trips to the tsunami impacted areas in Indonesia. The opportunity of working with CARE Indonesia allows the researchers to access information and data and to conduct a substantial study with a number of aid agencies that were meanwhile engaged in post-tsunami housing reconstruction in Indonesia. The authors spent three months in Banda Aceh, the capital city of Aceh Province, Indonesia between March and June 2008 with the aim of understanding the constraints that made the donor-driven resource procurement peculiarly difficult. A thorough field observation was made and a range of stakeholders involved in post-Indian Ocean tsunami recovery and reconstruction in Aceh were interviewed or answered surveys. The study identifies the key constraints and suggests possible solutions for improving donors' resourcing performance. A ranking hierarchy among the identified impediments is presented in order to inform the thinking and actions of priority for donor-driven resource procurement post-disaster. Although the discussion focuses mainly on resourcing issue faced by NGOs in Indonesia, it is also applicable to other donor-driven reconstruction processes.

### Factors affecting resource availability for construction projects

In recent years research findings from both academic and practitioner studies have provided much-needed insights into the factors that contribute to resource availability for construction projects during the procurement process. Availability of resources has been recognized as a driving force for the success of construction projects (Bassioni, Price, & Hassan, 2004, 2005; Chua, Kog, & Loh, 1999; Tukul & Rom, 1998). Belassi and Tukul (1996) highlighted a number of environmental factors such as political, economic, and social elements which influence the project resource availability and thus the project performance.

Manavazhi and Adhikari (2002) identified the factors that lead to contractor's material and equipment procurement delay, including organizational weaknesses, suppliers' defaults, governmental regulations and transportation delays. In addition, inadequate

resource planning and scheduling (Tserng, Yin, & Li, 2006) and poor site inventory management (Liu & Wang, 2007) have an impact on resource utilization at the later stages of construction.

Closer cooperation between procurement and other construction functions enables direct receipt of materials from suppliers to a construction site (Yeo & Ning, 2002). The design specifications (Tatum, 2005) and construction methods (El-Rayes & Kandil, 2005) also determine how the project team is mobilized and resources are procured. Walker and Rowlinson (2008) suggested that procurement alternatives can have a profound impact on project delivery. Pryke (2004) underlined the important role of the social network of project stakeholders, especially large contractors in resource acquisition. On account of their purchasing power, large contractors are able to deal directly with manufacturers and wholesalers thus acquire resources more easily than small and medium units (Agapiou, Flanagan, Norman, & Notman, 1998). The construction site location also bears on resource availability in terms of material transportation time and cost (El-Rayes & Khalafallah, 2005).

In post-disaster reconstruction, Singh (2007) concluded that five factors influence availability of resources for reconstruction projects including prioritization of works, ability to pool resources, lead time of procurement, existing contractual relationships and transportation into and around the disaster zone. Singh and Wilkinson (2008) added that availability of resources is also governed by the policies and strategies put in place by the authorities to deal with the reconstruction phase. Furthermore, during the tsunami reconstruction in Aceh, UNDP (2006) identified factors that impact the commercial environment in which the brick supply chain operates, including community preference, quality of raw materials, slow new technology adoption, high transportation costs and poor infrastructure for dispersal and delivery.

In light of past studies, it is clear that various researchers have recognized the factors that are likely to have an influence on the success of project resource procurement. In comparison with pre-event project construction, the post-disaster reconstruction environment is chaotic, dynamic, and complex (Alexander, 2004; Berke, Kartz, & Wenger, 1993; Birkland, 2006; Davidson et al., 2007). This study would, therefore, take this work further to identify the key constraints that impeded resource availability for post-tsunami donor-led reconstruction projects in Indonesia. The information this paper provides will lead to more effective donor-driven resource procurement for post-disaster reconstruction.

### Research methodology

The authors spent three months in Banda Aceh, Indonesia with observations made during this trip. This paper, as part of the first author's doctoral study, is based on a combination of three-month field observations and the formalized research strategies including questionnaire and interview surveys. A questionnaire was designed drawing on the factors derived from the above literature review. In order to enhance the questionnaire, a pilot study was conducted by consulting with three experienced construction coordinators involved in post-tsunami housing reconstruction in Aceh, Indonesia. A total of 37 factors extracted from both literature and the pilot study are displayed in Appendix Table 1. By using the content analysis method (Krippendorff, 1980), these 37 factors were categorized into five groups.

A total of 20 questionnaire surveys were carried out in Banda Aceh between March and May 2008 with 20 elite stakeholders engaged in post-Indian Ocean tsunami housing reconstruction program. Prior to the survey, each potential participant was advised by the researchers to subscribe the Participant Consent Form

**Table 1**  
Basic profile of the informants in Banda Aceh, Indonesia.

Country	Field trip time	City	Informants
Indonesia	March– June 2008	Banda Aceh	<ul style="list-style-type: none"> <li>• 12 project managers from 6 NGOs<sup>a</sup> (P1–P12)</li> <li>• 4 donor representatives/reconstruction coordinators (Co1–Co4)</li> <li>• 4 governmental officials from BRR<sup>b</sup> (BRR1–4)</li> </ul>

<sup>a</sup> IFRC, CARE, Canadian Red Cross, UNDP, Australian Red Cross, and British Red Cross.

<sup>b</sup> BRR is the Agency for Rehabilitation and Reconstruction for Aceh and Nias in Indonesia.

through which a number of the interviewees chose to be unidentified by the name, gender, position and status. Table 1 presents the basic profile of the 20 respondents. The respondents were asked to rank the importance of these five categories from 1 to 5 (1 symbolizes the most significant and 5 means the least significant) and then to rank the top 5 factors under each category. The average scores and the number of people that scored the factor are reported in Appendix Table 1. A hierarchy was displayed in Table 2 of top 10 factors identified through the total score a particular factor received.

Follow-up semi-structured interviews were conducted between May and June 2008 with the original 20 respondents. Before the commencement of each interview, the generated ranking hierarchy from the questionnaire survey was provided to the informant for verification. The 20 interviewees all agreed that the hierarchy is fairly robust for the factors that scored the highest. Within the interviews, qualitative data in terms of interpretation of the ranking and perspectives on possible improvements were captured to clarify and augment the findings yielded from the survey. The remainder of the paper presents the research findings and an observation-based discussion, followed by proposed solutions to address constraints faced by NGOs in their post-disaster resource procurement.

## Results

As shown in Appendix Table 1, among the five categories of factors, reconstruction stakeholder-related factors and environment-related factors were seen as more significant than the other three groups. Table 2 presents the identified top 10 determinants affecting donor-driven resource procurement in post-tsunami reconstruction. These are competition for resources among aid agencies, local transportation capacity, housing type, resource procurement lead time, local housing culture and customs, community influence and participation, local government support and assistance, competence of contractor, NGOs competency of resource procurement, and local production capacity.

**Table 2**  
Key constraints affecting donor-organized resource procurement in Aceh, Indonesia.

Factors obstructing NGOs' resource procurement in post-tsunami reconstruction	Rank
Competition for resources among aid agencies	1
Local transportation capacity	2
Housing type	3
Resource procurement lead time	4
Local housing culture and customs	5
Community influence and participation	6
Local government support and assistance	7
Competence of contractor	8
NGOs competency of resource procurement	9
Local production capacity	10

Again, by using content analysis, the identified 10 key constraints can be classified into three categories: (1) NGOs-related factors including NGOs competency of resource procurement and competition for resources among aid agencies; (2) exogenous hurdles in NGOs' implementing environment, including: local transportation capacity, competence of contractor, local government support and assistance, and local production capacity; and (3) community-related factors including local housing culture and customs and community influence and participation.

## Discussion

The following discusses the resourcing problems post-disaster as they relate to donor-driven resource procurement.

### NGOs-related factors

Competition among NGOs for resources was ranked highest by the respondents. This result relates to the importance of coordination among the implementing agencies involved in Aceh's post-tsunami reconstruction and the need to seek a collaborative procurement strategy for post-disaster resourcing. The reality, according to the interviewee BRR3 during our interview, was that with available funding at the initial stage of reconstruction, the potential threat of resource shortage for long-term rebuilding was largely overlooked by the involved NGOs. However, as was observed in Aceh, the quantity and schedule pressure of housing programs from off-site donors, along with the lack of coordination intensified the resource competition among aid agencies.

For instance, the International Federation of Red Cross and Red Crescent Societies (IFRC) was tasked with the overall coordination for post-tsunami recovery activities among other National Red Cross and Red Crescent Societies in Aceh. However, the IFRC failed to achieve this target. Due to differing local knowledge and expertise, access to communities and local governments, and infrastructure, the IFRC national auxiliaries had a tendency to showcase their respective capability and competencies in humanitarian aid. The inadequate execution ability and absence of coordinating mechanism within IFRC also contributed to this coordination failure. As was witnessed in Aceh by the researchers, despite a common wage standard set by IFRC for employing labour, each national agency still increased the rate for acquiring such limited resource. In this competitive environment, NGOs' involvement in housing reconstruction tended to become a resource-supplier type of intervention. And the role and responsibility for NGOs in post-disaster housing practice was undercut by this resource competition.

The absence of in-house competencies for construction resource procurement directly affects NGOs' resourcing performance. Lyons (2009) argued that NGO's approaches to post-disaster reconstruction is at odds with their day-to-day work in developing countries. Often, the international aid agencies operate with inexperienced staff and in unfamiliar conditions (Harris, 2006), or undertake unrealistic commitments (Pandya, 2006). The resourcing approaches some NGOs adopted, as observed by the research team, was largely dependent on tacit knowledge and improvisation at the operational level, leading to inefficient procurement practices and material shortages. A lack of monitoring and evaluation of real construction demand in some aid organizations was also observed. Both the interview participants Co2 and P8 indicated that there are inventory of imported construction products on a large scale within their agencies such as windows, doors and roofs as a result of changes to design. Furthermore, NGOs underestimated the difficulty in resource procurement, as reflected in a quote from the interviewee Co2: 'Without qualified procurement personnel, suitable

facilities and database systems, basic knowledge and technology regarding resource management in place within the aid agency, the resourcing difficulties escalated to a level that significantly impeded the development of housing programs'.

#### *External hurdles in NGOs implementing environment*

Second highest rank was given to 'local transportation capacity'. The significance of the transport network has been confirmed in previous studies with respect to post-disaster reconstruction especially the high cost of resource transportation (Limoncu & Celebioglu, 2006), and lack of access (Singh, 2007). The resource transportation difficulty encountered by NGOs in Banda Aceh, as observed by the researchers, resided with the lack of key requirements for infrastructure such as roads connected to the housing system. The reason, according to the interviewee P10, is due to NGOs' over-investment in housing and their ignorance of infrastructure connections. Apart from a few infrastructure rehabilitation works conducted by the local government, the United States Agency for International Development (USAID) was the sole agency tasked with the reconstruction of the Banda Aceh to Meulaboh road linking Aceh Province with the rest of North Sumatra and Indonesia.

The lead time of materials and supplies has an impact on the productivity and performance of donor-driven reconstruction projects. This result is consistent with the study by Singh (2007) who concluded that lead time associated with acquiring resources in post-disaster situations can be detrimental to the availability of these resources, especially in a construction industry which relies heavily on "just-in-time" delivery. In post-tsunami Indonesia, the procurement lead time was contingent on a broader recovery environment. For instance, evidence from the observations and interviews showed that during the tsunami reconstruction, the 'Green Aceh' timber administration rules issued by the Indonesian government in 2007 reduced the possibility for donors to procure timber locally in Indonesia. A number of NGOs resorted to donor countries or other producing countries for timber resources. The lead time of procuring timber off-shore was unpredictable, especially when negotiating and obtaining approvals from Indonesian authorities or encountering road bandits during transportation in northern Sumatra. Specifically, as the interviewees P1, P5 and Co3 reported that their agency's importing legal timber from countries such as Australia, Canada and New Zealand with lead times of three to four months led to subsequent consequences like construction suspension and resource idle.

Government support and assistance received a high score in the questionnaire survey. During our interviews, the need to increase involvement of local authorities in donor-driven resource procurement was stressed by the representatives of NGOs. According to the interviewees P3 and Co1, some issues, such as transportation safety, inspection for imported cargo and material inflation control could only be properly addressed with the support of BRR or local governments.

The paucity of support from local government can be traced back to the beginning of housing recovery and reconstruction in Aceh. According to some interviewees, 'The 'Master Plan' formulated by the Indonesian National Government as the 'blueprint' to guide tsunami reconstruction operations, received a 'cold welcome' at the local level despite the widespread consultation with NGOs, local governments and communities. As a conciliatory way, the Master Plan was put aside by BRR and replaced by an evolutionary approach with an emphasis on providing opportunities for communities to participate in the process of reconstruction' (synthesis of views from P4, P7 and Co4). However, the representative BRR 1

stressed that 'due to the limitations on Indonesia's ability to absorb and utilize local capacities, BRR ended up fully relying on assumed support from NGOs.' The limited local governance capacity in the immediate aftermath of the tsunami seemed to give external NGOs a 'free hand' at the housing design and planning stages. On the other hand, NGOs initially failed to seek close partnership with local institutions. The interviewee BRR3 pointed out that: 'Initially it even took long time for BRR to decide on the allocation of rebuilding tasks in the affected areas to a wide variety of NGOs.' Both interviewees P7 and P10 from NGOs and BRR3 and BRR4 from BRR acknowledged that 'at the start of the rebuilding, both sides (BRR and aid organizations) had different even sometimes quite conflicting rebuilding priorities and interests'. The differing recovery objectives between NGOs and the local government to some extent hindered further effective collaboration at a later stage of reconstruction.

Low competence of contractors was regarded as a key constraint to donors' reconstruction ability. Often local contractors employed by NGOs were unable to meet the reconstruction requirements especially in terms of procuring qualified building expertise and materials, and ensuring construction quality. Contractor competence had depleted pre-tsunami because of a decade of conflict which limited construction and development activities. As some interviewees claimed: 'The construction industry in Banda Aceh, particularly after decades of civil conflict, was insufficient for large-scale reconstruction. Nearly 95% contractors, solutions, materials and expertise were imported from outside Banda Aceh, mainly from Java' (synthesis of views from P4, P6–8, Co2, and Co4). Poor construction capability impaired donors' ability for housing reconstruction work. The large amount of outsourcing from beyond Aceh and the country affected donors' financial and technical commitment and capacity.

During the tsunami, the local manufacturing and supply facilities in Aceh were widely damaged. Some development agencies like UNDP (2006), Asian Development Bank (2007) and World Bank (2008) were engaged in financing the development of small and medium sized enterprises (SME) fostering production recovery to assist with physical reconstruction and community redevelopment. Despite a number of material production plants being rebuilt, the overall supply capacity was unable to satisfy the demands of large-scale reconstruction and rehabilitation. As the interviewee BRR2 perceived that: 'These international NGOs brought in design for the modernized houses which were very different from what the local people had before, but the materials were not out there and you cannot expect the construction and operation of manufacturing facilities happen overnight'. However, as observed by the research team in Aceh, Indonesia, the business climate including limited accurate information on Aceh's prospects, the lack of investment incentives provided by the government, along with the impact of past conflict on social stability hindered potential civic and external investments for Aceh's economic redevelopment. Both the local government and the reconstruction practitioners overlooked the importance of a robust economic recovery to the success of physical housing reconstruction.

#### *Community-related factors*

Housing type is closely connected with indigenous housing culture and customs. Both of these factors were regarded as being important in the survey. The housing culture of Aceh traditionally utilized organic building materials such as timber, thatched grasses and bamboo. As recorded by the research team, a number of beneficiaries in Banda Aceh expressed their preference for a 'modern' westernized house which symbolizes solidity and social

status. The new housing types introduced by the international aid agencies matched this local aspiration. The cultural preference to housing type, however, placed extra resourcing burdens on NGOs. As alluded to earlier, local capacity for producing the industrialized materials, such as cement, steel, concrete and mass-produced products, was unable to meet the large-scale requirements for masonry and concrete construction. Low supply capacity made a number of NGOs procure these resources from outside of Aceh with a significant increase of transport costs and a longer lead time. As the interviewee P9 commented that *'The community consultation on housing type in the tsunami stricken areas in Indonesia was prominent, however, also caused a whole lot issues including resource availability and the resulted delays of housing delivery.'* In this sense, both the local needs and realities should be weighed up and factored in the NGOs' decision making particularly during the upfront stage of construction.

Community influence and participation is seen by the participants as being important for a successful resourcing practice. During the tsunami reconstruction in Aceh, a number of aid agencies such as UNDP and UN-Habitat (2007) recognized that communities can bring in skills, networking, resources and capabilities which could facilitate donor-driven reconstruction activities. For instance, the interviewee P4 pointed out that the community influence and participation in early decisions, such as selecting construction materials and techniques, will show donors' sensitivity to community needs. However, as was observed by the research team in Aceh, community participation in donor-driven reconstruction was limited and in certain affected areas NGOs failed to work closely with community groups in coordinating the relief effort. The reason can be attributed to NGOs' lack of understanding, experience and knowledge of the way in which the community-based reconstruction can be organized (Dercon, 2007). Apart from this, the interviewee Co3 reported that: *'In order to maximize community inputs, we set up a liaison team employing people from the local communities. However, without a community engagement mechanism in place in our organization, the information and feedback from the local communities were put aside by our key decision makers and then the liaison team became a mere formality'*. The interviewee P6, however, pointed out that: *'The expectation of local communities to NGOs' assistance with rebuilding was very high whereas the awareness of local engagement and real participation was very low'*. The potential for the local affected community to contribute to rebuilding therefore depends on the readiness of both aid agencies and the local communities.

## Conclusions

The Indian Ocean Tsunami in 2004 offers clear insights into challenges during long-term reconstruction and recovery after a large-scale disaster. The donor-driven post-disaster housing reconstruction requires special attention to be paid to the implications of resource availability and appropriateness of NGOs' resource procurement during the reconstruction period. Donor-driven resourcing bears on a variety of factors inherent in the specific post-tsunami recovery context. Despite the significance of the event, little research has, however, been undertaken to examine the constraints and issues with regard to donors' post-tsunami resource procurement practice.

Based on three-month in-field observations and surveys, this paper presents the resourcing difficulties confronted by the NGOs in post-Indian Ocean tsunami reconstruction in Indonesia. Donor-driven resource procurement was primarily impeded by (1) NGO-related factors including: NGOs competency of resource procurement

and competition for resources among aid agencies; (2) external hurdles in NGOs implementing environment including: low local transportation and supply capacity, incompetence of contractor, and insufficient government support; and (3) community-related factors including: local housing culture and lack of community influence and participation.

The resourcing difficulties experienced by donor organizations show a need for NGOs to place priorities on enhancing capabilities for post-disaster reconstruction. To overcome both institutional weakness in NGOs and external complexities during their resourcing process, the recommendations outlined below are suggested for the involved stakeholders to consider and incorporate into their operations for improving NGOs' resourcing performance.

## NGOs' capacity building for resource procurement

NGOs need to develop better construction knowledge and understanding to fully build their capacity to procure external resources and manage their supply chains. Desired resource procurement requires dedicated procurement staff, competence to implement all aspects of resourcing including resource assessment, planning, purchase, delivery and management. NGOs should have staff with professional expertise, such as architects, engineers and consultants who have a direct influence in selection of appropriate housing type and resources. Involvement of the construction experts at an early stage can reduce the problems of design iterations, poor construction management and rework.

## Proactive resource mapping and planning

Resource availability for construction projects especially in a post-disaster situation requires proactive resource mapping, assessment and planning. Before commencing a reconstruction project, an assessment of local construction capability is likely to be able to identify the extent of the resource need for housing reconstruction programs, and inform the selection of housing types in terms of building materials and techniques. The resource assessment can also help the agency to identify the key stakeholders, how to tackle potential resource constraints, what additional assistance and facilitation is needed from stakeholders, and what kind of partnerships and coordination structures are required.

## Developing and strengthening relationships with local communities and institutions

It is important for NGOs to create partnership environment with local communities and institutions to facilitate their procuring operations. Developing potential partner relations at the initial recovery stage with local institutes or communities can help form operational links between NGOs and local potential resources and capacities. The partnering connections can be established by twinning NGOs' recovery and resource mapping, assessment and planning activities with government recovery plans and community redevelopment programs such as skills training and education. NGOs should involve governmental agencies and representatives from the affected community in the development of their reconstruction resourcing plans.

## Collaborative resource procurement

A collaborative resourcing approach between different aid agencies is required. Materials sourced from outside of Indonesia

such as timber and steel, if procured together among the aid agencies, can significantly reduce their lead time and transaction costs. This advanced level of resource procurement requires networks across institutional boundaries, which leverage on and link together critical capacities of other stakeholders. Continuous improvement to remove resourcing bottlenecks during post-disaster reconstruction also needs all the stakeholders to establish a culture of communication, coordination and collaboration.

The research in this paper highlights many of the issues from previous studies regarding donor-driven post-disaster reconstruction such as capacity building of NGOs, community participation, collaboration between NGOs and the local government, and pre-event planning and preparedness. Through grounded survey, this paper identifies the main resourcing challenges that are Indonesia specific. However, the research findings can also be translated across all disasters where NGOs lead the recovery and reconstruction. The experiences and lessons which are captured and manifested in the form of quotes and anecdotes in the paper are hoped to inform the actions for improvement of donor-led reconstruction after a major disaster.

The topic of donor-driven resource procurement in a post-disaster situation contributes to the philosophy of project management and the theme of the International Recovery Platform

(IRP) to stimulate more thoughts and dialogues. Resource availability after a large-scale disaster along with the appropriate procurement strategies should be taken into account by any reconstruction practitioner to be of sufficiently high priority to warrant attention. The research undertaken opens up broad channels for future research. Detailed operational aspects under each suggestion need to be investigated. Future studies regarding the mechanisms within NGOs to engage local communities, to collaborate with local government and institutions and to cooperate with other aid agencies are likely and necessary. With NGOs' commitment and available funding, resource procurement for habitat reconstruction could be more effective if the identified constraints are sufficiently understood and resolved.

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### Appendix Table 1.

Questionnaire response rates and ranking hierarchy.

No.	Factors affecting project resource availability in post-disaster reconstruction	W <sub>1</sub> 100	W <sub>2</sub> 80	W <sub>3</sub> 60	W <sub>4</sub> 40	W <sub>5</sub> 20	Score	Rank
(I)	<i>Construction Market-related factors</i>							
1.	Resource price fluctuation in market	4	2	1	9	4	1080	III
2.	Local production capacity	5	4	4	3	4	1060	14
3.	Pre-existing market structure		6	6	3	5	1060	14
4.	Competition for resources from other industries		8	8	5	7	820	20
5.	Competition for resources from among aid agencies	11	8	1			1800	1
(II)	<i>Logistics-related factors</i>							
1.	Local transportation capacity	10	10				660	V
2.	Transportation method		2	9	9		1800	1
3.	Transportation cost		4	10	6		1060	14
4.	Location of depot					20	1160	12
5.	Resource procurement lead time	10	4	1	5		400	25
(III)	<i>Reconstruction project-related factors</i>							
1.	Project design drawings	2	2	7	5	4	1580	4
2.	Housing type	4	4	4	6	1	1060	IV
3.	Quantity of resources required	12	4	3	1		1220	11
4.	Resource procurement method		4	4	2	4	1740	3
5.	Construction technique/technologies	1	2	1	1	3	720	21
6.	Project resourcing plan		1				420	24
7.	Housing reconstruction approach					5	140	31
8.	Project schedule/urgency		1				180	30
9.	Construction funding	2	4	4	4	4	80	33
10.	Location of construction site	1		1	2	2	1000	17
(IV)	<i>Reconstruction stakeholders-related factors</i>							
1.	Competence of contractor	13	5	1	1		280	27
2.	Selection of material suppliers	8	1	7	1	1	240	28
3.	Partnership and supplier management						1800	I
4.	Contractor resource database system						1360	8
5.	Contractor inventory						40	34
6.	Supplier inventory						120	32
7.	Cooperation of parties in construction						20	36
8.	Coordination among agencies						40	34
9.	Communication with local authorities		1	2	5	6	0	37
10.	Local government support and assistance	2	3	1	7	5	520	23
11.	NGOs competency of resource procurement	4	10	3	2	2	880	18
(V)	<i>Environment-related factors</i>							
1.	Legislation and policy	4	8	3		4	240	28
2.	General economic environment	5	8	3			1460	7
3.	Social and political stability	1	1	2	4	8	1320	9
4.	Physical impact of the disaster	2	3	3	5	3	1400	II
5.	Local housing culture and customs	7	7	5			1160	12
6.	Community influence and participation	6	8	2	3		620	22
							300	26
							880	18
							1560	5
							1480	6

Note: W<sub>1</sub>–W<sub>5</sub> symbolize the weights 100, 80, 60, 40, 20 respectively.

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