

Modeling and Analysis of Aid Coordination Processes for Post-disaster Education in Indonesia after the 2004 Indian Ocean Tsunami

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Abstract—Aid coordination processes for post-disaster education in Indonesia after the 2004 Indian Ocean Tsunami tragedy are modeled and analyzed. Stakeholders who shared the same mission for disaster risk mitigation gradually started to work together. Three models of the value creation process generated by the aid coordination, Value Provision, Adaptive Value, and Co-creative Value models, are presented. Human social networks and consortia of consultation are helpful in building trust relationships among participants, enabling them to mutually collaborate and ultimately create a new aid coordination form to promote post-disaster education.

Keywords—aid coordination, disaster education, value creation

I. INTRODUCTION

Indonesia is one of the countries in the world that are frequently struck by natural disasters. It has been called “a department store of natural disasters.” Right after a disaster, developing countries must manage both international assistance and effective coordination among many international aid agencies for emergency relief and reconstruction. The bigger the natural disaster, the weaker is the post disaster governance in developing countries. It is very important for local government, aid agencies, Non-Governmental Organizations (NGOs), and Non-Profit Organizations (NPOs) to purposely and independently communicate and coordinate with each other in emergency situations. Without coordination, some communities receive assistance more than once; some communities do not receive any assistance. In such situations, communities will be confused by the uncoordinated aid activity of each agency.

The Indian Ocean Tsunami that occurred in December, 2004 killed 170,000 people in Indonesia. In October 2006, the Consortium for Disaster Education (CDE) started activities for a school road show in Jakarta including disaster education and evacuation drills. Various NGOs, Christian and Muslim, international and domestic; United Nations agencies; Red Cross Society; educational institutions; government agencies; and the Department of Social Affairs took part in activities of the CDE. The CDE included so many agencies and yet the agencies can coordinate with each other to manage the disaster

education program together. Disaster education discussed in this paper aims to educate general public at local community level, elementary school children, and junior and senior high school students on practical indigenous knowledge of surviving a disaster by themselves.

Donors coordination for aid assistance has been troubled in developing countries for a long time [1][2][3][4]. The Development Assistance Committee (DAC) of the Organisation for Economic Co-Operation and Development (OECD) (OECD/DAC) stated that “We will need to change how we think and how we operate, in a far more coordinated effort than we have known until now” [1]. Why are so many agencies in the CDE able to coordinate and manage its disaster education program together? The main objectives of this paper are to analyze aid coordination processes, to find how obstacles were overcome, and to identify benefits of aid coordination.

II. AN OVERVIEW OF THE CONSORTIUM FOR DISASTER EDUCATION

The working process and activities of the CDE was initially observed by the first author who worked for the Japanese Embassy and Japanese Red Cross Society in Indonesia for three years after the 2004 Indian Ocean Tsunami. Additional information was gathered from the minutes of meetings [5] and from fact finding visits. Disaster education is usually not included in the curriculum of elementary, junior, and senior schools in developing countries such as Indonesia and emerging market economies such as China. It is difficult for communities to transfer lessons learned from the previous generations about low-frequency/high impact disasters, like tsunamis or major earthquakes. Public education in Indonesia could have provided knowledge from the previous generations to make evacuation easier for children during such disasters as the 2004 Indian Ocean Tsunami.

In 2006, a domestic Indonesian NPO, MPBI (the Indonesian Society for Disaster Management), proposed to the UN and to the Department of Social Affairs of Indonesia that joint activities should be undertaken with NGOs for the International Disaster Reduction Day (IDRD) in Jakarta [7].

The 2006 IDR theme was institutionalizing integrated disaster risk management at the school level. Previously there was no cooperation with other agencies for the activities of this international day or for disaster management in Indonesia. Before the Tsunami, the participation rate was very low for coordination meetings in Jakarta. An official from the Indonesia Office of the United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA), which was in charge of coordination, said “Participation increased in the UN-NGO-Donors once a month coordination meetings in Jakarta after the 2004 Tsunami. Before the Tsunami, we had to ask NGOs or aid agencies to give presentations on their activities for meetings.” In addition to this, a big earthquake and volcano eruption occurred in Yogyakarta in central Java in May 2006 [8]. Aid agencies have been changing their attitude to donors’ coordination since the Tsunami in Indonesia. The CDE was one of changes in this trend of coordination in Indonesia. The tragedy of huge natural disasters provided a different environment which enabled coordination to succeed.

The 2006 IDR schedule is shown in Table I. Coordination was successfully started one month before the IDR, and the decision was made to continue activities together for disaster education. The name “Consortium for Disaster Education” was first used, four months later, in the meeting minutes on January 27, 2006 [6].

TABLE I. SCHEDULE OF ACTIVITIES*

Date	Activity	Funded by
October 9, 2006	Training of facilitators for the school road show	-
October 10, 2006	Final preparation for the school road show	-
October 11, 2006	a. National Workshop for Policy Makers and Teachers on Integration of Disaster Risk Management into School Curriculum	An NPO, An NGO, UN
	b. National Workshop on Disaster Risk Reduction Information Management System	UN
October 12, 13, and 14, 2006	School road show in 23 schools	An NGO, UN

*Based on [7][8].

The names of 45 participants, on behalf of 21 agencies, were listed in the minutes of four coordination meetings for the IDR until October 18, 2006. Participation of international agencies (International NGOs, UN and the Red Cross) accounted for 73% of 21 agencies. Participants were from various religious affiliations including Muslims and Christians. NGOs include Catholic Relief Service, Church World Service, Red Cross Society, New Crescent Society, Islamic Relief, and *Muhammadiyah* DMC (Islamic Boarding School). Participation of domestic agencies including Indonesian government and domestic NGOs was 27% of 21 agencies. Comparing to domestic agencies, many more

international agencies participated. Composition of agencies participating in the CDE is shown in Fig. 1.

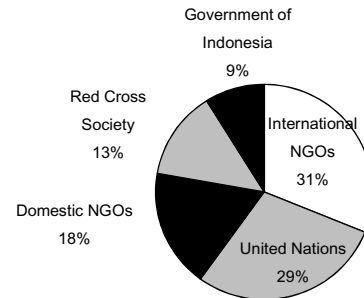


Figure 1. Composition of agencies participating in the Consortium for Disaster Education (CDE) (based on [6][7]).

Looking at the nationality of those who work in the international agencies, 82% of the participants in the CDE are Indonesians, as shown in Fig. 2. The CDE was mainly organized by Indonesians. In addition to this, some university research institutes and the Indonesian Government agencies joined the IDR. Activities succeeded in the CDE mission to spread disaster education in Indonesia after the 2004 Tsunami disaster because of good cooperation that went beyond position, occupation, religion and nationality.

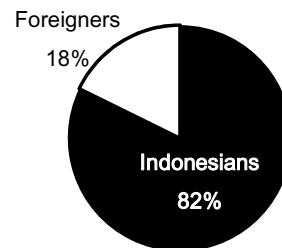


Figure 2. Nationality of the CDE participants (based on [6][7]).

The CDE has the following interesting characteristics:

1. Each provider offers its own advantages such as technical knowledge, service contents, and fund, as illustrated in Table I.
2. Donors easily find not only a suitable candidate to employ or train but also a project to fund from the CDE participants. Such information from donors circulates among participants by email.

3. Everyone can freely enter and exit from the activities depending on each activity.
4. In the CDE decisions are made by majority and not by social hierarchy. In this sense the CDE is a horizontal organization.

As for numbers 3 and 4 mentioned above, one participant said to the first author in an interview that “A participant from the Indonesian Government exited from the CDE when his proposal was voted out by participants.”

Based on the role-playing network model [9], Sugimoto and Okada [10] have modeled and analyzed the social network development which provided a communication platform for the CDE to effectuate such coordination processes. This paper explores on this research finding and shows that the coordination processes based on the CDE are driven by the benefit and enhancement of value by co-working in the CDE. According to one of the key organizers, the following themes evolved from the CDE in Indonesia in 2009:

1. The CDE has become an 'icon' in education and disaster related matters.
2. The CDE has a good image in Indonesia and at the international level.
3. Due to the CDE's wide network, it could become a force to put pressure on increasing risk reduction through education.
4. There is significant involvement by the CDE in exhibitions and networking.
5. The CDE does not yet produce strategic recommendations or ideas that influence the government for education.
6. Because of its diverse members, it would be beneficial to share responsibilities by forming task forces for matters such as policy, research, and documentation.
7. Exhibitions are good for the public image of the CDE. However the CDE should avoid being the event organizer for exhibitions

Based on these observations, coordination has been successful in the CDE for three years. Referring to point 2, the good image of the CDE has already spread both domestically and internationally. Using the Value Creation Model [11], the reasons for the successes and benefits of coordination are analyzed next.

III. BENEFITS OF COORDINATION

A. Value Creation Model

It is practical for aid providers not only to share the same humanitarian mission, but also to increase benefit (value) of the aid by aid coordination among different political missions from each agency. To systematically understand the benefit and enhancement of value by co-working in the CDE, the value creation model based on the concept of emergent synthesis is employed to examine the aid coordination processes within the CDE [11], [12]. Emergent synthesis has been used to study the value creation process of innovation in services. Because of environmental changes, innovative services and service models are required.

Within the concept of emergent synthesis, the following three classes with respect to the incompleteness of information about the environment and/or specifications are defined [11]:

- Class I – Problem with complete description: if specifications and information related to the environment are available completely, then the problem is defined entirely. However, finding an optimal solution among many feasible ones is often difficult.
- Class II – Problem with incomplete environment description: the specification is given completely, but information related to the environment is not available completely. The description of the problem is not complete. The dynamic nature of an unknown environment poses difficulties.
- Class III – Problem with incomplete specification: information related to both the environment description and the specification is incomplete. Therefore, the synthesis process starts with an ambiguous purpose. Interaction involving human in exploring the environment description and the specification becomes important.

Based on the concept of emergent synthesis, Takenaka and Ueda [11] presented a classification of the service models: Class I service: Service Provision Model; Class II service: Adaptive Service Model; and Class III service: Co-Creative Service Model. The three classes of service models proposed by Takenaka and Ueda [11] are adapted in this paper to analyze the value creation process generated by the aid coordination processes in the CDE.

B. Class I Model: Value Provision Model in the Aid Coordination Processes prior to the Disaster on December 26, 2004

Prior to the disaster on December 26, 2004, aid agencies acted independently providing disaster education to service receivers, as shown in Fig. 3. Service objectives and service environments were clear before the disaster occurred. It is necessary to develop the economy of scale and scope in this model to identify optimal solutions.

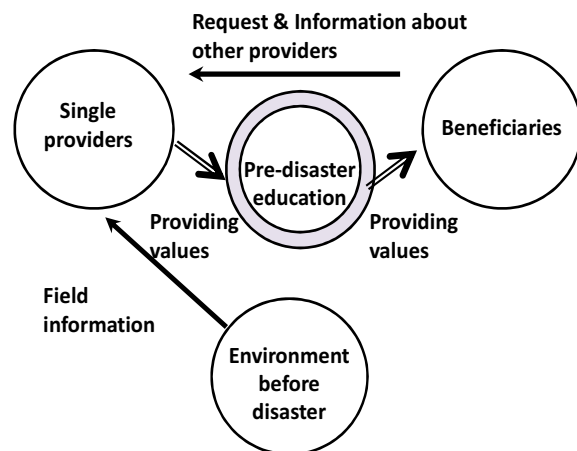


Figure 3. Value Provision Model.

C. Class II Model: Adaptive Value Model in the Aid Coordination Processes between 26 December 2004 to August 2006

Several months after the disaster on December 26, 2004, the disaster utterly changed the environment, making it more unpredictable. The external influence of natural disasters confused people, substances, information, organizations and society. International aid agencies that were newcomers rushed to the disaster area. At first, it was difficult for strangers to cooperate and build trust. However, people have to adapt to a new environment after disasters. Stakeholders gradually exchanged information among organizations to get over the crisis. The crisis provided the opportunity to coordinate meetings and completely define the objectives of service. The contents of disaster education were changed based on the “live” lessons. This is called Adaptive Value, as shown in Fig. 4.

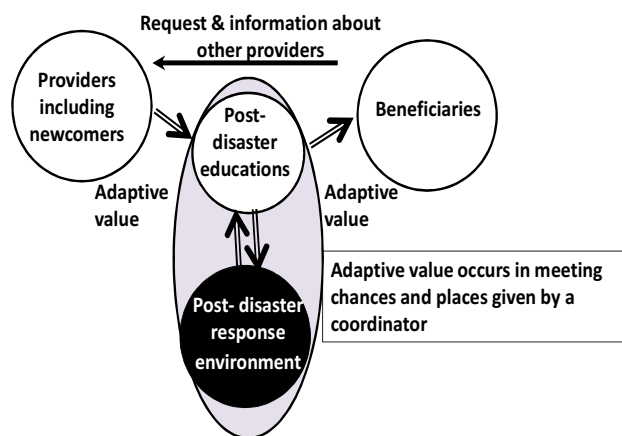


Figure 4. Adaptive Value Model.

The first convergence workshop that involved coordination among agencies for disaster risk reduction by the UN was held in Jakarta in September 2005. Participating agencies handed out information about their activities. This information was published as a report and distributed in December 2005.

D. Class III Model: Co-Creative Value Model in the Aid Coordination Processes from September 2006 to Now

Fig. 5 shows the Co-Creative Value Model, in which the service objectives are ambiguous and the information related to the environment description is incomplete. Therefore stakeholders try to exchange more information and experience from “live” lessons with each other than that in the Adaptive Value Model. Stakeholders build up trust with each other, in part, due to continually having meetings. The providers, aid donors and beneficiaries are mutually inseparable from the viewpoint of value creation. Consequently, the service providers must be mutually involved with beneficiaries such as communities and schools to create the service value together. Stakeholders gradually share the same mission and coordinate to provide better projects with others beyond each organization to get over many crises. These crises prompt the restructuring of the system for providing disaster education. At

this stage the budget for rehabilitation from aid donors gradually decreases and stakeholders seek more efficiency. Intermediate networks are necessary for coordination not only for taking initiative but also for funding information and so on. In this model the basis of the coordination system is reconstructed from external influences.

The basis of coordination system is the CDE. The CDE started activities for the IDR in Jakarta in September 2006, as mentioned in Section II. The second convergence workshop to coordinate among agencies for disaster risk reduction by the UN was held in Jakarta in December 2006. The joint resolution of the workshop, decided by participating agencies, was to develop the “3W data base” to share project information for disaster risk reduction mapping on the web [5]. This web system has spontaneously updated information from aid agencies to provide disaster prevention activities by the United Nations Development Program (UNDP). This type of web system under the auspices of the UN started in March 2007. Now with this system, information about the CDE activity is always open to review. Agencies and individuals may easily obtain information from this system and join current CDE projects if they have an interest in activities such as school road shows for children or flood mitigation drills. Participants of the CDE system have access to information about jobs and trainings from aid agencies and studying abroad from USAID and others from the CDE mailing list.

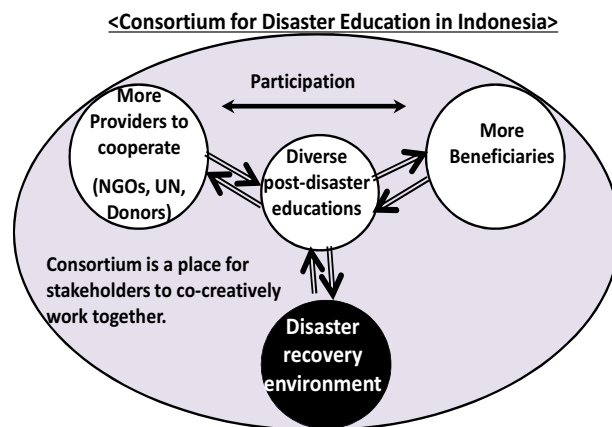


Figure 5. Co-Creative Value Model.

A comparison of the three value models is shown in Table II. There are large differences between Class II and Class III. In Class II, stakeholders are still in confusion. Therefore the coordination of work does not start. It took approximately two years to proceed to Class III after the Tsunami disaster. In Class III, opportunities are provided to build trust and to work together. In addition, service providers for solving problems must be mutually involved with beneficiaries such as communities or school children to cooperatively create the service value. The component of problem solutions in Class III is definitely different from the other classes. In the next section, the obstacles and solutions for the coordination of disaster education are analyzed.

TABLE II. COMPARISON OF VALUE MODELS

Components	Class I	Class II	Class III
Providers	Single	Single	Multiple
Contents of Disaster Education	Original	Original	Variety
Beneficiaries	Small	Small	Many
Information (related to environment)	Complete	Incomplete	Incomplete
Problem Solutions	One to one	By adaptation	By coordination
Realm of Value Creation	Small	Middle	Large

IV. DISCUSSIONS ON VALUE CREATION

Value creation related to disaster education service is discussed in this section.

A. Disaster Education Service

Education is a category of semi public service [13]. Disaster education should be provided by government in view of humanitarian problems. For example, vulnerable people were children based on the data of high mortality rate in Aceh

during the tsunami disaster [14]. It can be interpreted that the tragedy of a huge natural disaster provides the environment for cooperation of humanitarian missions, without political considerations among various stakeholders. Disaster education is not as expensive as other more difficult projects such as construction. However, it takes time to continue educational activities and adapt the situation to each community. Local talent is a very important factor to be examined to provide knowledge of disaster education.

Table III shows the advantages and disadvantages of three modes of delivering disaster education: (1) single provider, (2) adjustment or compartmentalization, and (3) coordination of activities. The advantages and disadvantages can also be classified in term of the stakeholders, as shown in Table III, where “P” is used to denote “Providers”, “B” for “Beneficiaries”, and “D” for Donors.

To put it in perspective, there are more advantages and less disadvantages in the coordination mode than in the modes of single provider and adjustment, not only for beneficiaries but also for providers. Therefore the overall value of the coordinated disaster education is highly appreciated as complicated to otherwise. This kind of synergetic value is considered to be created through the three-stage processes modeled. There are significant incentives for stakeholders to coordinate.

TABLE III. ADVANTAGES AND DISADVANTAGES OF THREE MODES OF DELIVERING DISASTER EDUCATION

	(1) Single Provider	(2) Adjustment (Compartmentalization)	(3) Coordination of Activities (Creation for Values by Co-programs)
Advantages	<ul style="list-style-type: none"> • It is efficient for a single provider to manage time and administration. (P) • It provides an independent service. (P) 	<ul style="list-style-type: none"> • Able to exchange information among participants for coordination. (P) • It is more efficient for a single provider to manage time and administration than for a group of co-providers. (P) • It has a possibility to unify service contents and to provide service without overlapping. (P and B) 	<ul style="list-style-type: none"> • Able to exchange information among participants for coordination. (P) • Able to benefit from the economy of scale and scope. (P & B) • Provide unified services to avoid confusion among beneficiaries. (B) • Political power for negotiation is usually stronger. (P & B) • Each provider offers its strengths, not requiring uniform funding. (P) • Each provider has opportunity to learn techniques and gain knowledge. (P) • Not only donors can easily find a suitable project or provider from a group, but also providers have more opportunity to receive funding. (D & P) • A single provider can report its activities to its political mission or through the media.(D & B) • It makes management of co-projects easier. (P)
Disadvantages	<ul style="list-style-type: none"> • It is too small to work on the economy of scale and scope. (P & B) • Overlapped service is often provided at the same location. (B) • Beneficiaries are confused by different educational contents from many providers in the field with overlapped service. (B) • A single provider’s political position is usually weaker than a united group of providers for negotiations. (P) 	<ul style="list-style-type: none"> • It is too small to work on economy of scale and scope. (P & B) • Beneficiaries are confused by different educational contents from many providers in the field with overlapped service. (B) • Meetings for coordination and adjustment take time. (P) 	<ul style="list-style-type: none"> • It takes more time to coordinate and administrate. (P) • Minority opinions to be less taken if decision-making is only majority voting. (P)

B. The Consortium for Disaster Education

After the disaster in December, 2004, people were confused by the disaster in the new environment, and coordination of work did not start. Stakeholders gradually exchanged information and started to work together. The occasion of organizing the 2006 IDRDR initiated the Consortium for Disaster Education (CDE). The development of the “3W data base” to share project information for disaster risk reduction on the web further enhances the function of the CDE [5]. Everyone who has interests in disaster risk reduction can access both the information and activities of the CDE. Everyone can freely join and leave from the activities of the CDE. In the CDE decisions are made by the majority and not by social hierarchy.

C. Significance of Social Networks

Coordination which requires a common communication platform may not happen without human networks. As mentioned earlier, such networks and the role for coordination are analyzed using a role-playing network model by Sugimoto and Okada [10]. One is a network of vertical-related organizations, and the other a horizontal social network. The result is that such social networks and consortia of consultation are helpful to build trust relationships among participants, thereby enabling them to mutually collaborate and ultimately create a new aid coordination form to promote post-disaster education. Intermediate networks are necessary for coordination not only for taking initiative but also involving more stakeholders.

The CDE was mainly organized by Indonesians, 82% of the participants are from Indonesia, as shown in Fig. 2. The coordinator is a domestic person from a UN agency. Local university research institutes and Indonesian government agencies have joined the IDRDR. This shows a consortium like CDE can be organized by local personnel.

V. CONCLUSIONS

By using the Value Creation Model [11], three models of the value creation process generated by the aid coordination processes, Value Provision, Adaptive Value, and Co-creative Value models, have been presented. The Value Provision Model can be described as being completely within a closed system. There is no opportunity to coordinate with other stakeholders in a situation which is completed. Therefore, it is necessary to develop an economy of scale and scope in this model to identify optimal solutions.

In the Adaptive Value Model, it is clear that the tragedy of a huge natural disaster provides the environment for cooperation on disaster education with many advantages to promote coordination among stakeholders beyond each position. Disaster education contents are changed based on the “live” lessons. This is called adaptive value. Originally, the CDE was mainly organized by Indonesians. Thanks in part to continually having meetings, stakeholders build trust for coordination with each other. In the context of Value Creation Model, the providers, aid donors and beneficiaries become the basis of coordination to create values in the new environment after disasters. However, coordination would have not happened without human networks and meetings.

The providers, aid donors and beneficiaries are mutually inseparable from the viewpoint of value creation. Consequently, the disaster education service providers must be involved mutually with beneficiaries like communities or school children to co-create the service value.

Further research will be conducted to deal with coordination of the CDE networks and system under emergency relief cases over longer span and for other disaster areas. The CDE should be developed not only for mitigation but also as basis for emergency relief and reconstruction for future.

ACKNOWLEDGMENT

The research observation was first made when the first author worked for the Japanese Embassy, Japanese Red Cross Society, and Disaster Risk Reduction Steering Committee under the United Nations in Indonesia after the 2004 Indian Ocean Tsunami for three years. The authors are thankful to Professor Kanji Ueda and Dr. Nariaki Nishino of the University of Tokyo, members of the CDE, and people of the affected areas for their spontaneous cooperation. The views expressed in this paper, which are views of the authors, do not necessarily reflect views of the organizations mentioned in this paper as well as the organizations the authors are affiliated to.

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