

Types of Information Required for Online Disaster-aid Management in Solo

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Abstract—People living in vulnerable disasters area often lack of information about aids for disaster victims. It happens because of limited facilities to communicate between donors and disaster victims. The objective of this study is to find out the types of information required for online disaster-aid management. The data of this study were collected with questionnaires and analyzed by confirmatory factor analysis. This study involved partners comprising six non-government organizations and Indonesian Red Cross Organization in Solo. The result of this study shows that the types of information required for online disaster-aids management consists of eight items, that are general coordinator, the schedule of disaster rescue exercise, network, expert of disaster, rescue team, disaster management agency, tools, and logistics center placement. The information should be provided in website.

Index Terms—online information, disaster aid, management

I. INTRODUCTION

A modern disaster management system consists of four elements: Mitigation, preparedness, response, and recovery [1]. The preventive action of disaster can be done completely and continuously by a team in good coordination, good planning, rescue team, government, and agents [2].

Indonesia is vulnerable to disasters. Disasters such as tsunami, flood, earthquake, and volcano eruption has hit Indonesia since 2004. In 2004, tsunami killed 232,000 people in Aceh. Meanwhile, the intensity of flooding in Indonesia has been increasing dramatically in the last decade [3]. A mud flood in 2006 in East Java buried homes, schools, and farmlands over seven kilometers square. This caused more than 13,000 families to lose their homes. In May 2006, the Yogyakarta earthquake occurred with a magnitude of Mw 6.3. About 6,000 people were killed, 50,000 were injured, and as many as 600,000 people were displaced in the Bantul-Yogyakarta area [4]. In 2010, Mount Merapi volcano eruption killed more than 100 people in Yogyakarta. The President declared the situation a national disaster.

However, the rescue teams for victims were not well prepared. Although the Indonesian government has a Search and Rescue (SAR) team, the team is still lacking.

It must be handled by an army that always has their personnel ready. This could be seen from the Manokwari and Wasior flood in 2007. The government decided to build temporary shelters for disaster victims, which were constructed jointly by military and police personnel as well as local inhabitants.

The recorded of Flood In Solo Raya shows that annual maximum of daily precipitation during the period of 1975 to 2009 occurred four times extreme daily precipitation exceeding 10-year recurrent interval [5]. It means that probability of flood in Solo Raya increased and it should be anticipated and prepared urgently.

The main principle of giving aid to disaster victims is by distributing food and logistic to the disaster sites [6] in [7]. Consequently, it needs appropriate transportation and a good network. Meanwhile, reference [8] expanded the earlier model [6], focusing on the participation of military and non-governmental organizations (NGOs) in emergencies. However, when the situation is considered as stable enough, the military assistance is declined; in such situation, NGOs should take over.

Information Communication Technology (ICT) has also been widely utilized to support the effective humanitarian action. An early warning system may use it. It can be combined with other tools to parallel information. Some other examples of ICT include use of editable web sites, blogs, and data-mining tools to capture, analyze, and share lessons learned from operational field experiences [9]. Electronic information is important to the perception, regulation, and management of risk at a local, national, and international level [10].

ICT is also vital for the distribution of information, and it has positive effect to coordination. Partner coordination has to be clear in order to join all information from user and provider [11]. Web design of supply chain management is the connection between supplier, factory, garage, distributor throughout coordinating of planning and acting, developing product from raw material to ready-to-use product. Web design consists of three modules; back end, middleware, and web services [12]. Back end functions as database, middleware functions for lane connection external user and server, and web services functions for face control each user. The aim of this study is to find out the type of information required for online disaster-aid management.

II. DISASTER HANDLING AND E-SUPPLY CHAIN MANAGEMENT

A. Disaster Handling and Supply Chain Management

Disaster is not something interesting but it is an incident that will *guide* people to solve the problems [1]. There are three main points in preparing for disaster recovery; they are before, current, and after disasters [1]. They are four significant elements: mitigation, preparedness, response, and recovery. Mitigation can be defined as a reduction of disaster risk. It can be done by identifying the threat of disaster and eliminating it. Preparedness can be done by preparing tools and equipment in disaster-prone areas. Responsiveness is an action to reject or to eliminate the effect of disaster that probably happened. Recovery is an effort to rescue disaster victims and save them from the disaster site.

According to the policy of National Disasters Management Agency (NDMA) of Indonesia [13] No. 7/2008, there are six guidelines to give aid to disaster victims: (1) the temporary homestay; (2) food; (3) non-food; (4) clothes; (5) clean water and sanitation; and (6) health services. The six items of aid have minimum standards. As explained in the policy, each item is divided in details. This is done to match the needs of the victims, aids-organizer, and government.

NDMA policy also describes how to create structural organizations dealing with the distribution of logistics for disaster victims, at the province level, regional level, and district level. Local government can distribute international aid. Although the line of distribution is clear, there are many miscommunications between donors and organizers. As a result, the logistics are not distributed appropriately. The recovery of disaster programs can be done well if there is good coordination between aid-organizers, government organizers, and government from the preventive phase to recovery phase [2].

Dynamics and flexibility in providing ready stocks is an important step to fulfill requirement, complexity, competition, and globalization. Globalization has good and bad effects to the company. The good effect of globalization is that the company will improve his business well, but the bad effects include unbalanced competitions, treaty competitors, and climate change [14]. In order to solve such problems, there needs to be a good supply chain management system, which should be ready to anticipate all presumed conditions. Reference [15] stated that the database of supply chain management consists of location, products, resources, network of transportation, structure of the product, process of production, and supplier network. Enterprise Resource Planning (ERP) deals with information on the kind of machine, the suppliers, users, and materials, central of operation, purchase record, product, information recorded, maintenance schedule, and contract. Certain users can access all recorded information.

In globalization era competition, quick information service and network is important. Internet-based supply chain management is an accurate solution to evaluate stocks quickly and to win competitions and markets [2].

In order to implement the application of supply chain management, the company can design a website.

Web design of supply chain management is a network lane between the suppliers, factories, warehouses, and distributors. There should be a good coordination of planning, developing products from materials procurement to finished products between the related parties [14]. A Supply Chain Management (SCM) system can be divided into three components: Enterprise Resource Planning (ERP), Middleware, and web-based applications [12]. The ERP System is connected with web-based applications to users and suppliers. Middleware consists of e-SCM applications. Web-based applications are directly integrated applications software systems comprising a variety of supplier and customer-side applications.

Reference [16] stated that supply chain management (SCM) has a three perspectives approach: tactical, strategic, and web technologies. Tactical is a type of management to combine and optimize internal capability. In the process, the tactical approach can directly reduce much expense and create teamwork by joining the partner function of supply chain, supplier, and customers. The Strategic approach means SCM should be liner, reliable, and fit the partner's order, thus improving the teamwork. Web technologies work as an electronic supply chain management, integrating and synchronizing all information and process.

An online disaster-aid management can adopt the model proposed by [12] who designed an e-SCM for business. Their system has three main modules; back end, middleware, and web service. Back end functions as a database containing recorded information, current information, and planned-action information. Middleware functions as a lane of external access to server. Web service functions as the provider of static and dynamic information. Information of e-SCM business is certainly different from online disaster aid information. The next step of online disaster-aid management follows the e-SCM business. Users of web technologies provide four online services, they are sign in, sign off, query, and cache [12]. Sign in enables each user to access online information by using the internet freeway. Sign off allows the user to finish the task successfully and report it to all colleagues. Query enables the users to look at recent service. Cache functions as a device to look at the recorded transactions.

III. RESEARCH METHOD

The design of this research is inductive-deductive study, focusing on the government's role in NDMA's policy and the opinion of people in Solo Raya throughout the questionnaire. This research also involved NGOs and Red Cross in Surakarta.

The data was gathered from 99 randomly selected respondents from Solo Raya. NGOs from the districts sent their members as participants in Focused Group Discussions (FGD).

The analysis of this research used Confirmatory Factor Analysis (CFA) with rule of thumb 0.40 using Statistical

Package for Social Science (SPSS) programs. All items are considered significant if the rule of thumb is more than 0.40 and Keiser Meyer Olkin (KMO) more than 0.5[17]. All significant items can be assumed as important, thus, they should be presented in online information for disaster-aids management.

IV. FINDING

The result of Confirmatory Factor Analysis (CFA) shows that Keiser Meyer Olkin (KMO) score is 0.706. It means that all items in the questionnaire list are valid because KMO score more than 0.50 [17]

The result of rotated component matrix shows that the respondents considered the items in two group indicators, information of disasters and organizational disasters, as important or needed. In details, the types of information which are needed for online disaster-aid management are general coordinator, the schedule of disaster rescue trainings/drills, network, disaster expert, rescue team, disaster management agency, tools, and central logistics placement.

A general coordinator is needed in every district in Solo Raya. Sixty-one percent of the respondents do not know the coordinators in their regions. They need a coordinator to manage and inform important information about disaster in their area. This information will help them to prepare and anticipate a massive disaster. The general coordinator functions as an agent who distributes disaster-aid and information to disaster victims. The existence of a general coordinator is very important to connect all people in Solo Raya. The government or even the non-government organization can appoint a person to be the general coordinator.

The government should make a schedule for disaster rescue trainings/drills in each region of Solo Raya. Sixty-nine respondents or two-thirds of the respondents in Solo have no idea how to anticipate and overcome a disaster. The training for disaster recovery is urgently needed. The most important thing in training for disaster recovery is to share information after a disaster prediction and how to anticipate the disaster.

Disaster happens unexpectedly. It baffles people, making them not knowing what to do. The situation becomes worse when the public facilities are destroyed. In such situations, people need aid. Network from another area is one of the solutions to fulfill their need. It can be done by creating a network not only when the disaster happens but also on the disaster anticipation. ICT will provide many lines of communication to do this to connect people. As a result, it is expected that people who are not seriously wounded can recover quickly. Although disasters in Solo Raya happen every year, there are no disaster experts in these areas. In this case, the areas need experts to analyze and control the situation. They can give more explanation to the residents on how to anticipate disaster before it happens, how to solve problems while disaster happens, and how to recuperate from disaster effects.

Disaster is an unpredictable incident and its effect destructs all facilities. Human and non-human resources

are damaged and/or destroyed. In this situation, rescue teams are needed because people do not know who to ask for help. In order to anticipate the effects of disaster, preparedness is an important effort to solve the problem. It means the government and non-government organization need to cooperate to map the disaster-prone area and descriptive statistics of the population. The completed data is important for analyzer in order to predict the logistics needed in the area.

Structurally, each district in Solo Raya has a regional disaster management agency, but people do not know the existence of this agent. Government should socialize and inform them how to access it. This activity will influence public opinion, which will help the Government to anticipate the effects of disaster.

Another important thing to be noted is the tools for rescue team. People can give help and assistance by using simple tools. However, in some cases, the tools and equipment are not organized well. Therefore, the regional disaster management agency should be the one to provide it. The tools needed include hoes, sawdust, machetes, mines, and axes.

The last type of information required for online disaster-aid management is logistics-center placement. The correct placement of logistics center will be a guide on distributing aids. Geography is important factor to place logistics center. The logistics center should be placed in the most strategic area that is accessible by all kinds of vehicles.

Focus group discussions involve six NGOs and Red Cross Organization in Solo. They believe that the online disaster-aid management is really needed in Solo Raya. It functions as aid coordination and establishing communication. In the future, besides using the website for communication, it will also use mobile phone and peer to peer file sharing. Reference [18] said that Armenian prefer to use mobile phone as tools to peer file sharing than ICT. They think ICT needs wireless or internet access but mobile phone only needs signal to operate.

V. CONCLUSION AND FUTURE WORK

People in Solo Raya need online information of disaster-aid. The types of information should be provided in website are general coordinator, the schedule of disaster rescue trainings/drills, network, disaster expert, rescue team, disaster management agency, tools, and central logistics placement.

General coordinator controls all disaster-aid in his area. He has to know the number of disaster victims and how many stock of disaster-aid ready to use. All data should be controlled by the general coordinator.

The schedule of disaster rescue training/drills. Every district in Solo Raya should have training schedule for disaster rescue. This activity will help people in Solo Raya to anticipate the effect of disaster. They will know how to prepare themselves when disaster happened in their area.

Communication is very important to inform an update data. Every minute data disaster always changes. So,

network lane in disaster area is very important. People will communicate to other people in different place by network. They can inform how many people injured and what kinds of aid should be provided.

An expert of disaster in disaster area is needed. He can advise to rescue team or local government what should they do in emergency condition.

Rescue team is the first agent to respond disaster victims. In some cases, government asks military and police personal to handle disaster. It means rescue team is not really ready to handle disaster all the time. It should be prepared as a solid team before incident happened.

The main principle of giving aid disaster is distributing food and logistic to disaster victims. Each area needs an agent to do it. Disaster agent each district should be coordinated clearly.

The tools and equipment are needed for first act in disaster. For example: umbrella, jacket, glove and so on. Although it just simple tools and equipment but it is really needed in emergency situation.

Disaster happened unpredictable. When it happened in wide area, it is hard to cover. This conditions lead disaster agency to place logistic center in strategic area. It means that the logistics center should be easy to access from each corner in disaster area.

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