ABSTRACT

Law Number 24 year 2007 on disaster management, mitigation is defined as a series of efforts to reduce disaster risk, either through physical development as well as awareness raising and capacity building facing the threat of disaster. Design of zoning into account key parameters, namely the earthquake zoning based seismic design category. Earthquake Disaster Mitigation in the flats, before disaster: (1) Categorization of areas based on the characteristics of the earthquake zone (seismic zoning); (2) Research the characteristics of land on which will be built flats (flat), whether included soft soil or hard soil; (3) Making a clear evacuation path on the building of towers and the surrounding area; (4) The construction of towers based on building standards for residential/earthquake resistant buildings, ranging from foundation to finish by referring to the building codes in force, such as size of the building (the building that avoid angular or curve) and the configuration of the building; (5) Quality control of the implementation of the building starts from the initial stage to the final stage; (6) The use of special material for reinforcement (retrofitting material), from local materials that are easy to find while saving the cost. While disaster, following guidelines/procedures for emergency earthquake that have been enacted or have been given training by the manager of the flat to flat consumer. After the disaster happen: (1) Checking of the condition of the flat dwellers who experience the disasters; (2) Checking of the condition of the buildings are damaged, the type of damage (structural and non-structural), and measures anticipated; (3) Improved method to save themselves; (4) Rehabilitation timely and build back better; (5) Maintenance and check on the condition of the building towers at regular interval.

Keywords: Mitigation, Flats, Quality Control

1. INTRODUCTION

Disaster management is a major part and positioned in the handling of a disaster. It is important to raise awareness of the whole of humanity to natural disasters, in particular through a better understanding of the natural disaster. As well as efforts to reduce disaster risk through technology and management capabilities. One of the most important part of disaster management is mitigation. Through the earthquake disaster mitigation, can take measures to reduce the effects of an earthquake hazard before the hazard occurs. Based on Law No. 24 Year 2007 on Disaster Management, mitigation is defined as a series of efforts to reduce disaster risk, either through physical development as well as awareness raising and capacity building facing the threat of disaster. Thus, mitigation measures also encompasses all the activities and measures of protection that may be preceded, from physical ones, such as constructing buildings stronger, until the procedural. Therefore, the use of
standardized techniques for incorporating hazard assessment in land use planning. Raising awareness of residents of the apartment will be catastrophic earthquake, in particular through a better understanding of the earthquake disaster is an important first step, in addition to technology and disaster management capabilities needed to reduce disaster risk. Technological capability is realized by taking into account the building regulations (technical requirements, earthquake-proof buildings, zoning earthquakes), and calculate the strength of buildings against earthquakes style, especially in areas that are in the path of the earthquake. As shown in the figure above, Indonesia is one country that has the level of risk and high vulnerability to earthquake disaster. Therefore, one important step in mitigation is preparing guidelines for the management of flats which include the manufacture of evacuation routes and signs (such as sign emergency exit), counseling and training of evacuation for residents of the apartment, exercises or simulations to save themselves or get out safely and do not panic when using emergency stairs coming out of the apartment building, and how to take shelter in a safe place when the earthquake occurred. Overview of important steps summarized above need to be more comprehensive in the form of disaster mitigation. The preparation of this mitigation is as an effort to anticipate and lessen the danger of earthquakes in the flats built by the Ministry of Public Works and Housing of the People in earthquake-prone areas.

Design of zoning consider key parameters, namely the earthquake zoning based seismic design category. Earthquake zoning parameters based seismic design category refers to the seismic zoning map are classified based seismic design categories set out in ISO 1726-2012. Earthquake zoning map used is a map of the spectral acceleration of an earthquake in a short period (S_s) are considered risk-targeted (MCER).
Source: Ministry of Public Works

Figure 2. Indonesia Earthquake Zoning Map is based on seismic spectral acceleration in the short period ($S_s$) are considered risk-targeted (MCER)

Based on ISO 1726-2012, seismic design categories are classified into three (3) zones, namely: (1) Zone I, a region with $S_s < 0.167$ (A); (2) Zone II, a region with a value of $S_s$ $\geq 0.167 - <0.50$ (B, C); (3) Zone III, which is the region with the $S_s$ value $\geq 0.5$ (D, E)

Source: Results Analysis

Figure 3. Earthquake Zoning Map Based Seismic Design Category

Furthermore, the preparation of mitigation can be designed based on the division of the zone based on the degree of disaster risk, disaster risk levels used by disaster risk maps issued by BNPB which can be seen in Figure 6. The basic assumption, that the development of infrastructure in a region not only consider the potential damage to buildings but also to the psyche of potential exposure, losses, environmental damage, and also regional ability to cope with the potential impact of the earthquake disaster.
Possible earthquake disaster mitigation operation in the flats, before the disaster:

1. Categorization of areas based on the characteristics of the earthquake zone (seismic zoning).
2. Investigations characteristics of the soil where will be built flats, whether included soft soil or hard soil.
3. Making the evacuation clear path to the building of towers and the surrounding area.
4. Construction of towers based on building standards for residential/earthquake resistant buildings, ranging from foundation to finish with reference to the applicable building codes, for example;
5. The size of the building (the building that avoid angular or curve) and the configuration of the building.
6. Quality control of the implementation of the building starts from the initial stage to the final stage.
7. The use of special material for reinforcement (retrofitting material), from local materials which are easy to find at the same time cost effective.

When disaster occurs, following the guidelines / procedures for emergency earthquake that have been enacted or have been given training by the manager of the tower management.

After Disaster:

1. Checking of the condition of the flat dwellers who experience disasters.
2. Checking the condition of the building are damaged, the type of damage (structural and non-structural), and the anticipation step.
3. Improved method to save themselves.
4. Timely rehabilitation and build back better.
5. Care and checks on the condition of the building towers at regular intervals.

**RESEARCH METHOD AND ANALYSIS**

The analysis of data and information made after and / or concurrent with the implementation of data collection and information. Data and information that is
collected, analyzed and evaluated by observing the related rules. Analysis survey that is conducted by comparing the results of a study literature, discussion, and data collection. From these results can be obtained by the analysis of non-structural mitigation of steeped area in the management of resources for handling the crisis period, especially during emergency response implemented. While the mitigation aspect of structural directed to building resilience in the face of earthquake disaster. From survey’s results will be present an analysis of each region questionnaires as follows:

**Ambon**

Based on respondent’s answer from questionnaires that was submitted, concerning the subject of emergency response conducted in towers located in the city of Ambon, the towers are located in the bay of Ambon and New Oli towers can be concluded that the respondents have limitations in answering affidavit file. This is evident from missed answering of some questions concerning the evacuation and safety fire hazards, cooperation with other disaster relief agencies as well as question about the training that has been held at the towers in the Village Bay of Ambon, the potential for disaster risk are two, namely earthquake and fire building. Land not yet have a certificate of land and the absence of ground testing. Construction of the building began in March 2015 and was completed in February 2016. The function of the flats is true at designated for the Army, Ministry of Public Works Pera project owner, contractor PT. Waskita work, and consultant PT. Bina Karya. Flat development value of Rp. 15 billion and yet have the IMB and the absence of complete data concerning the technical requirements and architecture of the building. The structure of the building was set in tree floors. It doesn’t have data on the structural design in accordance with ISO 2012. At the towers in the Village Hitu, potentially towards building fire disaster. Most of the land does not have a certificate and city planning. Construction of the building began in 2013 and was completed in 2014. The function of the building is intended for students and teachers with a project value reached Rp 5.6 billion. This building has not have the IMB and Feasibility of Building Permits yet own the management of environmental impacts such as waste water disposal arrangements and channels for rainwater. This flat building consists of two floors but they don’t have the soft data on building standards in accordance with ISO 2012. So, from the analysis results that was obtained from the 3rd towers are suggested for the future in the manufacture of disaster mitigation should contain binding regulations and have legal sanction in the framework of development planning and implementation of flats conducted Ministry of Public Works and other developers, especially in disaster prone areas.

**Banda Aceh**

Implementation in Banda Aceh survey was conducted in two locations of flats which was located in the village of Lampulo, Syiah Kuala sub-district and urban village Kendah Gampong, District Kutaraha. It is intended to get a picture about the condition of the apartment in the city of Banda Aceh detaily. The following results of the survey is based on responden answers. Survey analysis performed on flats which are in Sub Kutaraha which was built in 2009 until 2012 with 5 five number floors and has an area of 75 x 16 m². Soil testing in flats have been carried out in 2015. The data of the building, the apartment has had a permit but it didn’t have not a building permit eligibility. From the results of a survey which was conducted on the readiness of the occupants in the face of the risk of earthquakes and tsunami, in which the
manager has procedures required in conditions of emergency response. This is evident from the efforts of a manager/organizer flats to promote distribution of evacuation path apartment dwellers and implement training in 2015. However, the aspects of the provision of means of transport of the building on the state of the response, the building has not provide the necessary facilities such as emergency exit, emergency lighting, unavailability of adequate means of communication, lighting system and signs out targeted. In terms of waste management, the manager / organizer flats have facilitated the apartment dwellers to manage waste properly. So that, these efforts can reduce the risk of fire building. It can be concluded, although the apartment building still has shortcomings in aspects of the provision of facilities to the state of emergency, but the manager / organizer has done it pretty well in terms of preparedness dwellers from disaster.

Manado city
Survey that was implemented in Manado city is only done at locations situated in the Tingkulu Village, Wenang District. The flat in Tingkulu Village was built in 2009. This apartment consists of five floors, but the survey results were not obtained information about the planning of the building structure in accordance with ISO 2012, a special planning earthquake-resistant concrete and steel. This apartment have not land certificates and city planning and the absence of an explanation of the soil test data. So that the building didn’t have a permit and license of eligibility building. The building has been declared according to the functions and supporting facilities, suppose for emergency response, the manager / organizer has provided hydrant, access for disabled and elderly people in emergency situations, as well as the aluminium ventilation emergency stairs. Broadly speaking, it can be seen that the support for fire-fighting equipment was adequate only fire prevention training for residents of apartment have never done. Officer who handled earthquakes, building new declared uninhabitable for two months, so the lack of preparation regarding preparedness facing earthquake hazards, there was only one main staircase and additional ladder unit as many as two units with a width of 1.5 m. In the field of firefighter, the building has had a good waste management system as well as the manager has to provide adequate accessibility for fire rescue, including providing detection and fire alarm systems and smoke control system and hydrant system. But in case of fire emergency, the implementation of a training program for dwellers. In electrical installation terms, lightning rod and communication of the building manager has met the requirements and standard but insufficient at the time of the disaster. It can be concluded that the bunk house has had an emergency response facilities and adequate infrastructure just socialization and education for the residents has not been implemented.

CONCLUSION
(1) Making Disaster Mitigation should contain binding regulations and has legal sanctions in the framework of the planning and execution of construction of flats held the Ministry of Public Works and other developers, especially in disasters prone area (Ambon)
(2) Building of flats still have shortcomings in aspects of the provision of facility to the state of emergency, but the manager / organizer has done it pretty well in terms of disaster preparedness for occupant (Banda Aceh)
(3) Building of flats already have the facility emergency response and adequate infrastructure just socialization and education for the residents has not been implemented (Manado City)

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