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Research article

Intergenerational Tsunami Knowledge Transfer Sixteen Years After the Tsunami in Aceh, Indonesia

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Abstract.

The 2004 earthquake and tsunami left a lot of sorrow in Indonesia, especially in Aceh. It was reported that 127,720 people died and 93,285 people were missing after the tsunami. The total damage and losses reached 41.4 trillion rupiah. One of the reasons for the high number of victims in Aceh was the lack of tsunami information and knowledge transfer. The purpose of this study was to analyze how tsunami knowledge transfer occurs across generations and the extent to which people possess basic knowledge about tsunamis. This study used a mixed-methods design. Surveys and interviews were used as the data collection techniques. There were 300 respondents selected with several criteria, spread from three sub-districts. These sub-districts were chosen based on the level of regional risk from low to high, namely Baiturrahman, Syiah Kuala, and Meuraxa sub-districts. In each sub-district, 100 people were included. The data were analyzed using descriptive methods. The results showed that there was a difference in the mechanism of tsunami knowledge transfer between pre-tsunami and post-tsunami generations. The pre-tsunami generation transferred the tsunami knowledge bidirectionally to contemporaries and the younger generation. The post-tsunami generation transferred the knowledge in one direction, contemporaneously. Lastly, factors that influenced tsunami knowledge transfer were: knowledge, experience, work, and the media.

Keywords: knowledge transfer, tsunami knowledge transfer, mechanism, knowledge transfer mechanism

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1. Introduction

The 2004 earthquake and tsunami left a lot of sorrow for Indonesia, especially Aceh. It was reported that 127,720 people died and 93,285 people were missing. The total damage and losses reached 41.4 trillion rupiah [1,2]. The high death toll is not only caused by the earthquake (9.2 SR) and the devastating tsunami, but also by several factors. One of the factors causing the number of fatalities is the lack of public knowledge regarding to the tsunami [3]. Lack of public knowledge about the tsunami caused by the lack of information obtained and the lack of community motivation to convey the tsunami knowledge [4].

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To increase the tsunami knowledge in the community, one of efforts that need to undertake is transferring the tsunami knowledge [4]. The knowledge transfer focuses on the willingness of individuals in the organization to share the knowledge they experience or create with others [5]. In other words, tsunami knowledge transfer is considered the effort of somebody who has knowledge about tsunami. This action is expected to promote the disaster preparedness to the community, especially tsunami.

The preparedness is a disaster management strategy carried out at the pre-disaster stage when there is a disaster potential. LIPI and UNESCO categorize five parameters of preparedness namely the knowledge of disasters, policies, emergency planning, warning systems and resource mobilization [6]. Based on the parameters, one of the most important things to have tsunami preparedness is increasing the tsunami knowledge capacity of the community [4].

The results of preliminary observations conducted in the sub-districts of Baiturrahman, Meuraxa, and Syiah Kuala (see Figure 1) show that the process of transferring knowledge about tsunami among the community is relatively low due to the lack of direct experience during a tsunami disaster. In this case, the influence of the knowledge and motivation level of local community is presumably the root of the problem. Therefore, there is a need to conduct a research related to the tsunami knowledge transfer with the purpose of investigating the most active and effective generation in transferring the knowledge. The results of this study are expected to be a reference for the government in developing strategies of how to increase public knowledge and to preserve tsunami knowledge from generation to generation.

1.1. The Knowledge Transfer Mechanism

Mechanism is derived from the Greek word *mechane* which means the instrument, load-lifting machine, device, equipment to make something. It is also derived from the word *mechos* which means 'tool' and how to run something [7].

The knowledge transfer is the process of a network member being influenced by the experiences of other members [5], emphasizing the willingness of individuals in the organization to share the knowledge they acquire or create with others [8], a two-way exchange (dyadic) of knowledge organization between a resource person and a recipient [9,10]. Furthermore, the knowledge transfer comes up "when a contributor shares the knowledge applied by an adopter". Specifically, the knowledge is truly transferred when the learning occurs and the recipient comprehends the intricacies and implications and applies the knowledge [10,11]. Nonaka and Takeuchi [12] state
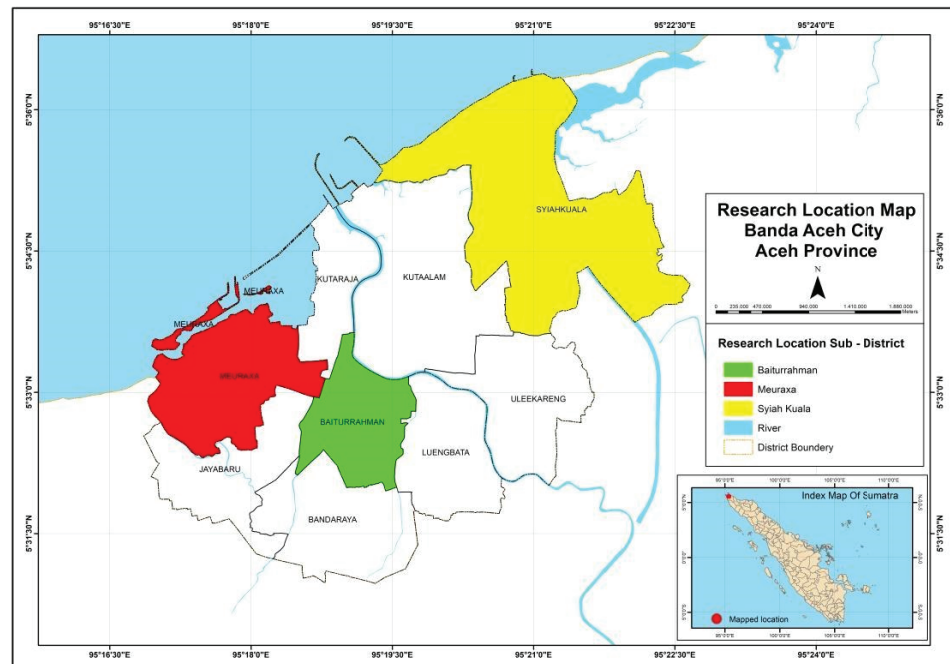
Figure 1: Research Location Map Banda Aceh City Aceh Province.

that the success of business organizations depends on their skills and expertise in knowledge creation. Likewise, in the disaster aspect, the knowledge will continue to exist if the community and the government are able to collaborate to build a culture of awareness in sharing/transferring tsunami knowledge and information.

1.2. Factors Affecting the Knowledge Transfer

According to Wan, et al. [13], there are 10 factors that influence knowledge transfer which are divided into 5 variables, namely the characteristics of knowledge, the characteristics of knowledge sources, the knowledge recipients, the context, and other factors with its own characteristics. The characteristics of knowledge means the nature of a transferred knowledge including the ambiguity and the systematics. The characteristics of the knowledge source is the characteristics of the knowledge owner that regards to the motivation and an ability to transfer the knowledge. The characteristics of the recipient of knowledge recipient refers to the ability to absorb or remember the material presented. The characteristics of context is defined as an unproductive organizational context and difficult relationships. This includes incentive mechanisms, culture, and technical support. Meanwhile the trust and knowledge gap also play a part to be the contributing and influencing factor in the knowledge transfer realm.

The results of Osterloh's research [14] show that motivation within the individual greatly influences the knowledge transfer process. Meanwhile, according to Szulanski [8], the factors that influence the transfer process are:

1. The transferred knowledge: the knowledge is ambiguous or the transferred knowledge cannot be trusted.

2. The source of knowledge: an interest to share is low, the knowledge produced is not trusted by the recipient.

3. The knowledge recipient: a desire to receive knowledge from outside, the low ability to absorb and to store the knowledge

4. The bad relationship between the recipient and the source of knowledge

1.3. Generation Theory

Generation is a group consisting of individuals who have the similar age range and experienced important historical events in the same time period [15]. This implies that there are differences in the characters built if the time span is different. According to Mannheim [16], there are differences in the way of perfectly socialization and communication between generations. The younger generation is more difficult to do this because of the gap between the ideal values taught by the older generation and the reality faced by the younger generation. In addition, a social location also has a great effect on how the individual consciousness is created.

Subsequently, Mannheim elaborates that the individuals who are the part of one generation, are those who have the same birth year in a span of 20 years and are in the same social and historical dimension. The further research by Ryder [17] explores that generation is an aggregate of a group of individuals who experience the same events in the same period of time. The generations are grouped based on the birth year, where each generation has a different character due to the influence of different era and technology [18]. The generations are divided into the following timeframes:

1. Pre-Baby Boom or Generation Veterans (born 1945 and earlier)

2. The Baby Boomers (born 1946 – 1964)

3. Generation X (born 1965 – 1976)

4. Generation Y or Millennial Generation (born 1977 – 1997)

5. Generation Z or iGeneration, or often called Generation Net (born 1998 – 2010)

6. Generation Alpha (born 2010 – 2024)

1.3.1. The 2004 Pre-Tsunami and Post-Tsunami Generation of Aceh

In this study, the generations are simplified into two categories include the generation born before the 2004 tsunami and the generation born after the 2004 tsunami by purpose of research efficiency and time-saving. The ages belong to pre-tsunami generation are 74-17 years old, while those who born in the post-tsunami period are 16-10 years old.

2. Method

2.1. Type of research

This research is conducted by using mixed-method. The type of mixed-method design applied in this study is embedded design which involves more than one data to support another data. Mixed method is considered suitable in this research as the quantitative data, which is a primary data, is insufficient to explain the knowledge transfer in detail. Thus, the qualitative data is needed to complete the data [19].

2.2. Population and samples

The population in this study is the people who live in Baiturrahman, Syiah Kuala and Meuraxa districts. The sample is selected by using the Slovin Formula with a confidence level 90% and an error 10% [19]. The sample chosen in each sub-district is 100 people.

2.3. Data Retrieval Methods

This research obtains the primary data and the secondary data. The primary data is the main source directly attained from the surveys. The survey questionnaires are distributed with the help of several enumerators. The survey was conducted on 300 respondents, in which each region amounted to 100 people. Respondents were selected using purposive sampling technique with several criteria. First, the respondent is in one of the sub-districts where the research is located. Second, the age of the respondent is in accordance with the age categorization that has been determined. The questionnaire

distributed during the survey consists of several questions related to the basic tsunami knowledge in the community and how this knowledge was obtained. In-depth structured interview technique was used during the interview process. This interview process was carried out directly to obtain the qualitative data and more in-depth answers. The questions asked at the time of the interview were the questions developed from the results of the survey results. The respondents who have filled out a survey questionnaire are selected to be the interviewee. In each sub-district, four representatives were selected to be interviewed. The results obtained from the survey and interviews are then combined to get the final results. To complete the data, the secondary data is also needed which are taken from the reference books, journals, and other sources related to research.

2.3.1. Quantitative Data Analysis

The initial data obtained from the survey results are entered into Excel and processed by entering the data from 300 respondents. Furthermore, the data is divided into several categories according to the questions theme in the questionnaire and displayed in a graph. The process of data analysis is carried out through descriptive analysis. The percentage of tsunami knowledge transfer and other findings in each generation are presented through a diagram.

2.3.2. Qualitative Data Analysis

In the process of analyzing the qualitative data, the first step to carry out is transcribing the interview results and grouping the themes (coding). In the process of analysis, the researcher applied the constant comparative method, which refers to the data analysis that is carried out by constantly comparing one data with another data between categories [20].

2.4. Research Instruments

The research instruments used in this study are questionnaire and interview. The questionnaire is a tool to collect the quantitative data. Other than questionnaire, the qualitative data are collected through the interview which consists of key questions to enrich and complete the data. The key questions are questions that are compiled based on the questionnaire results, which is also used as an interview guide. The key

question addresses in detail how the respondents got the tsunami knowledge, the reason of choosing the knowledge transfer method, and their tsunami experience (if any).

3. Result and Discussion

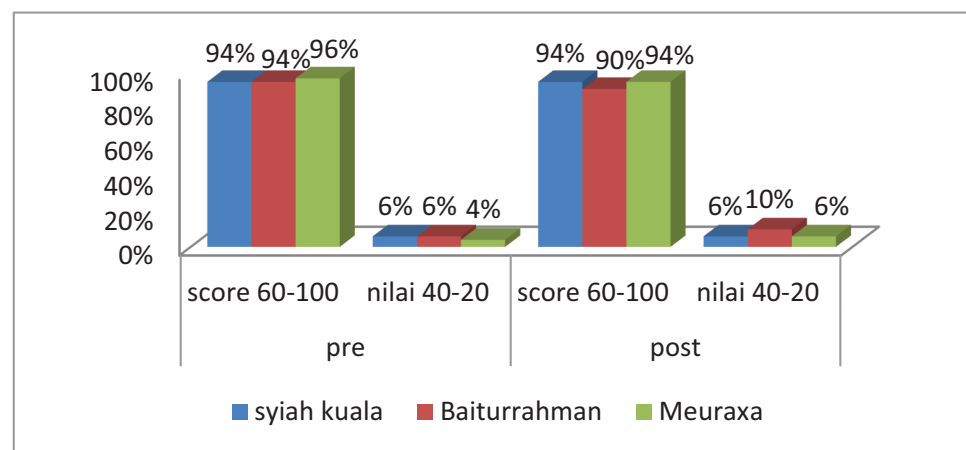## 3.1. Basic Level of Tsunami Knowledge in the Community

Figure 2

Based on the percentage, the weight value of each generation in each sub-district indicates that the level of basic tsunami knowledge of the community is classified very good.

3.2. Intergenerational Tsunami Knowledge Transfer After 16 Years of the Aceh Tsunami

1. Source of Knowledge

2. Tsunami Experience

The Figure 3 reports the varying results of the respondents who experienced the tsunami. The respondents who belong to the pre-tsunami generation experienced more tsunamis than those who born after tsunami. From the graph, it is noticed that the higher tsunami risk (red zone), the percentage of respondents who encounter the tsunami is also higher.

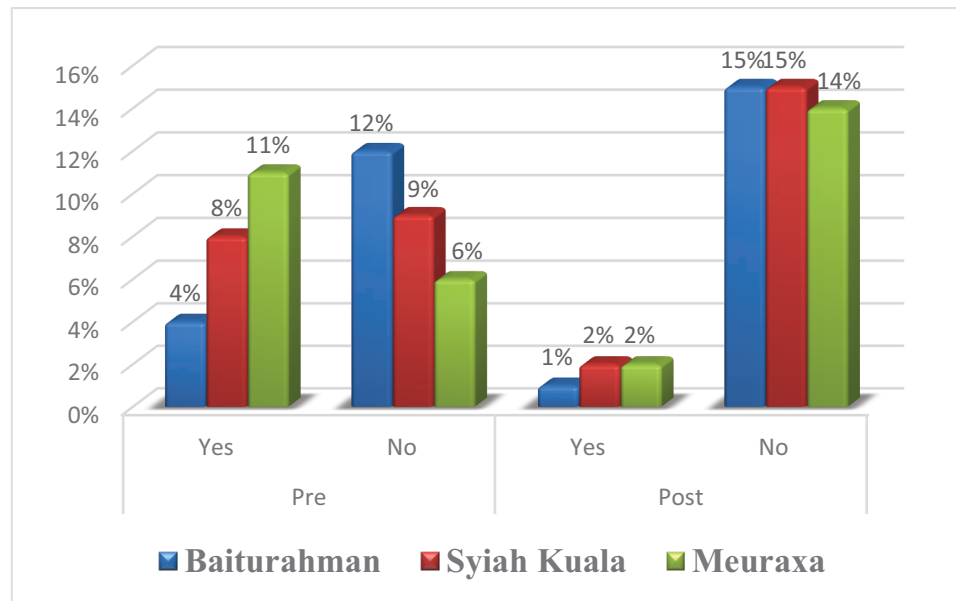1. Tsunami Information Availability Before and After the 2004 Tsunami

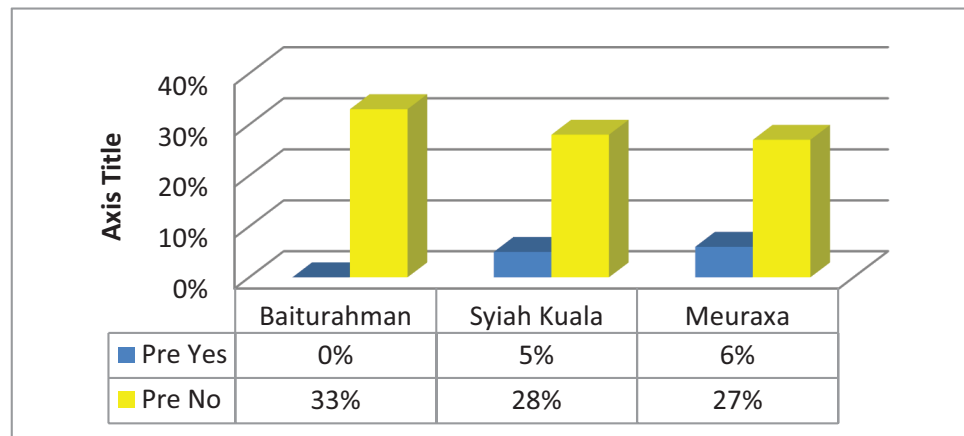**Figure** 3: People who experienced the tsunami.

Figure 4: Informs that in each sub-district, the media such as television and parents a.

From the graph 4 and 5, it shows that before 2004, the tsunami disaster information is not well spread. In fact, the 2004 tsunami was not the first tsunami attack in Aceh. Nevertheless, the tsunami information is not properly absorbed by the community which cause the excessive death toll in 2004 tsunami. After the 2004 tsunami, almost all of respondents from Baiturrahman, Syiah Kuala, and Meuraxa sub-districts receive the tsunami information. However, the tsunami information remains unfamiliar only for 2% of the pre-tsunami generation and 4% of the post-tsunami generation in Syiah Kuala sub-district.

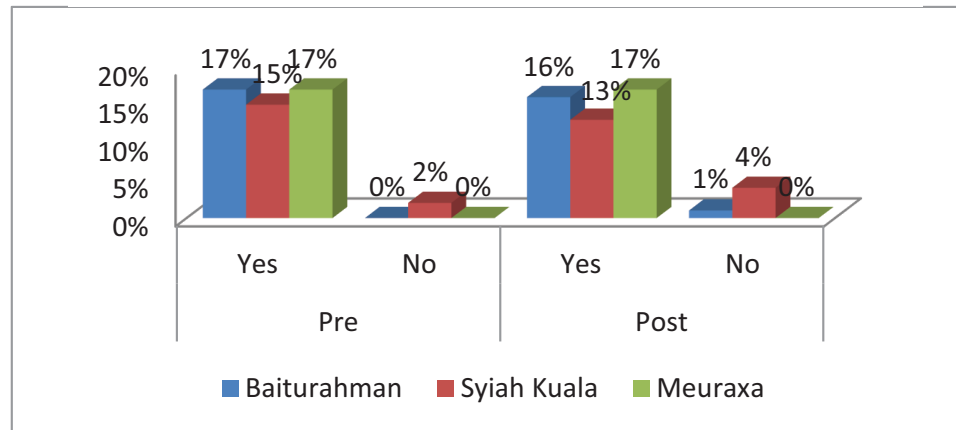1. Types of Information Source used After the 2004 Tsunami

Figure 5: Post-tsunami generation respondents who heard the tsunami information after 2004 tsunami.
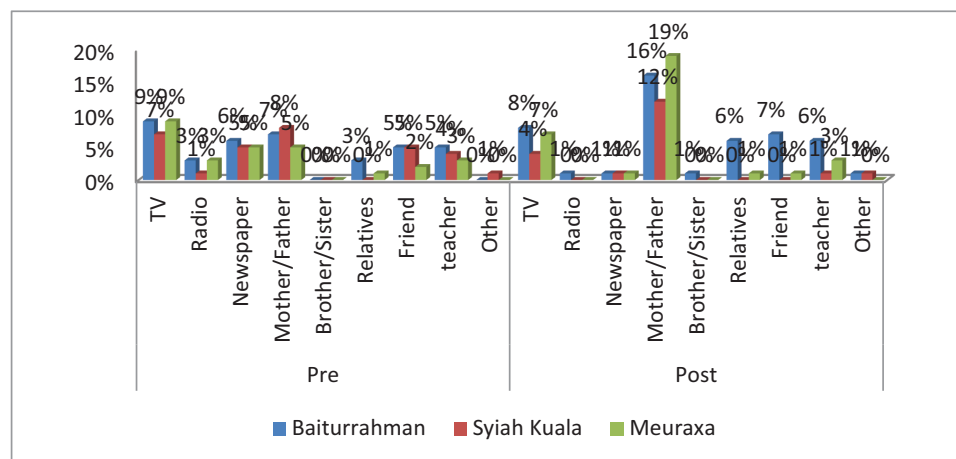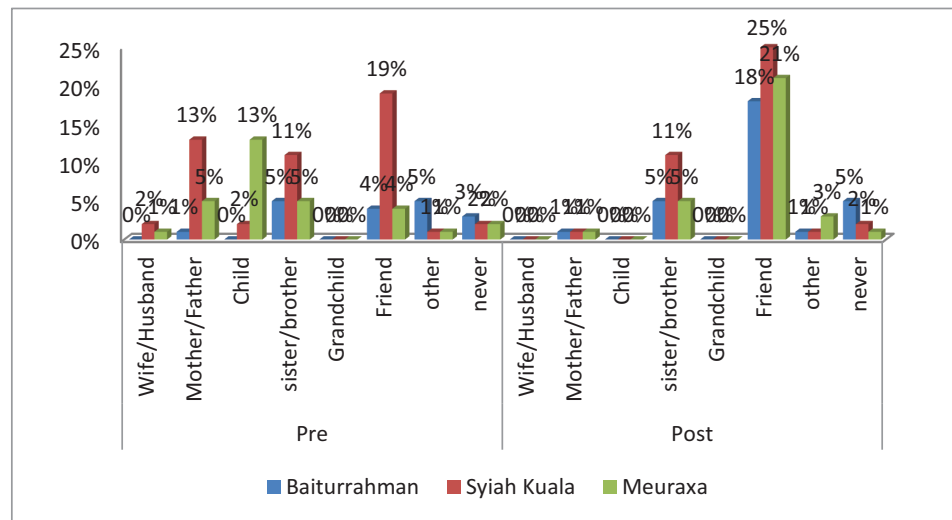

Figure 6

The Figure 6 two sources of tsunami information that the pre-tsunami 2004 respondents frequently receive. Meanwhile, the generation born after 2004 tsunami gain the tsunami knowledge/information only from their parents.

3.3. The Knowledge Transfer to Society After 16 Years of the Aceh Tsunami

3.4. Tsunami Knowledge Transfer to the Generation Born before the 2004 tsunami

The sources of knowledge in the generation born before the 2004 tsunami are obtained through the media facilities such as television, newspapers, magazines/tabloids and radio. The news or information obtained from the media is then shared to the next generation through various ways such as storytelling, social media, educational institutions, cultural arts, articles.

Figure 7: the graph presents the differences between the generations born before and after the tsunami. The pre-tsunami generation more often deliver the tsunami knowledge to parents, children and friends. While for the post-tsunami generation, the knowledge is often shared to their siblings and peers.
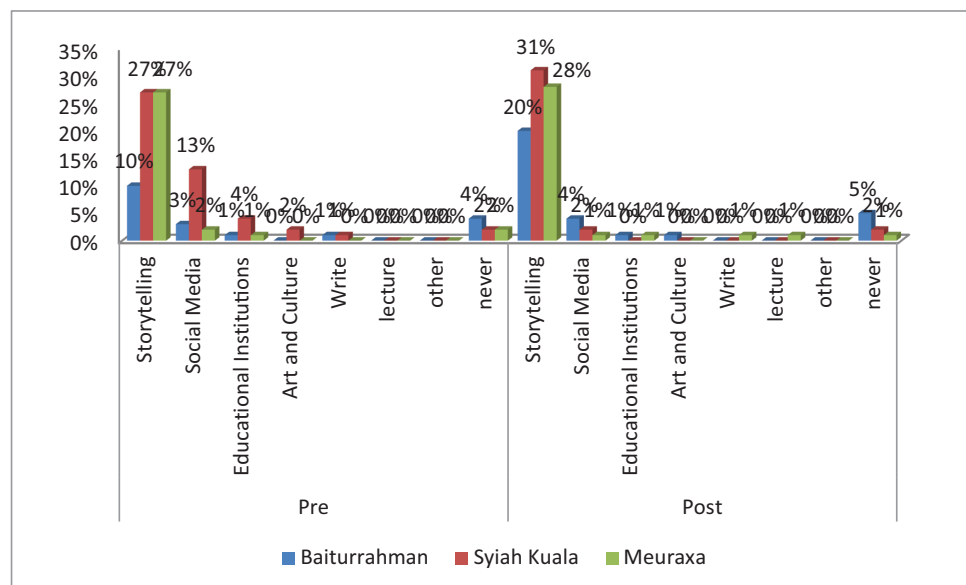
Figure 8: The way of respondents disseminates the tsunami knowledge to acceptors.
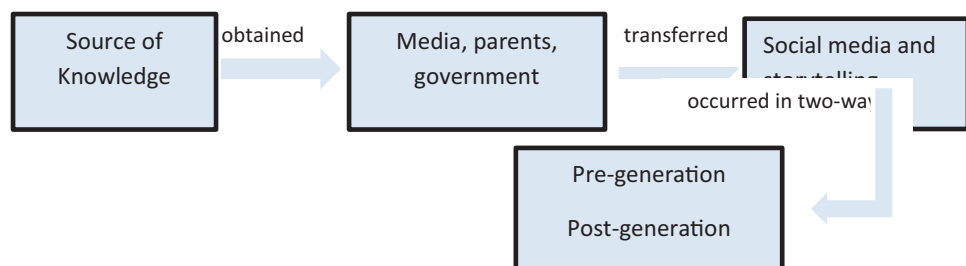
Figure 9: The Flow **of** Knowledge transfer of 2004 Pre-tsunami.

Besides, the pre-tsunami generation in the three sub-districts with the red, yellow and green zone, is reported mostly using the storytelling method in transferring the tsunami knowledge.

In the same vein, the research conducted by Carla O'Dell in Tobing [21] investigates that 80% of knowledge is gained by the tacit knowledge. While the explicit knowledge is only 20% of knowledge. On account of this, conveying the knowledge through storytelling is considered the easiest way to take since the individual experience is also included, with purpose to make the story trustworthy and be able to motivate the others in gaining the knowledge. Regarding to the source of knowledge, the media facilities are used over 50 percent which is noted as the most important knowledge source.

In transferring the knowledge, the 2004 pre-tsunami generation tends to use two-ways transferring. Two-ways means the knowledge is transferred to the fellow genera-tions and to the next generation. This generation conveys plentiful tsunami knowledge to friends, children, and parents. The International Business Machines Corporation and the American Society of Training and Development also revealed that 60% of respondents used a mentor (a person who conveys information) as a method of knowl-edge transfer. The results of this study also noted that the most effective way to share knowledge is by having a direct meeting or direct relationship between the knowledge giver and the knowledge recipient so that the experience and knowledge transfer is facilitated. The estimate of the respondents' frequency level in providing information to others is categorized into 'sometimes'. This 'sometimes' means the 2004 pre-tsunami generation occasionally shares the tsunami information or narrate the tsunami chronology. However, this point is presumably equitable due to the impossibility to repeatedly raise the history issues unless the community or the person is assigned or authorized to socialize the information of 2004 tsunami history.

3.5. Tsunami Knowledge Transfer to the 2004 Post-Tsunami

The post-tsunami generation (starting from 16 age of years until now) has the differences in the mechanism of knowledge transfer. They have the sources of information from various ways include parents, schools, friends, social media and or the tsunami trainings arranged by government and non-government. This generation gains the tsunami information/knowledge from their parents and the media. This denotes that there is a convenience in sharing information through the family sphere due to some factors

include relationship factors, family ties, and high trust [22]. On top of that, the 2004 post-tsunami generation lives in the digitalization era which the information as the tsunami disaster history is accessible and provided in any social media platform.

All in all, the tsunami knowledge/information obtained is transferred in one-way. One-way signifies that the knowledge is only passed to the same generation or the generation born after the tsunami. The most method used in transferring the tsunami knowledge is narrating. This method is also accordant with the way of 2004 pre-tsunami transferring the knowledge. Meanwhile, in the three research areas, there is no difference between the green, yellow, and red zones.

4. Conclusion

Based on the research conducted, it is concluded that those respondents who belong to pre-tsunami generation acquire the knowledge from the media and parents. The knowledge is then transferred by spreading it through the social media and storytelling. This tsunami knowledge is transferred in two-ways, which are the fellow generation and the post-tsunami 2004 generation. This knowledge is more often transferred to friends, children, parents, and siblings. Meanwhile, the source of knowledge absorbed by the respondent from the post-tsunami generation is also media and parents, then the transferring process is undertaken by telling stories. However, the mechanism of tsunami knowledge transfer occurs only in one-way, which is the fellow generations after the 2004 tsunami.

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