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Research Article

The Impact of Tsunami and Liquefaction on Traditional Marketers in Central Sulawesi Indonesia

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Abstract

This study discusses the changes of traditional merchant's incomes before and after the earthquake and tsunami disaster in Central Sulawesi, especially in the three regencies affected by the natural disasters. The method used in this research is mixed method. Data were obtained through observation, interviews, and questionnaires. The quetionaires were distributed to the traditional marketers in the traditional markets within three regencies affected by the natural disasters. The results of this study indicate that there are significant differences in the economic activity and income of traditional marketers before and after the earthquake and tsunami that occurred in Central Sulawesi on 28 September 2018. Although the economic and supporting infrastructure has improved, economic activity and income are still declining and have not recovered when this study was conducted. This phenomenon was caused by the lack of supplies of natural resources to the traditional markets within the affected areas. Although the economic infrastructure has recovered, agriculture and animal husbandry have not yet recovered. Besides that, the psychology of merchants who are still traumatized has also hampered the economic recovery of the traditional merchants. We conclude that the restoration of economic infrastructure alone is not enough to restore the economic activities of traditional merchants. However, it is necessary to take psychological and social corrective actions for the traditional merchants to help them be more active in trading again to recover their income.

Keywords

Traditional marketers, tsunami, liquefaction, traditional markets, natural disaster

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Introduction

On 28 September 2018, there was an earthquake with a magnitude of 7.5 in Central Sulawesi, with the epicenter near the provincial capital, Palu. The earthquake triggered a tsunami that hit the coastal areas of Palu and Donggala Regency, which was followed by liquefaction and landslides. As a result, more than 2000 victims were lost, people were left homeless, and there was significant economic damage in Sigi and Palu and the districts of Donggala and Parigi Moutong (Yulianto, Utari, & Satyawan, 2020). The disaster affected agricultural land, irrigation systems, fisheries, horticulture, and markets. After the earthquake, many markets were closed, and some returned to operations at only 50 percent capacity (Yulianto et al., 2021). Road conditions Poor infrastructure, damaged infrastructure, and unavailability of transport impede access to markets in most locations. The Indonesia National Disaster Management Agency (BNPB) estimates the total material damage to reach 910 million dollars (US$)1 (Syifa, Kadavi, & Lee, 2019).In that year, Indonesia experienced 1999 natural disasters. This data will continue to increase until the end of 2018 in the form of floods, landslides, earthquakes, tsunamis, liquefaction, volcanic eruptions, droughts, forest and land fires, nipples pickaxes, and extreme weather, and more (Irawati, Siminto, & Supriatnaningsih, 2021).The earthquake damaged various public facilities ranging from government offices, educational buildings, markets, and shopping centers in Palu. The magnitude of the tsunami waves, as high as 10 meters, had killed more than two thousand people along the bay coast of Palu City. In addition, many economic infrastructures were damaged, such as markets, roads, bridges, and small and medium enterprises. As a result, economic activities, especially traditional merchants in Palu City, were greatly affected. For example, there was absolutely no activity at the traditional market during the first month because the transportation of goods had stopped due to damaged roads and bridges.

After two years after the earthquake and tsunami, the government has repaired the infrastructure. However, several economic indicators such as the supply of goods and services have not returned to the way they were before the earthquake and tsunami. Some experts say that there are still differences in the income and activities of traditional merchants between before and after the earthquake and tsunami (Fatimah & Roberts, 2019). However, until now, there is no valid data related to traditional merchants' economic activity and income in Palu City. The absence of data on economic activity and income of traditional merchants can hinder people's economic development, which is the main support for the economy in traditional markets. Besides, the absence of such data also weakens our understanding of the effects of earthquakes and liquefaction natural disasters on the economy of traditional merchants.

For this reason, this study examines the impact of the 2018 earthquake and liquefaction natural disaster on traditional merchants' economic activities and income in Palu. This study aims to provide data to the government and academics regarding how earthquake and liquefaction natural disasters affect traditional markets. Another objective is to contribute to the lack of knowledge about the effects of earthquakes and liquefaction natural disasters on the economy of the poor.

Relevant Studies

Some studies related to natural disaster impact on business have been carried out. The studies include research on the excesses of natural disasters that occurred in Indonesia caused by different types of natural disasters. Therefore, understanding previous studies could help us in understanding our problem and highlight new insights from our case study. Also, it is considered important to describe previous studies as a comparison and reference material for the implementation of this research properly.

Qayyim Asy'ari conducted research on the Socio-Economic Impact of Post-Disaster in Pamekasan Regency (Asy'ari, 2018). The study found that the Pamekasan district was severely affected by disasters, including floods, droughts, landslides, extreme weather, and coastal abrasion. The study recommended overcoming the impact of disasters in which the community should be given mitigation education on natural disasters and given the expertise to be physically and psychologically prepared to overcome all possibilities that will occur after the disaster. Economic recovery mitigation was implemented in coordination with government and private stakeholders (Nurdin, 2018; Nurdin, Stockdale, & Scheepers, 2014). As a result, the effect of the disaster was minimalized due to the quick recovery in economic infrastructures.

Meanwhile, Artiani (2015) conducted a study on the impact of natural disasters on macroeconomic in Yogyakarta (Artiani, 2015). The study found that policymakers responded to the impact of the natural disasters on the province's macroeconomic by providing a holistic analysis of the effects in early post-recovery programs. The local government encourages faster interaction between local businesses and national companies, and other business entities. As such, the macroeconomic impacts were minimal. Local business entities were able to recover in a short time. Local small enterprises were also recovered faster due to macroeconomic improvement.

Furthermore, Coffman and Noy (2011) conducted a study to understand the impact of Hurricane Iniki on the long-term economic recovery. The study used synthetic control methods for comparative case studies. The study found the long-term impacts of a 1992 hurricane on the Hawaiian island of Kauai on the economy. Hurricane Iniki caused a US$ 7.4 billion loss, and the economy has yet to recover after 18 years of the disaster. Aggregate personal income and the number of private-sector jobs are proportionally lower increased in the period of recovery. Another study conducted by Noy and Vu (2010) found the impact of natural disasters on annual output growth in Vietnam. They used provincial data for primary and secondary businesses and employed the Blundell–Bond General Method of Moments approach to predict the impact of natural disasters on the country's macro economy. They also found that more deadly disasters result in lower output growth but that disasters that destroy more property and capital appear to boost the economy in the short run. They also found that disasters have a different macroeconomic impact in other geographical regions; these differences are potentially related to generating transfers from the Vietnamese central government.

A further study (2011) to understand the impact of disasters on the Indonesian economy conducted by Supriyatna (2011) used the Socio-Economic Balance System (SNSE) approach. The background of the research was the earthquake and tsunami in Aceh in 2004 and the earthquake in Yogyakarta, and the Lapindo mudflow in Sidoarjo. The study found that the number of lost and damaged production assets due to the direct impact of the disaster in the financial, leasing, and corporate services sector was 6.4 trillion, the fisheries sector of 3.7 trillion, the agricultural sector of 1 .9 trillion in trade, hotels and restaurants at 0.1 trillion and the spinning, textile, clothing, and leather sector at 2.53 billion as a shock to the balance sheet multiplier matrix.

The results of the analysis of the study indicate that the disaster has an impact on the decline in output which is relatively large for the fisheries sector by 4.58% and the financial and leasing sector and company services by 2.3%. The decrease in labor absorption is relatively larger for farm laborers in the city by 1.89%. The decrease in income was relatively large for the households of the farmer entrepreneurs by 0.81% and the households of the farmworkers by 0.8%. Meanwhile, companies experienced a decrease in revenue by 0.69%, and the government experienced a decrease in state revenues by 0.47%, as well as a decline in the Indonesian economy as seen by the difference of -0.7% between GDP in the event of a disaster and GDP if there was no disaster.

Finally, a study conducted by Manik (2018) described the impact of community income after the natural disaster at the Dua Warna Sibolangit Waterfall, North Sumatra. The study found a change in the percentage of people's income before and after natural disasters. This study indicates that the highest rate of reduction in people's income after the natural disaster. The reductions of income were most experienced by lower-income and middle-class communities. The causes of income reduction were due to the lost business infrastructures and the decline in communities demand.

Methodology

This study employed a survey technique Vaus (2013) to understand the impact of natural disasters on traditional marketers. We also used secondary data from various sources to obtain market conditions, identify market interest, and map supply chains and trade flows before and after the natural disaster (Bodamaev & Fatmaningrum, 2018). Existing price monitoring data for the market in Palu was used to understand the current price situation and serve as a basis for comparison with results from the field. Primary data was collected from merchants, key informants, and market conditions (Boso, Story, & Cadogan, 2013; Nurdin, Pettalongi, & Ahsan, 2019). There are two survey questionnaires given to respondents, namely a questionnaire for merchant and key informants. A structured questionnaire Carlsson et al. (1998) was administered to selected retailers and wholesalers to obtain information about the market structure at the survey sites. This included the availability and supply of food in the market. In each market, seven questionnaires were

distributed to merchants (three for wholesalers, two for grocery retailers, one for retailers selling fuel, and one for building materials stores). Two key informants (head/deputy market head or community representative/community leader) were also interviewed in each market surveyed. Direct observations were also carried out in each market surveyed to enrich the data collected from the merchants and key informants (Marzuki & Nurdin, 2020; Modell, 2005). Interviews and discussions were also conducted with the Central Sulawesi provincial government from the Industry and Trade Office, Agency for Logistics, the Social Service, the Fisheries and Marine Service, and the Plantation and Livestock Service. The survey was conducted in 23 main markets in the four affected districts.

Results and Discussion

Market and Trader Characteristics

There were 91 markets in three affected regencies which eleven of them were located in Palu, 53 markets were located in Donggala, and 27 markets were located in Sigi. The tsunami, earthquake, and liquefaction disasters impacted the functioning of those markets. After the disaster, most of the markets stopped operation. The natural disasters completely destroyed two market locations in Wani and Ulujadi districts. More than 100 merchants in each market moved to other markets locations to sell their products or even shut down their businesses. Communities around the Talise market in Palu city also stated that they had to buy the commodities they needed from markets outside the regencies because their nearest market had stopped operating. One and a half months after the disaster, most markets began to recover with the increasing presence of retail and wholesale merchants and the availability of various food and non-food commodities. Of the 22 markets surveyed in Palu, Sigi, and Donggala regencies, only seven markets operate daily, while 16 others (70 percent) were open once or twice a week. Our findings also revealed that traditional retail merchants generally dominated the smaller markets in the district with few wholesalers. About 49 percent of merchants sell goods in open-air stalls, while 26 percent are sold in shops. One-fifth of merchants reported that their trading location had changed since the disaster. The results of observations at several traditional markets also revealed that the condition of the main buildings in the market was unsafe, and merchants decided to trade outside of the market area. Sigi Regency has the largest number of merchants moving from place to place. Traditional merchants in open-air stalls generally do not have their own place to trade.

Availability of Food and Non-Food Commodities in the Market

The market survey aims to check the availability of basic food commodities (rice, chicken, eggs, cooking oil, and beef), fuel, and building materials in the selected traditional markets. Data on the availability of the commodities in each market according to their location and markets have significantly decreased availability compared to before the disasters.

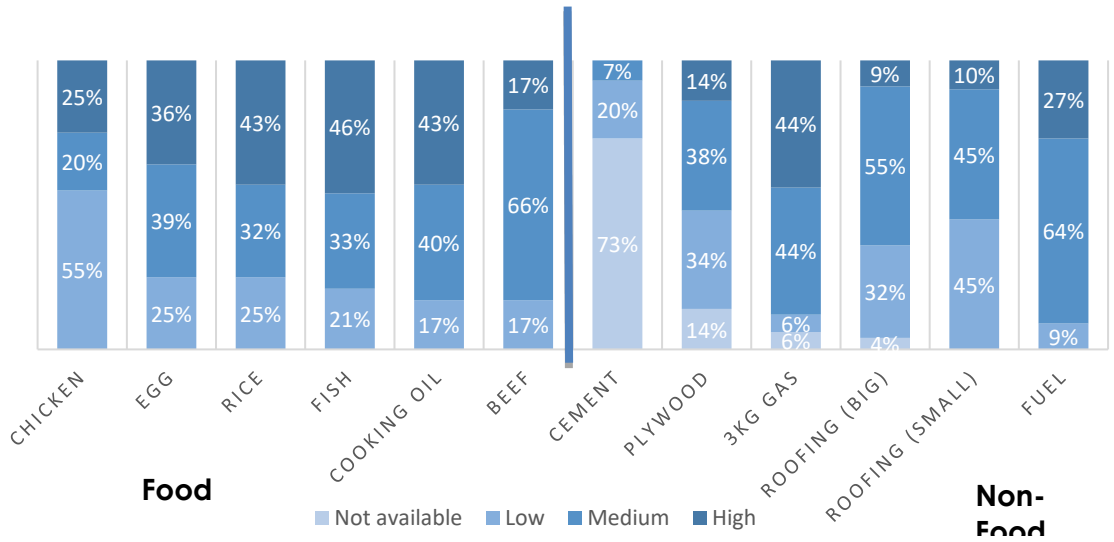
Availability of Food Commodities

Overall, markets in the four affected districts have adequate supplies of basic food and non-food commodities. The increasing number of retail and wholesale merchants over the past month and their ability to respond to food and non-food demand indicates a fairly good rate of market recovery. In general, staple goods originating from within the province or imported from outside the province are widely available in the markets surveyed in the four affected districts. It indicates that supply disruptions after natural disasters can be overcome within a period of approximately one month. When collecting data, traditional merchants stated changes in the availability of several staple food commodities in the market. From observations in the surveyed markets, beef is only available in six of the 23 markets surveyed due to low demand from low-income households. As many as 55 percent of traditional merchants also reported a decrease in the availability of chicken due to limited supply. This was due to the impact of the disaster, which greatly affected poultry infrastructure and a significant decrease in investment. For other staple foods (long beans, fruits and vegetables, green beans, kidney beans, sweet potatoes, and cassava), almost 90 percent of key informants stated that these foodstuffs were available in the market in sufficient quantities.

The availability of non-food products

In addition to basic food commodities, the availability of building materials is also seen as it relates to the reconstruction and rehabilitation of buildings and infrastructure affected by the disaster. The survey results reveal that cement is not readily available in most markets, mostly in Palu and Donggala. More than 70 percent of interviewed merchants reported very limited cement stocks (Bodamaev & Fatmaningrum, 2018). In general, building materials also had lower availability than before the earthquake, as reported by more than 30 percent of traditional merchants in Figure 1.

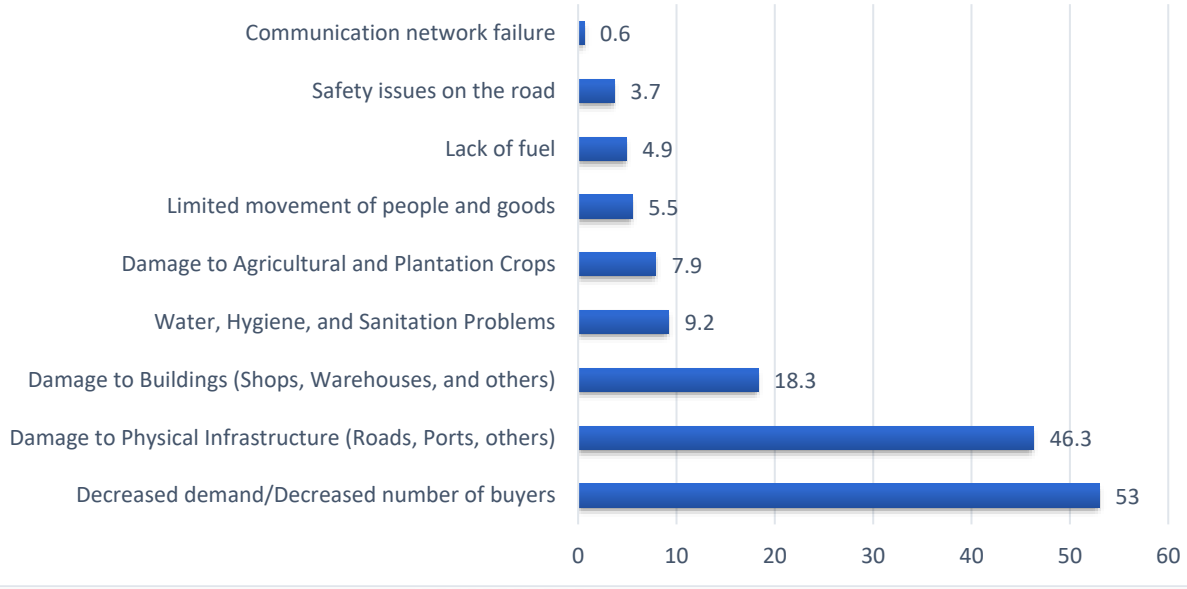
Figure 1. Current Availability Of Food And Non-food Commodities (Compared to Before the Disaster



Barriers to Trading

This survey explores the main obstacles faced by traditional merchants. The impact of the barriers disclosed by merchants was further measured by the very severe, severe, and not severe categories. The main obstacles reported by traditional merchants related to a decrease in demand decreased the number of buyers and damaged public infrastructure. A total of 87 traditional merchants (53 percent) reported that reducing the number of buyers was a significant challenge, and 55 percent of traditional merchants categorized this as a severe obstacle. The highest number of respondents who experienced this significant obstacle was in Palu city. This is due to the high level of displacement and the low purchasing power of the people. The next obstacle to trading activity was damaged public infrastructure, as 46 percent of traditional merchants were admitted in Sigi regency and Palu city (Bodamaev & Fatmaningrum, 2018). Figure 2 below shows traditional merchants' opinions on the barrier to trade.

Figure 2. Barriers for Merchant Activities

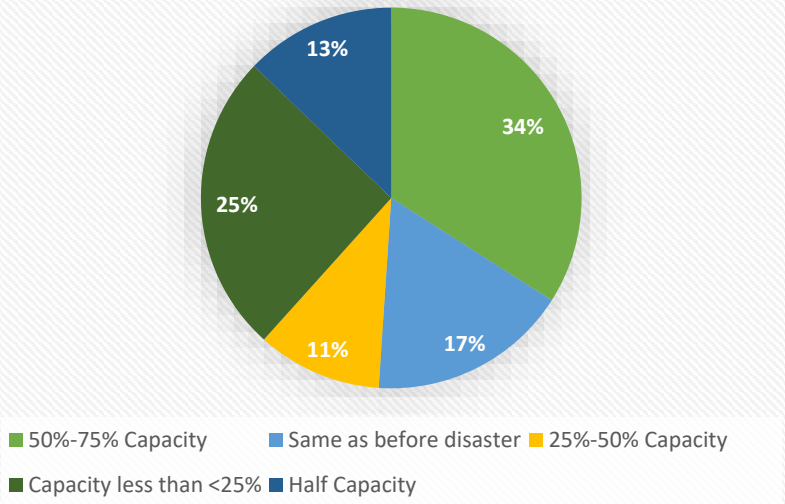


Regarding the impact of the disaster on the market, around 75 percent of traditional marketers stated that the earthquake caused the market to be partially damaged. In comparison, 6 percent of key informants stated that the market was totally or completely damaged.

Markets respond capacity

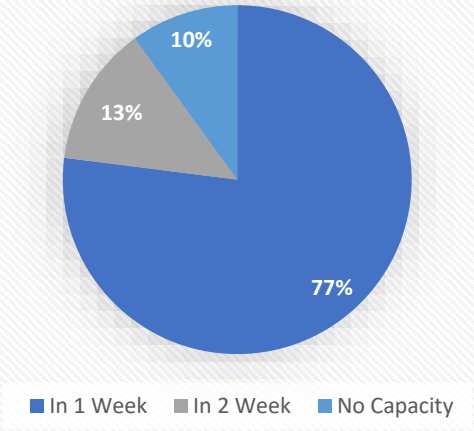
The market response capacity was analyzed to ascertain how the market responds to the gradually increasing demand from refugees returning to their place of origin. In addition, to identify the challenges of expanding sales and response capacity, the survey also looked at the main obstacles that prevent traditional marketers from doubling sales volume in the market, including lack of capital (55 percent), lack of demand for traded goods (47 percent), and limited supply (37 percent). Most of the traditional marketers who mentioned a lack of capital were in Sigi (45 percent), followed by Palu (30 percent). Lack of demand or decline in customers remains the main obstacle to double their sales volume for traditional marketers in Palu city. A total of 76 traditional marketers surveyed reported the obstacle as a significant challenge. There was a significant decrease in the number of traditional marketers in the 23 markets surveyed. This was especially true in the larger markets, with more than 75 traditional marketers were active in the market before the earthquake. Twenty-two percent of the traditional marketers surveyed reported that merchants had decreased since the earthquake occurred. Around 81 percent of respondents confirmed that the number of merchants in the traditional market had decreased, mostly in Sigi regency and Palu city. Around 11 percent of other respondents stated that the number of merchants remained the same as before the earthquake, and 8 percent stated that the number of merchants increased. This was due to the movement of customers and merchants after the natural disaster. Figure 3 below shows merchant delivery capacity.

Figure 3. Merchant Delivery Capacity (compared to pre-disaster)



Seventeen percent of key respondents reported that market capacity was the same as before the earthquake. In comparison, 47 percent of key informants interviewed reported that the market was functioning at half capacity. Within 1-1.5 months after the earthquake, most merchants were able to maintain adequate levels of product availability and were confident that they had the capacity to increase up to a quarter of the volume of their current sales (Figure 9).In terms of delivery capacity, 43 percent of merchants stated that their shipping capacity was more than 75 percent of the total capacity. Another 15 percent of marketers stated that they were operating at a lower rate than before; 26 percent of marketers said they deliver less than half the volume of goods compared previously. Figure 4 below shows marketers' capacity to increase demand.

Figure 4. Merchant Capacity to Meet 25% Increase in Demand

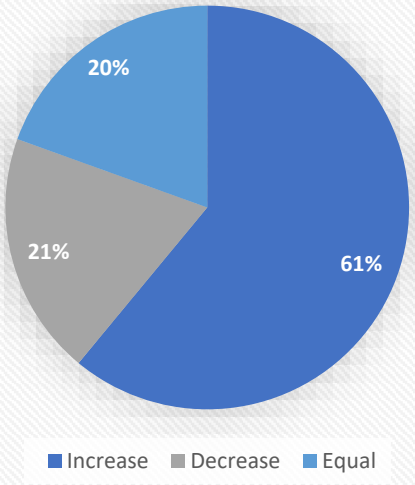


When the demand was increased by 25 percent or more, 77 percent of merchants said that they could deliver sufficient quantities of goods within one week, while 13 percent believed they would meet all demands again. Their supply was within two weeks or a month. The ability to respond to market demands might be affected by family ownership and traditional marketers' positioning to capture opportunities for business recovery after a natural disaster (Salvato et al., 2020). Following the natural disasters, traditional marketers' families performed better than non-family firms, especially when multiple family members were involved as owners. This study also found that women's roles in the traditional markets also increase the traditional marketer's resilience (Nurdin & Handayani, 2021).

Sales Volume

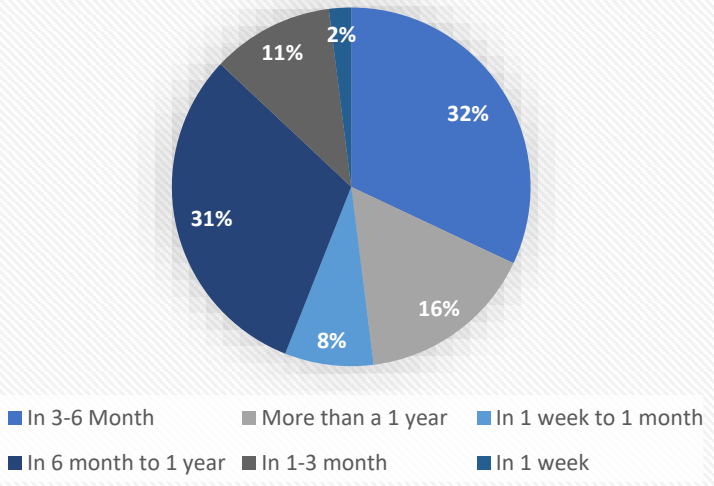
Specific questions about sales volume were intended to identify changes and the estimated recovery time after the earthquake. Sixty-one percent of the traditional marketers reported a decrease in sales volume after the earthquake, while the rest reported no change or increase in sales volume. Among traditional marketers reporting a decline in sales, 49 percent of them showed a decline in 21-49 percent value, while 26 percent of them reported a decline of more than 50 percent (see figure 5). Sales volumes decreased significantly in Palu city, and Sigi regency was 40 percent, and 34 percent of traditional marketers in the two areas reported a decline in sales, respectively. About 46 percent of the traditional marketers who reported a drop in sales reported 50 percent of their sales reduction. While demand for staple food commodities has declined in most markets in the three districts, while 19 percent of traditional marketers reported sales remained the same as before the earthquake or an increase.

Figure 5. Changes in Sales Volume (Compared to pre-disaster)



Regarding the forecast of how long the sales volume will reach the average level, 32 percent of traditional marketers said that it would take three to six months, while another 31 percent of traditional marketers expected to recover to pre-earthquake capacity in six to twelve months (see figure 6) below. The disruptions in product sales after natural disasters have been found in previous studies. For example, Todo, Nakajima, and Matous (2015) found that the supply chain in Japan was returned to normal rates in the half-year period after the Great East Japan Earthquake.

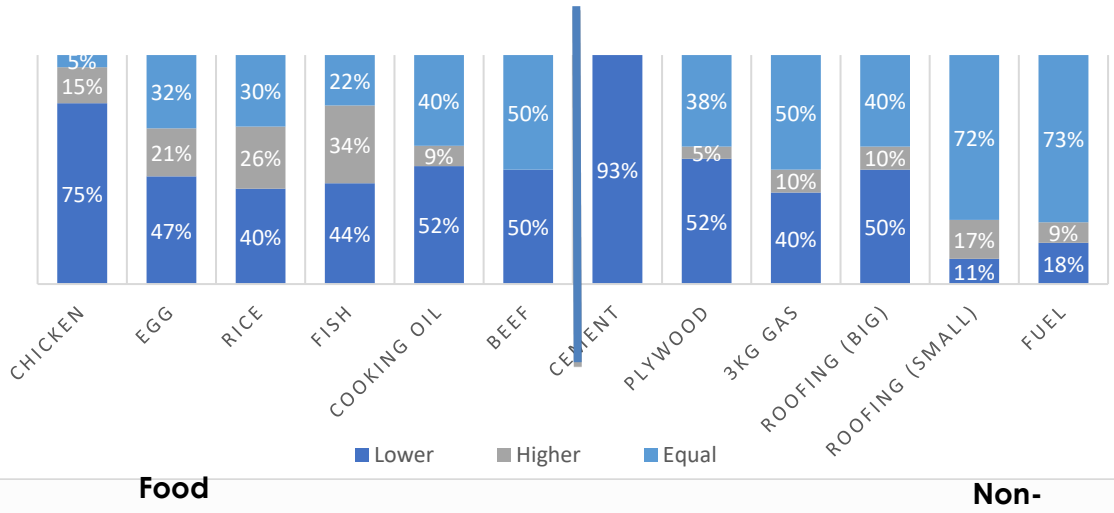
Figure 6. Estimated Time For Sales Recovery To Normal



Market Stock

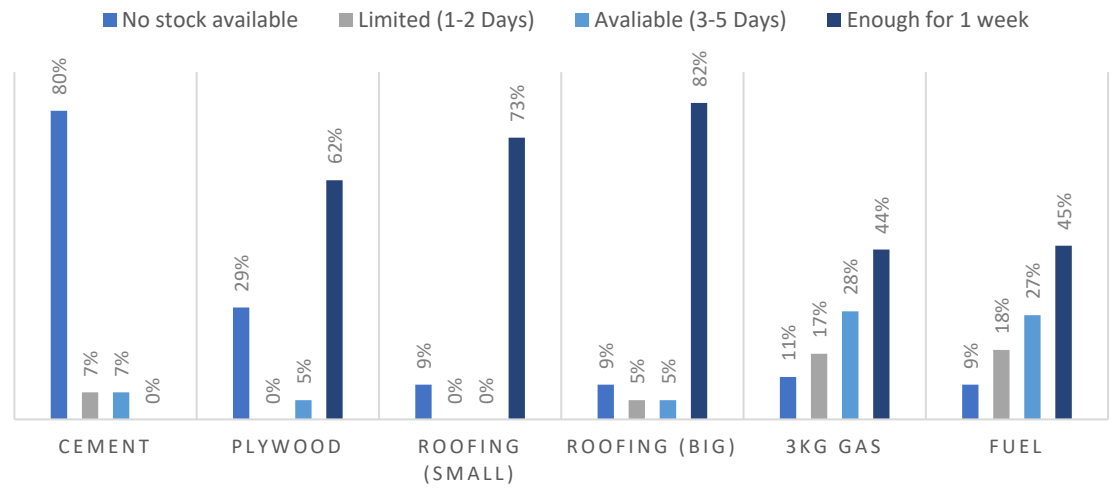
Most of the traditional marketers reported that they had sufficient supplies to meet consumer demand. After the earthquake, 40 percent of the traditional marketers stated that stock was reduced. However, the improvement of road access and transportation services 2-3 weeks after the disaster allowed traditional marketers to deliver the supplies needed to meet the existing demand. About 22 percent of traditional marketers indicated that they ran out of stock only once after the earthquake occurred. Regarding stock availability, although most traditional marketers stated that they had sufficient stock to meet existing demand during data collection, 75 percent of the traditional marketers reported that their current chicken stock was lower than before the disaster, followed by cooking oil (52 percent) and eggs (47 percent). Most of the traditional marketers were confident that they would have sufficient stock for at least a week for other staple food commodities. About 96 percent of the traditional marketers also indicated that they had sufficient rice supplies, 69 percent said they had sufficient cooking oil supplies, and 46 percent stated that they had sufficient supplies of eggs for one week. Figure 7 below shows the availability of food and non-food commodities after the disasters.

Figure 7. Current Availability of Food and Non-food Commodities (Compared to Before the Disaster)



Regarding current stock levels compared to pre-earthquake, 93 percent of traditional marketers reported that cement stocks decreased significantly (see figure 8 below).

Figure 8. Stock Availability to Meet Demand for Building Materials and Fuel



Stocks of other building materials were also experienced similar, with approximately 40 percent of traditional marketers reported lower levels than before the earthquake. This is in contrast to commodities such as 3 kg gas cylinders and gasoline, which still had the same amount of stock compared to before the earthquake. Meanwhile, 80 percent of traditional marketers said that they did not have enough semen for the next few days. Hoogezand (2013) argues that the availability of food and non-food after natural disasters depends on government protection and collective action taken by the government and private business entities.

Access to Market

Access to the traditional market was found a significant challenge for traditional marketers after the natural disasters hit the regencies. Limitation access to the market was caused by the damage of transportation infrastructures such as roads and bridges. Traditional harbors were also demanded by the tsunami. The harbors were used to deliver agricultural products from remote islands to city markets. Previous studies (e.g.Haddad & Teixeira, 2015; Rus, Kilar, & Koren, 2018) found that the loss of transportation infrastructures produce damages that cross the city boundaries, affecting income and output in the metropolitan area as well as in other parts of the state and the country. Similarly, the damage of transportation infrastructures has contained product delivery and distribution across the traditional markets in the two regencies and one city. The impacts of the transportation infrastructures lost have caused the traditional marketers to take alternative routes to deliver their products. The alternative routes were much faster compared to the usual routes used before the disasters. Most traditional marketers and customers admitted that they had to travel longer to deliver their market products, which increased transportation costs, reducing their income. More than half of the traditional marketers had to travel more than ten kilometers by walk or horse-drawn carriage to access the city markets.

Since most of the traditional marketers were women, the distance access to markets had also caused psychological and sociological problems to the traditional marketers. In some areas of the impacted districts, women were mentioned as the main family members who travel and access the market to sell and buy groceries. Regarding transportation costs for traveling to the market, the majority of traditional marketers (73 percent) said that it took longer to return the transportation costs to normal prices as before the disasters occurred. The main cause of late recovery in transportation was a slow response from the local government. Transportation systems are key to response and recovery of economic and social in natural disasters affected areas (Freckleton et al., 2012). The transportation systems must withstand stress, maintain baseline service levels, and be stout enough in physical design and operational concept to provide restoration to the system.

Access to Financial Service Providers

Traditional marketers experienced access to financial services due to many small financial service branches were damaged. Meanwhile, larger marketers did not experience difficulty accessing financial services because they used financial technology. Traditional marketers mostly used conventional mechanisms to access financial services. For example, they go to small branches of the banks in their villages to make a financial transaction. Our surveys revealed that 65 percent of traditional marketers had limited access to financial service providers after the disasters. According to 87 percent of traditional marketers, the nearest financial service provider that could be accessed was about 3 kilometers. Eleven percent of the traditional marketers said that the easiest way to make financial transactions was by going to the post offices because they were closer. Interestingly, there was around 68 percent of the traditional marketers prefer to make non-cash transactions during the recovery period. The non-cash transaction is considered a traditional payment system, an innovative payment instrument that may become an alternative for cash in a shorter history (Harasim, 2016). The payment mechanism was very helpful during the recovery period, and the normal payment system was on reconstruction. The non-cash payment system was mostly preferred by the citizens who had lost their properties and lived in tents.

Conclusions

There was a significant decrease in buyers and sellers, mainly due to a decline in traditional marketers' ability to do business activities after the natural disasters. The main reasons were the loss

of access to the market and damage to transportation infrastructures. Economic infrastructure damage was also another big challenge for traditional marketers to involve in business after the disasters. As such, their incomes were significantly decreased. The local government exaggerated the situation's slow responses toward recovery programs such as market rebuilding and transportation infrastructures recovery. As a result, traditional marketers lost their jobs and livelihoods, as well as the displacement from their homes. Although there had been an increase in the supply of some commodities, it was very limited. In addition, communities' purchasing power was still low due to the loss of income sources. Our findings highlight the need for all governments within an affected area to prepare contingencies planning in response to natural disasters. Further research should focus on what contingencies planning should be implemented, and governments deal with such contingencies planning to reduce the effect of the impacts of the natural disasters.

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