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The Impact of Earthquake and Liquefaction on The Socio-Economic Aspects of Farmers in Sigi District

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Abstract: The study aims to find out the impact of the earthquake and on the social and economic aspects and to know and analyzes the income after the earthquake and the cap. Like farmers in the Village of Jono Oge, Sidera and Sidondo 1 Sigi District Central Sulawesi Province. The Impact of a very all aspects except the social aspect except the social aspect The economy the loca community.This of research is descrivtive and quantitative. Research Descrivtive is resecearch that expalains the impact of social economic aspect, post-earth, liquefaction, and quantitative research is research that analyzes the data of observation results questionnaires and direct interview and documentation of tecniques using sampling proposive methods, with the number of respondent 148 people. The result of the study showed that the impact of earthquake dan developed on the Sociol economi aspect, namely: 1) The change in farmers activities due to the loss of propertyof shalter, thus encouraging some farmers to switch professions to meet their daily needs; 2) The amount of revenue of farmers before the earthquake in the Village of Jono Oge, Sidera and Sidondo 1, Sigi district City, with an average land area of 0.74 ha with an average revenue of IDR IDR 11.523.648,65 with an average total cost of IDR 4.474.400,34. So that the average income of IDR 7.049.248,31 For one time growing season; 3) The amount of revenue of farmers after the earthquake in the Village of Jono Oge, Sidera and Sidondo 1, Sigi district City, with an average land area of 0.68 ha with an average revenue of IDR IDR 11.796.875,00 with an average total cost of IDR 7.548.819,71 So that the average income of IDR 4.248.055,29 For one time growing season.

Keywords: Earthquake; Economic aspects; Farming Business; Liquefaction; Social

Introduction

Disaster nature that occurs is notes history and lessons valuable. As long as in 2015, various disaster occurs in various countries which causes Lots losses and casualties, including earthquake earth that hit the country of Nepal (Nagai et al., 2017; Okuda & Ohashi, 2012) with strength of 7.8 SR with kill more of 7,200 people. India is hit by wave scorching heat with temperature reach 50 degrees Celsius which killed 1,800 people due to dehydration (Reza et al., 2024; Yulianto et al., 2021) , Earthquake with a magnitude of 7.3 struck Southern Japan, more of 40 people died and more than 2000 people experience wound. As a result from disaster the cause damage to the road highway, house residents, bridges and buildings (Kusumastuti et al., 2014; Mijic & Bray, 2024)

Disaster Earthquake earth and liquefaction has to destroy activity public in Sigi Regency, Palu City and Donggala Regency. Earthquake earth and liquefaction This happened on the day Friday, September 28 2018 at 18.02 WITA with strength of 7.4 Mw *(Moment magnitude)*. The epicenter of the earthquake located 26 km north of Donggala and 80 km northwest of Palu City with depth of 10 km. On the same day and date, two earthquakes occurred earth start at 14:00:00 WIB with

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strength or magnitude 5.9 Mw and at 14:28:37 WIB with strength or magnitude 5.0 Mw. Event earthquake earth September 28, 2018 has been result in the occurrence disasters and liquefaction in the Central Sulawesi region, namely Sigi Regency, Palu City, Donggala and Parigi Moutong. The areas located near with the Palu Koro fault zone being hit by earthquake earth and liquefaction, (Meteorological Agency) Climatology and Geophysics, 2018).

Resident Sigi Regency in Sidera Village, Jono Oge and Sidondo 1 in particular the farmer who lost land agriculture, damaged rice fields, injuries, refugees, problems food, availability of clean water, and disasters social scale vast, destruction land agriculture and facilities general, and lost place living and working is the effects caused disaster earthquake earth and liquefaction Based on study recorded wide affected land disaster earthquake landslides and liquefaction in Sigi Biromaru District wide land affected agriculture disaster earthquake landslides and liquefaction in Sigi Regency covering an area of 2,029 ha with amount farmer as many as 2,210 people. Recovery efforts social economy, farmers post disaster earthquake earth and liquefaction is steps that must be professional. Related actions with recovery social farmers economy is the most diverse from all function management disaster. Ideally, reducing risk from same incident when disaster the happen again in the future come (Coppola, 2007), meaning We need Study more Lots Again about management disaster look in the mirror from series incident disaster nature that occurs (Irwansyah et al., 2024; Khanal, 2022) .

The disaster on September 28, 2018 resulted in most of the agricultural land being severely affected in Jono Oge Village, Sidera, and Sidondo1 which previously was one of the rice barns in Sigi Regency. Livelihood resident part big in the area study is farmer paddy so that matter the demand farmer for can adapt for endure alive. Even though farmer own problem instability natural or happen disasters that affect business farmer so farmer will difficulty For rise return build business farmer, but the reality farmers also have high resistance as a strategy for sufficient need House ladder farmers (Sembiring & Arya Hadi Dharmawan, 2014).

Damage land and groundwater availability or irrigation water be one of factor main in improvement cost production and decline income farmer post-earthquake earth and liquefaction. Farmers before earthquake part big use land alone so that No need emit cost rent land. Condition the force farmer for switch function business farmer paddy fields become business farmer corn feed as business for endure live. Based on the problem that occurred in Sigi Regency, Central Sulawesi Province on September 28 2018, and then objective from study this that is for now and analyze Receipts and income before and after the occurrence earthquake and liquefaction on social aspects farmer economy paddy fields in Sigi Regency, Central Sulawesi Province

Method

Types of research

This type of research is descriptive and quantitative research. Descriptive research is research that explains the impact of the socio-economic aspects of the community after the earthquake and liquefaction disaster in Sigi Regency, Central Sulawesi Province. Meanwhile, quantitative research is research that analyzes disaster impact data both data that has been published by the National Disaster Management Agency of Central Sulawesi Province, the Regional Disaster Management Agency of Sigi Regency and the perceptions of informants which are assessed in the form of numbers.

According to Arikunto (2002), descriptive research does not use hypotheses and after the data is collected, the data is classified into two groups of data, namely qualitative data and quantitative data.

Location and Time of Resear

The research location was in Sigi District, Jono Oge Village, Sid ondo 1, and Sidera, Central Sulawesi Province. The reason for choosing this location is based on data and information relevant to the problem being studied, namely the social, economic and agricultural impacts of the community after the earthquake and liquefaction disaster in Sigi Regency, Central Sulawesi Province. Then the reason for choosing the district and village is because it is one of the districts most severely affected by the earthquake and liquefaction disaster on Friday, September 28, 2013 2018, so that it becomes a reference in the economic and social recovery of post-disaster farmers. This dissertation research was conducted for 11 months, namely May 2022 - April 2023.

Population and Sample

The Greatest Showman (2007) explain that population is a generalization area which consists of: object and subject which has certain qualities and characteristics which set by researcher for studied and withdrawn in conclusion. Population in study this is all over Farmer which affected disaster earthquake earth and liquefaction in Subdistrict Sigi Biromaru Which totaling 2,210 person farmer. Arikunto (2012) stated that If population study more from 100 then the one taken is 10-15% or 20-25%. Population farmers in research this as many as 983 people for Sidera Village, Jono Oge and Sidondo 1. Engineering determination

sample in this study using the method *purposive sampling*. According to The Siregars (2010), *Purposive sampling* is a method of determining respondents to sampled based on certain criteria. Research sample this by 15% or 148 respondents. As for criteria which made into determination sample in study this as following:

a. The farmer who stay in region Regency Sigi.
b. Farmers whose land agriculture affected earthquake earth and liquefaction most critical
c. The farmer who is at in Jono Oge Village, Sidondo 1 and Sidera.
d. Farmers in the Village Jono Oge, Sidondo 1, and Sidera who received recovery economy, social post-earthquake earth and liquefaction.

Technique Analysis Data

The data obtained, both from results questionnaire and interview analysis use technique data analysis percentage formula Sugiyono (2005), with formula :

$$P = \frac{F}{N} x\ 100\% \quad (1)$$

Information :
N = Number of cases (Number of cases) Frequency / Amount respondents).
F = Frequency answer respondents who are searching for the percentage.
P = Percentage number.

Analysis Income

Soekartawi (2002), for now the magnitude income Farmers in the affected villages, used formula as following :

1. Analysis reception with formula
   TR = P×Q (2)
   Information:
   TR = Total revenue/total receipts (Rp)
   P = *Price* (Rp)
   Q = *Quantity* (Number of Products) (Kg)
2. Analysis cost with formula
   TC = TFC + TVC (3)
   Information:
   TC = Total cost/ total cost (Rp)
   TFC = Total fixed cost/ total cost fixed (Rp)
   TVC = Total Variable cost/total cost variable (Rp)
3. Analysis income with formula

$$\pi = TR - TC \quad (4)$$

Information :
π = Income (Rp)
TR = *Total Revenue* (Total Income)
TC = *Total Cost* (Rp)

Result and Discussion

Data on Affected Farmers Disaster Earthquake and Liquefaction on Aspects Social
Age

Related data response affected farmers disaster earthquake earth and liquefaction describe condition after post disaster. Age affects physical ability to work, the older the farmer's ability to carry out farming will decrease. Young farmers tend to have the ability to adopt innovation the latest more profitable. Age farmer respondents Most of them is in the category aged 41 – 50 years Jono Oge Village 16 people or 33.33%, Sidera Village 43 people or 66.15% and Sidondo Village 8 people or 22.86% where the total is from three village namely 67 people or 45.27% of 148 respondents whereas lowest in the group aged 20-30 years in Jono Oge 4 people or 8.33% in Sidera 2 people or 3.08% and in Sidondo Village 6 people or 17.14% where the total is 12 people or 8.11%.

Level of education

Education level can influence work farmer in a way significant. More education tall tend open door to opportunity diverse work, including in the non-agricultural sector. In addition, education can also introduce technology and practice more agriculture efficient, improve productivity and income farmers. Respondents' education at university height of Jono Oge Village 3 people or 6.25, Sidera Village 2 people or 3.08% and Sidondo Village 4 people or 11.43% where the total overall from three village namely 9 people or 6.08% of 148 respondents. While lowest No schools in Jono Oge village 0 people or 0% in Sidera village 0 people or 0% and in Sidondo village 2 people or 5.7% where the total is 2 people or 1.35%.

Gender

Role type sex in agriculture often related close with role traditional expected from society. In many society, especially in the regions rural, women often involved in work agriculture in a way significant. However, often they own access limited to source equal power and opportunity with men, like access to land, credit, or training agriculture. Therefore that, in consider impact type sex to work farmer, important for notice social and economic factors, which influence access and participation Woman in sector agriculture. At the research location Gender Respondent most is man Jono oge village 37 people or 77.8%, Sidera village 37 people or 56.92% and Sidondo village 30 people or 85.71%% where the total is from three village namely 104 people or 70.27% of 148 respondents. While lowest women in Jono Oge Village 11 people or 22.92% in Sidera Village 28 people or 43.08% and in Sidondo Village 5 people or

14.29% where the total is from three village namely 44 people or 29.73%.

Length of Stay

Length of stay in a place place can own significant impact on activities agriculture someone. For example, someone who lives in a place For a long time maybe has build network strong social in the community agriculture local. This can make it easier access they to source power, information and support from fellow farmers, institutions agriculture local, or government area. In addition, the length of stay in a place can also influence knowledge and understanding somebody about condition soil, climate, and practices agriculture effective local. A person who lives in a place For a long time maybe own more knowledge deep about land, season planting, and factors environment others that affect productivity agriculture.

Based on results study show that long stay most Respondent is 21-30 years old, Jono Oge Village 12 people or 25%, Sidera Village 25 people or 38.46% and Sidondo Village 11 people or 31.43% where the total is from three village namely 48 people or 32.43 % of 148 respondents. While the lowest in the 61-70 year old group in Jono Oge village 1 person or 2.08% in Sidera village 0 people or 0% and in Sidondo village 2 people or 5.71% where the total overall from three village namely 3 people or 2.03%.

Amount Family

Amount member family same house can influence work farmer in a number of way. First, the more big amount member family house, increasingly Lots power available work for help in activity agriculture. This can increase productivity and efficiency, especially in work that requires Lots power, such as planting, maintenance, and harvesting. However, if amount member family same house too small or too big, can influence dynamics family and allocation time between work agriculture and jobs House stairs. Family with amount too many members small Possible experience difficulty in operate all task necessary agriculture, temporary family with amount too many members big Possible experience difficulty in give enough attention to every member family.

In addition, the number of member family one house can also influence decision investment in agriculture, such as purchase equipment or technology agriculture. Family with amount more members big Possible own more Lots source Power For do investment this, meanwhile family with amount more members small Possible must make more decisions careful about allocation source Power they.

Based on Table 4 shows that amount member family in One House most Respondent is 3-4 people in Jono Oge Village 28 people or 58.33%, Sidera Village 39 people or 60% and Sidondo Village 22 people or 62.86% where the total is from three village namely 89 people or 60.14% of 148 respondents. While the lowest in the 7-8 year old group in Jono Oge Village 0 people or 0% in Sidera Village 1 person or 1.54% and in Sidondo Village 1 0 people or 0% where the total is from three village namely 1 person or 0.68%.

Data on affected farmers disaster Earthquake and Liquefaction on Aspects economy

Work Main Point

Work main somebody can own impact significant in activities agriculture and aspects economy. For example, someone who has work staple in the sector agriculture Possible own more knowledge and skills deep in activity agriculture, as well as more access easy to source power and information agriculture. This is can increase productivity and income agriculture them. On the other hand, someone who has work principal in the non-agricultural sector Possible own limitations time and energy for manage activity agriculture with effective. They Possible must overcome conflict time between work main them and their tasks agriculture, which can influence quality and quantity the efforts they make dedicate to agriculture. In addition, the work main one can also influence access they on capital and resources Power For investment in agriculture. Someone with work the fruit that produces stable income Possible more capable For invest money in equipment agriculture, crops new, or technology that can increase productivity and income agriculture them. Therefore that's important for consider role work main somebody in understand dynamics economy agriculture and development strategy effective farming.

Source livelihood the biggest public is as farmers. As many as 121 people or 81.76% of 148 respondents is work the main thing is as farmers. As many as 15 people or 10.14% as trader Although as farmers, before happen farmers disaster Still own income of 2.5-4 million / month and they can save and send to school his children Because expenditure only around 1-2 million / month. Post disaster earthquake earth and liquefaction hit income earned No still only around 1 - 2.5/ month temporary expenditure after disaster more from 2 million / month. Condition this describe that aspect economy farmer Still Far from the word prosperous post-earthquake earth and liquefaction. As effort farmers to remain own income addition use support economy family, most of them do work odd jobs and eating salary (laborer) building, sensors, furniture, trading vegetable cook (food) Ready serving) even there is work side by side is as seller around the boiled water. Therefore it is very necessary synergy between government, figures society, and society For respond

gap the so that recovery economy public back to normal and other factors such as theft, fights and conflicts between young people can minimized. Research results This supported by research William *et.al* (2015) *The Long-Run Socio-Economic Consequences of a Large Disaster: The 1995 Earthquake in Kobe that* (1) earthquake earth impact especially in the nearby area with center earthquake earth. (2) Areas of Cuba that experience a number of impact negative effect term short that is the number of people who fled to the Eastern Region of Cuba, and (3) The area furthest from center earthquake the earth that occurred in Kobe Country.

The research above in line with research conducted by Fahlia, Rawan, and Tasmin (2019) Analysis Impact Change Behavior Socio- Economics of Mapin Rea Village Community Post-Disaster Earthquake. Mapin Rea Village faces very complex conditions and situations, both in a way social or economy. A very fundamental problem is problem economy, such as disturbance income, day lost work, lost production volume, lost place stay. This is started from sanitation impact bad environment, so that cause absence comfort even can become source disease, loss treasure object causing the victim to become No powerless, and even more so become poor source livelihood and income that is not allows. Resulting in some inhabitant life in situation No own income (Rusmiati, Chatarina and Enny Hikmawati, 2012: 98). Seeing changes that occurred in the Mapin Rea Village community before and after post-earthquake earth, already h become description general condition absence empowerment the very complex community of Mapin Rea Village Good from aspect social and also economy.

Job Data Sideline

Work side can own significant impact on aspects economy worker farming. For example, work side can give source income additional that can be used for expand or increase business agriculture they. Income from work side can also help pay off debt or overcome challenge finance other things faced by farmers. In addition, the work side can give security financial addition for worker farmers, especially if they experience uncertainty in results agriculture or fluctuation price commodity. Job side can also give diversification income, reduce risk related financial with dependence on a single source of income. However, it is important to note that side jobs can also divide one's time and energy between side jobs and farming. This can affect productivity and efficiency in farming activities. Therefore, in considering the impact of side hustles on farmers' economic aspects, it is important to consider balance between benefit income additions and impacts potential in business agriculture main.

Based on study show that work side most Respondent is farming in Jono Oge Village 18 people or 37.05%, Sidera Village 19 people or 29.23% and Sidondo Village 19 people or 54.29% where the total from three village namely 56 people or 37.84 % of 148 respondents. While lowest furniture namely in Jono Oge village 1 person or 2.08% in Sidera village 0 people or 0% and in Sidondo village 0 people or 0% where the total is from three village namely 1 person or 0.68%.

Income Main Point Before and after Earthquake

Income main before earthquake most Respondent is 2.5 million – 4 million in Jono Oge Village 15 people or 31.25%, Sidera Village 51 people or 78.46% and Sidondo Village 2 people or 5.71% where the total is from three village namely 68 people or 45.95% of 148 respondents. While lowest <1 million namely in Jono Oge Village 3 people or 6.25% in Sidera Village 3 people or 4.62% and in Sidondo Village 7 people or 20% where the total is from three village namely 13 people or 8.78% while Income main after earthquake most Respondent is 1 million - 2.5 million in Jono Oge Village 24 people or 50%, Sidera Village 47 people or 72.31% and Sidondo Village 15 people or 42.86% where the total is from three village namely 86 people or 58.11% of 148 respondents. While lowest <4 million namely in Jono Oge village 2 people or 4.17% in Sidera village 0 people or 0% and in Sidondo village 0 people or 0% where the total is from three village namely 2 people or 1.35%.

Income side can own significant impact on aspects economy worker farmers, especially in increase security financial and diversification income they. Income addition from work side can help worker farmer overcome fluctuation price commodity agriculture or uncertainty in results harvest. In addition, income side can give source Power additional that can be used for investment in business agriculture, such as purchase equipment new, maintenance land, or diversification business agriculture. This is can increase productivity and sustainability business agriculture they in term long. However, it is important for remember that income side can also share time and energy somebody between work sideline and agriculture. This is can influence productivity and efficiency in activity agriculture. Therefore that, in consider impact income side on aspect economy worker farmer, important for notice balance between benefit income additions and impacts potential in business agriculture main.

Based on Table 3 it shows that income side most Respondent is 1.5 million – 2 million in Jono Oge Village 10 people or 20.83%, Sidera Village 16 people or 24.62% and Sidondo Village 10 people or 28.57% where the total is from three village namely 36 people or 24.32% of 148 respondents. While lowest 2.5 million - 3 million namely in Jono Oge Village 6 people or 12.5% in Sidera Village 8

people or 12.31% and in Sidondo Village 0 people or 0% where the total is from three village namely 14 people or 9.46%.

Average Expenditure Before and After Earthquake

Average expenditure before earthquake most Respondent is 1 million – 2 million in Jono Oge Village 22 people or 45.83%, Sidera Village 43 people or 66.15% and Sidondo Village 21 people or 60% where the total is from three village namely 86 people or 58.11% of 148 respondents. While lowest ≥3 million, namely in Jono Oge Village 5 people or 10.42% in Sidera Village 2 people or 3.08% and in Sidondo Village 3 people or 8.57% where the total for the three villages is 10 people or 6.76%.

Research result show that average expenditure after earthquake most Respondent is 2 million-3 million in Jono Oge Village 21 people or 43.75%, Sidera Village 44 people or 67.69% and Sidondo Village 3 people or 8.57% where the total is from three village namely 68 people or 45.95 % of 148 respondents. While lowest ≥3 million, namely in Jono Oge Village 8 people or 16.67% in Sidera Village 10 people or 15.38% and in Sidondo Village 0 people or 0% where the total for the three villages is 18 people or 12.16%.

Land Damage Level

Respondents' Land Damage Level show that level damage land affected most is very severe in Jono Oge Village 24 people or 50%, Sidera Village 41 people or 63.08% and Sidondo Village 4 people or 11.43% where the total overall from three village namely 69 people or 48.62%. While lowest level damage land currently namely in Jono Oge Village 9 people or 18.75% in Sidera Village 6 people or 9.23% and in Sidondo Village 9 people or 25.71 % where the total is from three village namely 24 people or 16.22%.

Response Affected farmers disaster Earthquake and Liquefaction in aspects social and economic

Central Sulawesi region as a disaster-prone area disaster, so too with Sigi Regency. Therefore it is very vulnerable with decline economy. However, the constraints the biggest is funding. Conditions economy moment This experience decline, besides consequence pandemic aggravated Again with follow-up earthquake earth and liquefaction. So for look for source financing in frame do *recovery* in Sigi Regency is needed Work extra. This is in tune with Ridwan *et.al* (2018) that Central Sulawesi, especially Palu, is very vulnerable area to earthquake and danger join in others, so that in the future must start taken into account in development with apply regulation in a way strict based on spatial planning based on disaster and implementation of SNI earthquake Already become necessity.

Research result show as many as 95 people or 64.19% have accept Facilities and infrastructure assistance general / infrastructure (*Public assistance*), 40 people or 33.78% have accept help residence / house (*The housing sector)*. 2 people or 1.35% have accept help employment / Empowerment community (*Economic recovery),* 1 person or 0.68% has accept help health and mental *(Individual, family and social recovery).* Data the describe that although they know type the help that is available, but No A little from they (farmers) have not get / obtain the assistance in question. Farmers affected greatly expect help from government as soon as possible Possible For restore condition social economy especially repair land and drainage so that farmer No Again go out from village they For rent land agriculture. Petterson (1999) said the same thing, that with involving parties certain, efforts organized recovery with Good can allow guaranteed Lots things learned, training best and efficiency laborer can walk in a way maximum. With No existence good coordination and communication, efforts recovery become No Possible For reach needs at the level local. If the structure formed Already true, result from mechanism coordination will become place storage information and assistance For all group or individuals involved.

Analysis Farming Business Costs and Income
Income Main Point Farmer

Research result show that income farmer before the earthquake in Jono Oge Village, Sidera and Sidondo 1, Sigi Regency showed that income farmer between IDR 500,000 – IDR 1,000,000 at least that is as many as 13 farmers, followed by farmers whose income between Rp 1,000,001 – Rp 2,500,000 as many as 51 people. While farmers who have income ranging from IDR 2,500,001 – IDR 4,000,000 the most that is as many as 68 people. Farmers who have income more big from 4,000,001 namely as many as 16 farmers. This is describe that farmers in Jono Oge Village, Sidera and Sidondo 1, some of them big own income results farming only range between 2,500,001 – 4,000,000 per one per month. while the respondent interval based on income farmer after the earthquake in Jono Oge Village, Sigi District, Sigi Regency shows that income farmer between IDR 500,000 – IDR 1,000,000, namely as many as 35 farmers, followed by farmers whose income between IDR 1,000,001 – IDR 2,500,000 as many as 86 people, farmers the most. While farmers who have income ranging from IDR 2,500,001 – IDR 4,000,000, namely as many as 25 people. Farmers who have income more big from 4,000,001 namely as many as 2 farmers. This is describe that farmers in Jono Oge Village, some of them big own income results farming only range between IDR 1,000,000 – IDR 2,500,000 per one per month.

Damage land farmer consequence disaster nature has a big impact on income farmers in Jono Oge, Sidera and Sidondo 1 Villages, Sigi Regency. Decline income farmer influenced by several factors, including increasing cost production No still like rent land, increase price fertilizers, pesticides and needs tool other.

Cost Production before Earthquakes and Liquefaction

Cost production is the magnitude expenditure used in the production process, both that cost still and also cost variable. Cost still in farming covering cost depreciation tools and costs rent land. While variable costs or cost No still is costs that can be incurred changed every time the production process, such as cost means production like cost purchase seeds, costs manure, urea fertilizer, phonska, pesticides, and costs power work.

Based on results study obtained the average total cost farmers in Sigi Regency before Earthquake Earth and Liquefaction in area of 0.74 ha business farmer especially in Jono Oge Village, Sidera Village and Sidondo Village 1 are amounting to IDR 4,474,400.34 Where Use seeds on the area an average of 0.74 ha of land requires 26.31 kg of seeds or IDR 118,398.65 in rupiah with details price seeds IDR 4500/kg Farmers who use seeds. According to the Center for Research Rice Plants (BB Padi), dosage fertilizer inorganic farming paddy is Urea as much as 300 kg per ha, SP-36 100 kg per ha and KCL 100 kg per ha, while dose fertilizer inorganic in the form of fertilizer compost straw and drums is 2 tons per ha (BBPadi, 2015). The average dose fertilizer used farmer Still varies depends ability economy farmers, so that results harvest in the area of 1 ha varies start from 2 tons/ha to 3.2 tons. Retail Price Highest (HET) fertilizer subsidized among others are Rp1800 per kg of Urea fertilizer, IDR 1,400 per kg of ZA fertilizer, IDR 2,000 per kg of SP-36 fertilizer, IDR 2,300 per kg of NPK fertilizer, and IDR 500.00 per kg of organic (Ministry of Agriculture Regulation 2020).

Use fertilizer For one season plant before disaster happen For area of 0.74 ha, which is IDR 542,135.14 where price urea fertilizer is IDR 1,800/kg, fertilizer cost fertilizer Phonska Subsidy of IDR 2,300/kg with average usage details fertilizer namely 153.38 kg of Sunsidi Urea fertilizer and 115.68 kg of fertilizer phonska.

Cost production which is one of factor increasing amount productivity that is cost pesticides. Cost pesticide the biggest is cost Herbicide which is IDR 158,564.19 or approximately 57.22% of the total cost pesticides. This is due to because growth weeds in the field agriculture more Lots compared to pests on plants. The rest is cost is cost Insecticide that is around 42.78% or with magnitude cost IDR 118,564.19. Interview results respondents also explained If cost power work done No too many things This due to Because farmer choose For process Alone land they so that cost wages power Work For one season plant in area of 0.74 ha, which is IDR 896,452.70. During the harvest period No use power Work But Already including in machine harvest with comparison 9 : 1 grain or For yield of 1 ton of rice service tool agriculture 100kg or If converted into rupiah which is IDR 500,000. Other costs in study This including fuel, sacks and others. For cost still in study This which is IDR 194,853.04 in one season plant.

Farm Business Revenue Before Earthquakes and Liquefaction

Reception obtained from results amount production the rice produced multiplied with price sell at the time research. The average number of production per hectare in one planting season can see in Table 1.

Table 1. Average Production farming rice, Selling Price, Revenue

Description	Amount (Rp)
Production (kg)	2,304.73
Selling Price (Rp)	5,000.00
Receipts (Rp)	11,523,648.65

Table 1 show that production farmer respondent with an average area of land area of 0.74 ha, namely of 2,304.73 kg or 2.304 tonnes. The average price sell before disaster which is IDR 5,000 per Kg or IDR 5,000,000 per ton. The average income is farmer Respondent is amounting to IDR 11,523,648.65 in one planting season.

Farming Business Income before Earthquakes and Liquefaction

Income farmers in Jono Oge Village, Sidera and Sidondo before Earthquakes and Liquefaction is with count difference between receptions with total cost of production. Revenue is results difference between sales with total expenditure farming so that can made into easy profit. Average income earned farmer Respondent can see in Table 2.

Table 2. Income Rice Farming before Natural disasters

Description	Amount (Rp)
Average Revenue (Rp)	11,523,648.65
Total Cost (Rp)	4,474,400.34
Income (Rp)	7,049,248.31

Based on table 2 shows the average total income of rice farming obtained by respondent farmers in Jono Oge Village, Sidera Village and Sidondo 1 Village, Sigi Regency, namely the average income in an area of 0.74 ha is IDR 11,523,648.65 with a production cost of IDR 4,474,400.34 so that the income for one planting season is IDR 7,049,248.31.

Cost Production after Earthquakes and Liquefaction

Based on results study obtained the average total cost production farmers in Jono Oge Village, Sidera Village and Sidondo 1 Village, Sigi Regency after

earthquake earth and liquefaction in area of 0.68 ha farming corn feed is amounting to IDR 7,548,819.71 with details cost as following.

Use seeds on the area an average of 0.68 ha of land requires 9.67kg seeds or IDR 1,209,134.62 in rupiah with details price seeds IDR 125,000/kg.

Based on Table 4.25 Usage fertilizer For one season plant before disaster happen For area of 0.68 ha, which is IDR 1,018,634 where price urea fertilizer is IDR 2,500/kg, and fertilizer Phonska subsidy of IDR 2,700/kg.

Use Pesticides on an area of 0.68 ha, namely IDR 298,557.69 for Insecticide or around 58.2 % more big from use herbicide, Percentage cost pesticide type herbicide is IDR 214,461.54 or 41.8 % of total usage pesticides. Interview results respondents also explained If cost power Work more minimized, thing This due to Because farmer more choose For process Alone land they remember the magnitude wages power work, so that cost wages power Work For one seasonplant in area of 0.64 ha, namely IDR 3,346,153.85 with details a number of workmanship among them in the phase processing land, planting, fertilization, spraying and harvest time. During the planting period use power almost the same work with the harvest time, things this due to the long harvest period and sourness plant need power Work with the amount that is the same.

Farm Business Revenue after Earthquakes and Liquefaction

Income farmers in Jono Oge Village, Sidera and Sidondo after Earthquakes and Liquefaction is with count difference between reception with total production cost plant corn. Average income earned farmer Respondent can see in Table 3.

Table 3. Average Acceptance after Earthquakes and Liquefaction

Description	Amount (Rp)
Production (kg)	2,359.38
Selling Price (Rp)	5,000.00
Receipts (Rp)	11,795,875.00

Table 3 shows that the average production corn feed farmer Respondent that is of 2,359.38 kg or 2.359 tons. The average price sell after disaster to IDR 5000/kg or IDR 5,000,000 per ton. The average income farmer Respondent is amounting to IDR 11,795,875 in one planting season. Average production still very low, water availability is one of the factor the decline production corn. This is This was also expressed by the secretary of Sidera Village that problem the main thing that happened is the difficulty water source for needs public and also agriculture. Government village has striven for procurement well in three point but at the moment researcher down only One working point, Device village Sidondo 1 also revealed that No There is water source for flowing rice fields farmer.

Income after Earthquakes and Liquefaction

Income is results difference between sales with total expenditure farming so that can made into easy profit. Average income farming corn feed obtained farmer Respondent can see in Table 4.

Table 4. Income Farming after Earthquakes and Liquefaction

Description	Amount (Rp)
Average Revenue (Rp)	11,795,875.00
Total Cost (Rp)	7,548,819.71
Income (Rp)	4,248,055.29

Based on Table 4 shows the average total income generated by farmers after the earthquake and liquefaction in Jon Oge Village, Sidera Village and Sidondo 1 Village, Sigi Regency, namely the average income in an area of 0.68 ha is IDR 11,795,875.00 with a production cost of IDR 7,548,819.71 so that the income for one planting season is IDR 4,248,055.29.

Farming Business Income Before and After Earthquakes and Liquefaction

Income farmers in Jono Oge Village, Sidera and Sidondo before and after after Earthquakes and liquefaction experience decline income, thing This visualized in Figure 1.

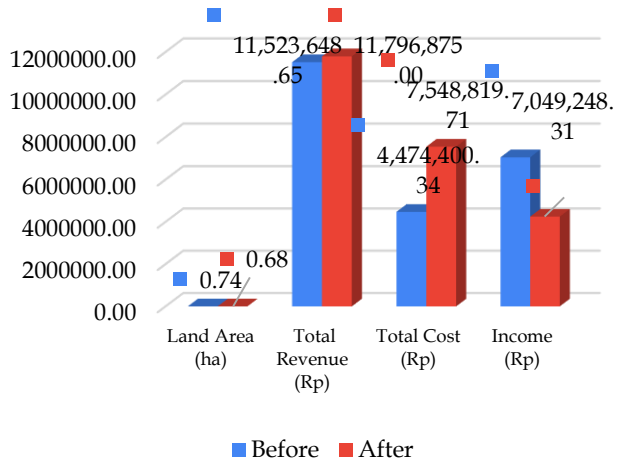

Figure 1. Farming Business Income Before and After

Based on the image above that Total revenue business farmer before earthquake with wide 0.74 ha of land amounting to IDR 11,523,648.65, total cost as big as IDR4,474,400.34 with income of IDR 7,049,248.31 while reception after earthquake with wide land area of 0.68 ha amounting to IDR 11,796,875.00, Total cost IDR 7,548,819.71 and income amounting to IDR 4,248,055.29.

Reception after earthquake morebig compared to before earthquake, after earthquake farmers who were originally plant paddy However switch for plant corn feed with same price before earthquake, but average income before earthquake mor big If compared to after earthquake and liquefaction. This is because it is influenced a number of factor among them, damage land and groundwater availability or irrigation water become factor main road disclosure cost production. Farmers before earthquake Most of the use land alone so that no need emit cost rent land. Lack of water supply after earthquakes and liquefaction also become factor the decline results harvest. For fulfil need daily the farmers lost paddy fields part from the land status Some must rent land and some work side For fulfill need life family. Like become coolie building, trader vegetables, sensor workers, sales at kiosk, laborer furniture and workshop.

Indonesian people use draft resigned when hit by disaster. Surrender own different meanings for every individuals and communities, but draft That Alone known by many religions in the world. In the concept surrender, fate man fully determined by God so No so enter reason for man for planning face incident No unexpected. Interpretation another surrender stated that man must try as strong as power while understand that at the point certain fate decides. Although No is a specific concept, usually draft resigned in a way comprehensive can influence planning countermeasures disaster nature and conservation environment. When all Already destined, what its use plan policies and steps for reduce impact from disaster nature.

Conclusion

Based on description background, research data analysis and discussion so can be withdrawn conclusion as: 1) Impact earthquake earth and liquefaction on aspects social economy that is existence change activity farmer Respondent consequence lost treasure object or place stay, so that part big farmer Respondent lost income and encourage farmers For switch profession For fulfil need daily; 2) The size Farm Business Revenue Respondent before earthquake in Jono Oge Village, Sidera, and Sidondo 1, Sigi District, Sigi Regency with average area value land area of 0.74 Ha with an average income of amounting to IDR 11,523,648.65, with a total average cost of IDR 4,474,400.34 so that the average income amounting to IDR 7,049,248.31 for one season plant. The size Farm Business Revenue Respondent after earthquake in Jono Oge Village, Sidera, and Sidondo 1, Sigi District, Sigi Regency with average area value land area of 0.68 Ha with an average income of amounting to IDR 11,796,875.00 with a total average cost of IDR 7,548,819.71 so that the average income amounting to IDR 4,248,055.29 for one season plant.

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Author Contributions

The following statements should be used "Conceptualization and methodology: S.Y; validation: S.D and R.A.R; formal analysis: S.Y; data curation: M.A and H.Y; preparation of initial draft: S.Y; writing review and editing: S.Y., S.D. and R.A.R.

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Conflicts of Interest

The authors declare no conflict of interest.

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