



EVALUATION AND MAPPING OF DISASTER-RESPONSIBLE AND RESILIENT VILLAGES IN EAST REMBANG

EVALUASI DAN PEMETAAN DESA BERDAYA DAN TANGGUH BENCANA DI REMBANG TIMUR

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ABSTRACT

Indonesia's development must be connected to the important role of village empowerment and disaster resilience. Efforts to increase village empowerment and resilience to disasters have been carried out previously, especially in villages in East Rembang. Even so, there has yet to be an evaluation to measure its success. This research aims to evaluate and map village empowerment and resilience using research instruments consisting of aspects, indicators, sub-indicators, and questions regarding disasters in East Rembang. The four main stages of research include instrument development, measurements of empowered and disaster-resilient villages that have been carried out, mapping of measurement results, and based on recommendations. The data collection technique used is a document study with the data collection instrument, namely a document study sheet containing a scale for measuring village empowerment and disaster resilience. The village empowerment scale was developed based on geographic, government, population, social, agricultural, economic, and housing aspects. In contrast, the disaster-resilient village scale consists of six aspects that reflect the value of security from disasters, facilities, and mitigation efforts. This research shows seven categories of villages that are empowered and resilient to disasters. The three villages with the highest level of empowerment are Sluke, Sendangmulyo, and Kragan Villages in Sluke, Sarang, and Kragan Districts, respectively. Meanwhile, the three villages with the highest disaster resilience are Sanetan, Bendo and Langgar Villages, Sluke District.

Keywords: Empowered Villages, Disaster Resilient Village, Village Evaluation, East Rembang

ABSTRAK

Pembangunan Indonesia tidak lepas dari peran penting keberdayaan desa dan ketangguhan desa terhadap bencana. Upaya peningkatan keberdayaan dan ketangguhan desa terhadap bencana telah dilakukan sebelumnya, utamanya di desa-desa di Rembang Timur. Meskipun begitu, belum ada evaluasi untuk mengukur keberhasilannya. Penelitian ini bertujuan untuk mengevaluasi dan memetakan keberdayaan dan ketangguhan desa dengan instrumen penelitian terdiri atas aspek, indikator, sub-indikator, serta pertanyaan terhadap bencana di Rembang Timur. Empat tahap utama penelitian yang meliputi pengembangan instrumen, pengukuran desa berdaya dan tangguh bencana yang telah dilakukan, pemetaan hasil pengukuran, serta berdasarkan pemberian rekomendasi. Teknik pengumpulan data yang digunakan adalah studi dokumen dengan instrumen pengumpulan datanya yaitu lembar studi dokumen yang berisi skala pengukuran keberdayaan desa dan ketangguhan desa terhadap bencana. Skala keberdayaan desa dikembangkan berdasarkan aspek geografi, pemerintahan, kependudukan, sosial, pertanian, ekonomi, dan perumahan sementara skala desa tangguh bencana terdiri atas enam aspek yang mencerminkan tentang nilai keamanan dari bencana, fasilitas, serta upaya mitigasi. Hasil penelitian ini menunjukkan tujuh kategori desa berdaya dan tangguh bencana. Tiga desa dengan tingkat keberdayaan tertinggi yaitu Desa Sluke, Sendangmulyo, dan Kragan yang masing-masing berada di Kecamatan Sluke, Sarang, dan Kragan. Sedangkan tiga desa dengan ketangguhan bencana tertinggi yaitu Desa Sanetan, Bendo, dan Langgar, Kecamatan Sluke.

Kata Kunci: Desa Berdaya, Desa Tangguh Bencana, Evaluasi Desa, Rembang Timur

1. INTRODUCTION

Efforts to make Indonesia a developed country cannot be separated from the vital role of the village. The progress of the village largely determines Indonesia's progress. If the village is developed, it will be easier to realize a developed Indonesia, and vice versa, because most of Indonesia's territory is village territory, while the city has experienced rapid development in various fields (Jamaludin, 2016; Prastowo, 2014). Therefore, the village is an essential component of the country that must be pursued for its development (Arifah & Kusumastuti, 2018; Hasyim, 2019; Syahza & Suarman, 2013). The Indonesian government is currently serious about implementing village development, one of which is realized by formulating Law (Undang-Undang) Number 6 of 2014 concerning Villages which prioritizes villages in the development process. The law has also issued new policies for villages, one of which is the Village Fund program which can be managed for village development and improving the welfare of village communities. Apart from that, village development is also mentioned in the *Nawacita* is a general term absorbed from Sanskrit, *nawa* (nine) and *cita* (hope, agenda, desire), that Indonesia's development is carried out from the periphery by strengthening regions and villages within the framework of the Republic of Indonesia (Pangestuti et al., 2018; Yulianto et al., 2021).

Village development is carried out with various efforts aimed at creating empowered villages. Efforts made include exploring and mapping local village potential, such as tourism, so that it can be further developed (Aly et al., 2021; Hidayah, 2018), strengthening community capacity in managing village potential (Rani, 2016), training the community to be able to utilize ICT in economic activities and daily life (Al-Kautsari, 2017), empowering communities to be able to manage waste or waste generated from households and the business sector (Nafiah, 2019), to empowerment through Islamic boarding schools and friendly villages children in the village (Perdana, 2019; Suhud & Islami, 2020). These efforts are expected to empower the village community's capabilities and utilize all the potential of the local village in various sectors so that the community can obtain a decent life and become an independent community.

Villages that have been empowered or are currently being empowered have one main threat, i.e: the potential for natural disasters is a range of areas that are prone or prone to disasters. The National Disaster Management Agency (BNPB - Badan Nasional Penanggulangan Bencana) stated that disasters destroy the hard-earned results of development. Most of villages in Indonesia is vulnerable to natural disasters, especially villages that have experienced a history of large-scale natural disasters (BNPB, 2016). Natural disasters result in various losses, include the form of loss of property, damage to public facilities, the emergence of various diseases, and even psychological impacts such as trauma from seeing the enormity of the disaster or because of the loss of family (Ersoy & Koçak, 2016; Prihatin, 2018). Therefore, even though the arrival of several disasters cannot be predicted in advance, humans can try to overcome these natural disasters so that the resulting impact can be maximally suppressed.

Efforts that the village can make is to form a disaster resilient village. Referring to the Regulation of the Head of BNPB Number 1 of 2012 concerning General Guidelines for, *Desa Tangguh Bencana* is abbreviated as *Destana* (*Desa/Kelurahan Bencana Tangguh, Desa Tangguh Bencana*), namely a village or sub-district that can independently adapt and face potential threats of disaster and can quickly recover itself after a natural disaster occurred. *Destana* is a community participation-based natural disaster reduction program, bearing in mind that the community is a subject that understands deeply the vulnerability of natural disasters in their area, where the community will also be the ones who will directly deal with disasters in the future. Therefore, it is necessary to empower a village to be resilient in facing disasters.

East Rembang is one of the areas in Rembang Regency which is prone to disasters. Three sub-districts in East Rembang, namely Sluke, Kragan, and Sarang sub-districts, had 14, 27, and 23 villages, respectively, in 2020 with the same disaster vulnerability. The disasters that often occur in villages in the three sub-districts from 2011 to 2019 include floods, landslides, abrasion, and drought. The Central Statistics Agency (BPS) and the PUPR Ministry of Rembang Regency stated that East Rembang had experienced 38 floods, 20 landslides, 25 abrasions and 44 droughts during that period (BPS Rembang, 2021; Kementerian PUPR, 2018).

Given the vulnerability of the East Rembang, various efforts have been made to shape the villages to be disaster resilient. Among the efforts that have been made by the Regional Disaster Management Agency (BPBD) of Rembang Regency, namely providing socialization on handling landslides and floods, outreach on disaster prevention and preparedness in schools, increasing the capacity of disaster risk reduction forums, making disaster prevention leaflets, and developing Disaster Alert Village (BPBD Kabupaten Rembang, 2019). Apart from the BPBD, tertiary institutions also formed Destana in Rembang, one of which was Semarang State University, which formed a Disaster Preparedness Group (KSB) in Karangharjo Village, Kragan District (Luthfi et al., 2020). Hamid (2021) also provides disaster education to the people of the Kragan District through socialization, participatory mapping, and preparedness training in dealing with natural disasters, specifically for abrasion disasters.

East Rembang, besides having a high potential for disaster vulnerability, also has the potential for a feasible development village. The Rembang Regency Investment Potential Map for 2021 states that the three sub-districts both have the potential for livestock and agriculture development with a total land area in the three sub-districts that can be optimized for the development of each of these commodities is 19463.9 and 28746.2 Ha (Pemkab Rembang, 2021). Cattle and goat livestock commodities start from the primary sector with breeding and fattening, the secondary sector with processing into durable food such as shredded and canned food, and the tertiary sector by using it as a supporting business in the form of transportation and expeditions. The agricultural industry is also making similar efforts, where corn is processed into animal feed and flour; Robusta coffee is processed into coffee beans; mangoes are processed into sweets; and cane is processed into sugar. These commodities can still be re-optimized so that various new product innovations that are more durable and have a high selling value will be obtained.

Data released by the PUPR Ministry also shows that East Rembang has various superior commodities that must be developed. First, the three sub-districts have pond cultivation, with the total area of the ponds in Sarang 60.3 Ha, Kragan 34.2 Ha, and Sluke 34 Ha sub-districts, respectively, namely. The three sub-districts produce Milkfish, Vaname, Windu, and various other fish, with a total income of more than 156.9 million rupiahs in 2015. Second, East Rembang also has pond fish farming. Sarang, Kragan, and Sluke sub-districts have pond areas of 840, 885, and 349 hectares, respectively. The types of fish produced are catfish, tilapia, and various other types. The production value obtained from the cultivation is Rp2,439,099,- in Sarang District, Rp2,506,200,- in Kragan District, and Rp824,495,- in Sluke District.

Until now, efforts to develop villages in East Rembang into empowered and disaster-resilient villages are continuing. Even so, there has yet to be an effort to evaluate the efforts' effectiveness. As a result, the development progress of the villages in East Rembang needs to be better controlled. For example, some villages continue to receive socialization and training, but several other villages do not, so villages are experiencing rapid development, but several other villages still need to develop. In addition, the lack of clarity on the target to be achieved makes the process undertaken to form a disaster-resilient and resilient village less than optimal. For example, the data released by the BPS only ranks livestock and agricultural potential by sub-district. Still, more detailed mapping of villages is needed so that disaster potential and superior commodities owned by each village in East Rembang cannot be mapped in detail (BPS Rembang, 2021).

Evaluation research conducted by first developing a measurement instrument for empowered and disaster-resilient villages is urgent. After being developed, the instrument measures the success rate of efforts to form empowered and disaster-resilient villages. Therefore, this research was conducted to evaluate and map village empowerment and resilience in East Rembang. Through this research, the targets to be achieved will become more concrete so that the process of developing empowered and disaster-resilient villages can be maximized. Apart from that, success will also be known between one village and another, which policymakers will consider in making decisions.

This research is not the first study to evaluate villages. Previously, Rahutama (2017) evaluated the development and management of existing markets in the Village of Penjakringan, Weleri District, Kendal Regency, by focusing on cooperative relationships from a financial and economic perspective between the

private sector and the government. Luthfi et al. (2020) have also evaluated the use of village funds for infrastructure development needs in the form of roads in Gondang Village, Karangreja District, Purbalingga Regency. Muazir et al. (2020) also surveyed to evaluate the readiness of Aruk Hamlet in West Kalimantan, located in a border area, to become a smart village. This preliminary research shows that an evaluation of village empowerment and resilience to disasters has never been carried out.

2. DATA AND METHODS

2.1. Types of research

This research is a type of evaluation research. Evaluation research can be used to evaluate activities or programs running to know the success of an activity or program, which is related to suitability with objectives and the percentage of program success (Ambiyar & Muharika, 2019). Evaluation research in this study was carried out on village empowerment and disaster resilience efforts that had been carried out in villages in East Rembang of the 64 villages in East Rembang, three villages have the highest village empowerment, namely Sluke Village, Sluke District; Sendangmulyo Village, Sarang District; and Kragan Village, Kragan District and the 64 villages in East Rembang, the three villages that have the highest disaster resilience are Sanetan, Bendo and Langgar Villages, all three of which come from Sluke District.

2.2. Research Stage

This evaluation research was carried out through four main stages: developing instruments, measuring village empowerment efforts and resilience to disasters that have been carried out, mapping the results of measurements, and providing recommendations based on the mapping results. First, this research develops a research instrument, namely an instrument for measuring village empowerment and disaster resilience. Experts then validate the instruments that have been developed by conducting expert judgments. The instrument will be revised based on input from experts until it is declared valid and feasible to take measurements.

The second stage is to measure the village empowerment efforts and resilience to disasters that have been carried out. This stage was carried out by collecting data related to the condition of the villages in East Rembang, namely in the Districts of Sarang, Kragan, and Sluke. Data were collected by reviewing library sources such as activity documentation, research reports, and news, which contain information about village empowerment and resilience to disasters. The data obtained can be used to measure village empowerment and resilience to disasters that have been carried out concerning the instruments developed.

The third stage is mapping the measurement results. Based on measurements carried out on villages in East Rembang, the level of village empowerment and resilience to disasters can be seen. The data is used as a basis for mapping the readiness of villages in East Rembang to become empowered and disaster-resilient villages.

The fourth stage is carried out by providing recommendations based on the mapping results. These recommendations include providing alternatives that can be implemented so that all villages in East Rembang become more empowered and resilient to disasters.

2.3. Data Collection Techniques and Instruments

The data collection technique in this study is the document study technique. This technique is carried out by reviewing previous documents related to the research objectives. The documents studied in this study are mainly on sub-district statistics published by the Central Bureau of Statistics (BPS) of Rembang Regency. The document is titled "Sarang District in Figures", "Kragan District in Figures", and "Sluke District in Figures" which will be published in 2021. However, as a review, validation, and basis for discussion, this research also uses documents from the previous year, especially those for the last four years, namely 2017-2020. The data collection instrument in this study was a document study sheet. The document study sheet

contains instruments in the form of a measurement scale for disaster-resilient and empowered villages whose validity and feasibility have previously been declared by experts.

The validated instrument is used as a reference in determining the empowerment of each village. Aspects and indicators for measuring empowered and disaster-resilient villages are shown in Tables 1 and 2, respectively.

Table 1. Empowered Village Assessment Instruments

Aspect	Indicator
Geography	<ul style="list-style-type: none"> • Distance from the District Capital to the Village • An area • Area Based on Land Use • Paddy Field Area Based on Type of Irrigation • Dry Soil Based on Soil Use • Crooked Land Area
Government	<ul style="list-style-type: none"> • Existence of Village Devices
Population	<ul style="list-style-type: none"> • Residents • Total Population Based on Gender • Population-Based on Age
Social	<ul style="list-style-type: none"> • Number of Schools • Ease of Reaching Educational Facilities • Number of Students by Education Level • Number of Teachers by Education Level • Number of Sports Facilities • Number of Art Groups • Number of Padepokan Dance Groups and Traditional Art/Theatre Groups • Number of Health Facilities • Ease of Access to Health Facilities • Use of Waqf Land • Marital status • Transportation Access • Existence of the Expedition
Agriculture	<ul style="list-style-type: none"> • Number of Reservoirs
Economy	<ul style="list-style-type: none"> • Number of Economic Facilities and Infrastructure • Number of Financial Institutions and Cooperative Facilities • Communication Facilities
Housing	<ul style="list-style-type: none"> • PLN Electricity User Families

Source: Results of the analysis, 2023

Table 2. Disaster Resilient Village Assessment Instruments

Aspect	Indicator
Safety Value of Various Types of Disasters Based on Disaster Events	<ul style="list-style-type: none"> • Earthquake • Tsunamis • Volcano eruption • Landslide • Flood • Flash floods • Drought • Forest and land fires • Tornado/Typhoon/Whirlwind • Sea Tidal Wave
Safety Value of Various Types of Disaster Based on the Number of Earthquake Victims	<ul style="list-style-type: none"> • Earthquake • Tsunamis • Volcano eruption • Landslide • Flood • Flash floods • Drought • Forest and land fires • Tornado/Typhoon/Whirlwind • Sea Tidal Wave
Existence of a Natural Disaster Anticipation Facility	<ul style="list-style-type: none"> • Natural Disaster Early Warning System
Existence of Natural Disaster Mitigation Facilities	<ul style="list-style-type: none"> • Safety Equipment • Signs and Routes for Disaster Evacuation
Efforts to Anticipate Natural Disasters	<ul style="list-style-type: none"> • Manufacture, maintenance, and normalization of waters
Tsunami Disaster and Early Warning	<ul style="list-style-type: none"> • Tsunami Disaster Vulnerability and Existence of Special Tsunami Early Warning

Source: Results of the Analysis, 2023

2.4. Data analysis

This study uses quantitative and qualitative data analysis. Quantitative data analysis was carried out on quantitative data, namely the score on each sub-indicator as measured by research questions. Qualitative data analysis was carried out on qualitative data that supports or describes quantitative data. Quantitative data analysis is the primary analysis in this study, where the analysis is strengthened and complemented by qualitative data analysis.

Quantitative data analysis was carried out by knowing the score of each question asked, both on the measurement of empowered villages and disaster-resilient villages. Scores are entered as is by the data contained in the BPS data with some adjustments. For example, on the population aspect, the available data are the total population, population density, and sex ratio. However, these data do not show the empowerment of the population. Soegiono & Muis (2016) stated that education makes a person empowered. Therefore, all population sub-indicators are multiplied by the number of students and university students, which shows how educated a village is.

After the scores on all aspects are known, the z-score of each question is sought in each village so that the z-score of each question in each village will be known. The calculation of the z-score is carried out using the help of a Microsoft Excel number processing tool with the following formula.

$$ZScore = \frac{\text{Criterion score} - \text{mean score}}{s \text{ standard deviation}}$$

The z-scores obtained from all the questions in each village are then added to make the total z-score known for each village. The total z-score scores are then sorted from the largest to the minimum score. The order of the z-score from the largest to the smallest shows a village's disaster resilience and empowerment ranking. The more excellent score indicates that a village is more empowered and resilient to disasters and vice versa. The Z-Score for each village is then used to determine the category of empowered and disaster-resilient villages. Class intervals and categories are determined using the calculation of the number of classes and class length, formulated as follows.

$$\text{Number of Classes} = 1 + (3,3) \log n$$

$$\text{Class Length} = \frac{\text{Largest Data} - \text{Smallest Data}}{\text{Number of Classes}}$$

Based on this formula and the data obtained, it is known that the intervals for the categories of empowered villages and disaster-resilient villages are shown in Tables 3 and 4, respectively.

Table 3. Adjustments in Assessment Criteria

Sub-Indikator	Adjustment
Mark Proximity to the District Capital to the Village	The data found in the literature is data on "the distance from the sub-district capital to the village". Meanwhile, the greater the distance, the further the village is from the capital. Therefore, the data was converted into "closeness value" data by subtracting 100 from the distance from the sub-district capital to the village. Through this calculation, the closer the village is to the sub-district capital, the higher the score
Device Presence Village	There are two score categories for the presence of village officials, namely a score of 1 for those who have village officials and a score of 0 for those who do not have village officials.
Entire Sub-Indicators on Indicators of Interest seat	The data available for population aspects are data on total population, population density, sex ratio, and so on. However, it is felt that this data does not show the empowerment of the population. Soegiono & Muis (2016) state that education makes a person empowered. Therefore, all population sub-indicators in this study are multiplied by the number of pupils and university students which shows how educated a village is.
Ease of Achievement Education facility	Existing literature shows village empowerment using qualitative data. This data is then translated into quantitative data by referring to the Linkert scale range which uses five categories, namely the "Very Easy" category with a score of 5, "Easy" with a score of 4, "Less Easy" with a score of 3, "Not Easy" with a score of 2, and "Very Not Easy" with a score of 1
Ease of Achievement Education facility	As with educational facilities, health facilities are the same. Existing literature shows village empowerment using qualitative data. This data is then translated into quantitative data by referring to the Linkert scale range which uses five categories, namely the "Very Easy" category with a score of 5, "Easy" with a score of 4, "Less Easy" with a score of 3, "Not Easy" with a score of 2, and "Very Not Easy" with a score of 1

Sub-Indikator	Adjustment
Marital status	Sub-indicators of marital status consist of "marriage and reconciliation" and "divorce and divorce". Marital status "married and reconciled" shows a positive score while "divorce and divorce" shows a negative score. The data available is data on the number of incidents of marriage, reconciliation, divorce and divorce. Meanwhile, it is known that the increasing number of divorce/divorce incidents is not something positive, but negative. Therefore, scoring of the incidents of "divorce and divorce" was carried out
Availability of Transportation General	The data found shows that the existence of public transportation is categorized into two, namely "available with routes" and "no transportation". The data is then converted into quantitative data to get a score of 1 and 0 respectively
Type Surface Road	Data from the three sub-districts that were found showed that the type of road surface was all reported as "asphalt/concrete". The qualitative data is converted into a score of 1.
Possible Path For Passed by Motorized Vehicles Four Wheels or more	Data from the three sub-districts found shows that all of the roads have the capacity to allow these vehicles to pass throughout the year. The qualitative data is converted into a score of 1
Office Existence Post/Auxiliary Post/ House Post	Data shows that in each village there are some that have a post office/sub post/post house and some that don't. Villages that have them are given a score of 1, while those that don't have them are given a score of 0.
Company Existence/ Agent Service Private Expedition	Data shows that in each village there are some that have private expedition service companies/agents and some that don't. Villages that have them are given a score of 1, while those that don't have them are given a score of 0.
Condition Signal Cellphone	As in educational and health facilities, cell phone signal conditions also use the Linkert scale as a reference. Existing literature shows a range with several categories. This research then converted it into five categories, namely "Very Strong" with a score of 5, "Strong" with a score of 4, "Quite Strong" with a score of 3, "Not Strong/Weak" with a score of 2, and "Very Not Strong" with a score 1.

Source: Results of the Analysis, 2023

Table 4. Categories of Empowered Resilient Villages in East Rembang

No	Interval	Category
1	99,8 – 125,3	Very Very Empowered
2	74,4 – 99,9	Very Empowered
3	48,8 – 74,3	Empowered
4	(23,4) – 48,9	Enough Empowered
5	(-2) – (23,5)	Less Empowered
6	(-27,6) – (-2,1)	Not Empowered
7	(-53,2) – (-27,7)	Very Not Empowered

Source: Results of the Analysis, 2023

Table 5. Categories of Disaster Resilient Villages in East Rembang

No	Interval	Category
1	5 - 6,7	Very Very Tough
2	3,2 - 4,9	Very Tough
3	1,4 - 3,1	Tough
4	(-0,2) - 1,5	Tough Enough
5	(-2) - (-0,3)	Less Tough
6	(-3,8) - (-2,1)	Not Tough
7	(-5,6) - (-3,9)	Very Not Tough

Source: Results of the Analysis, 2023

Qualitative data analysis was carried out using an interactive model. This model is carried out with several cycles in collecting, selecting, classifying, and processing the data obtained. The data used in this case are data from the results of literature reviews or studies, then the data is correlated and dialogued with theories and results of previous studies. The cycle was carried out repeatedly until complete research supporting data was obtained.

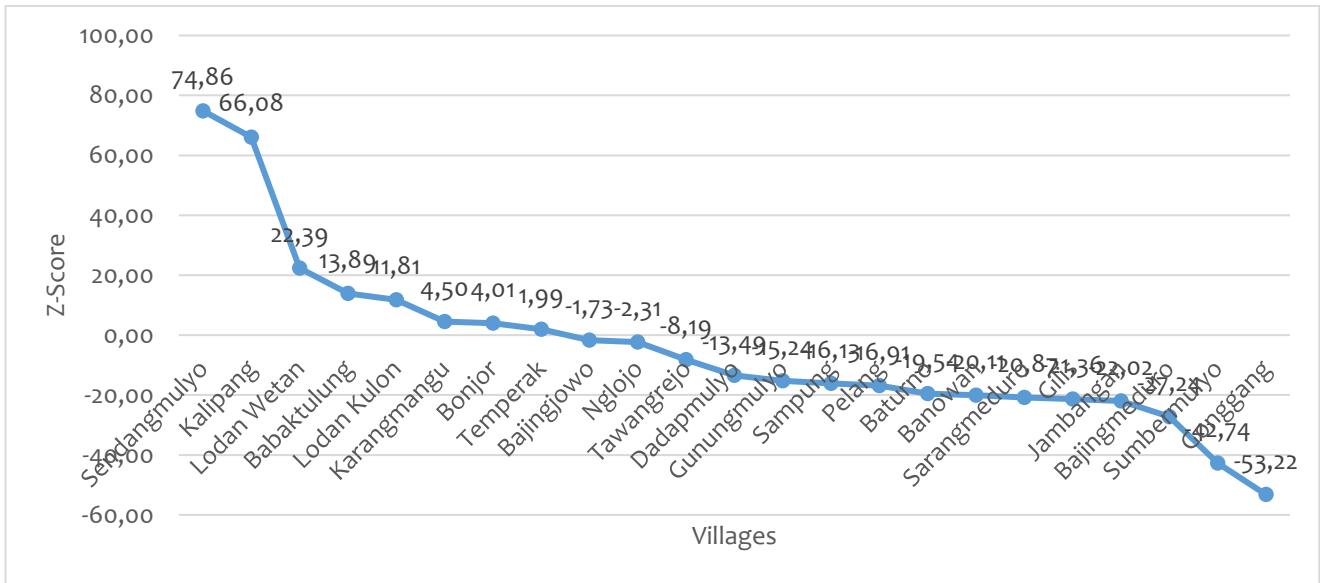
3. RESULT AND DISCUSSION

3.1. Empowered Village Mapping

This research has measured the empowerment of each village in East Rembang. Empowerment data on each aspect and all indicators are converted into a z-score so that it can be summed up, and the result of the z-score sum indicates the empowerment of a village. The z-score data is then sorted for each sub-district so that the ranking of the empowerment of a village in a sub-district can be mapped. The results of the mapping in Sarang District are shown in Figure 1.

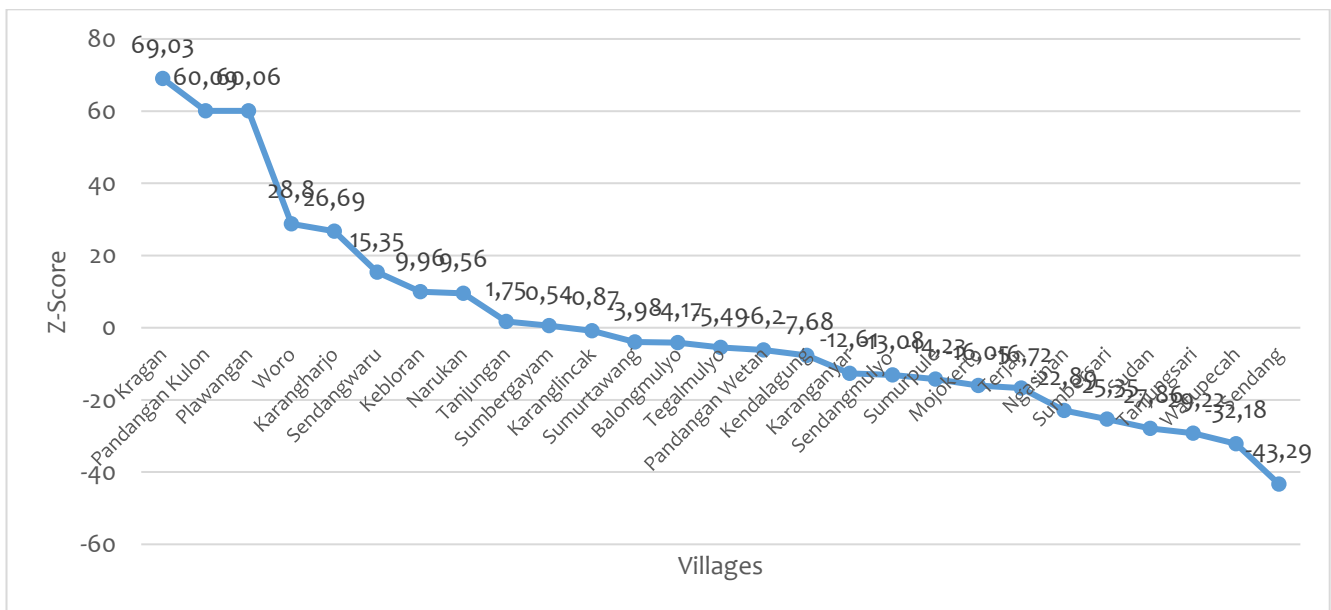
The mapping results show that the three villages with the highest empowerment are the villages of Sendangmulyo, Kalipang, and Lodan Wetan. Sendangmulyo Village has the highest score because of the seven aspects measured. There are three aspects with the highest significant scores: population, social, and economic. Kalipang Village is in second place because it is superior in geography, population, social, economy, and housing, with scores on population, social and economic aspects still below Sendangmulyo Village. Lodan Wetan Village is ranked third because it excels in social and economic aspects. Cumulatively, the z-score of Lodan Wetan Village differs significantly from Sendangmulyo and Kalipang Villages, but this score is the highest score among other villages, so Lodan Wetan Village is ranked third.

The results of the mapping in Kragan District are shown in Figure 2. Kragan Village has the highest level of empowerment in this District because it excels in five of the seven aspects measured, namely aspects of geography, population, social, economy, and housing. The ranking of the two empowered villages in this sub-district is Pandangan Kulon Village because it is superior in terms of geography, population, society, economy, and housing. The third rank is Plawangan Village, which is superior in economic, population, and social aspects.



Source: Results of Analysis, 2023

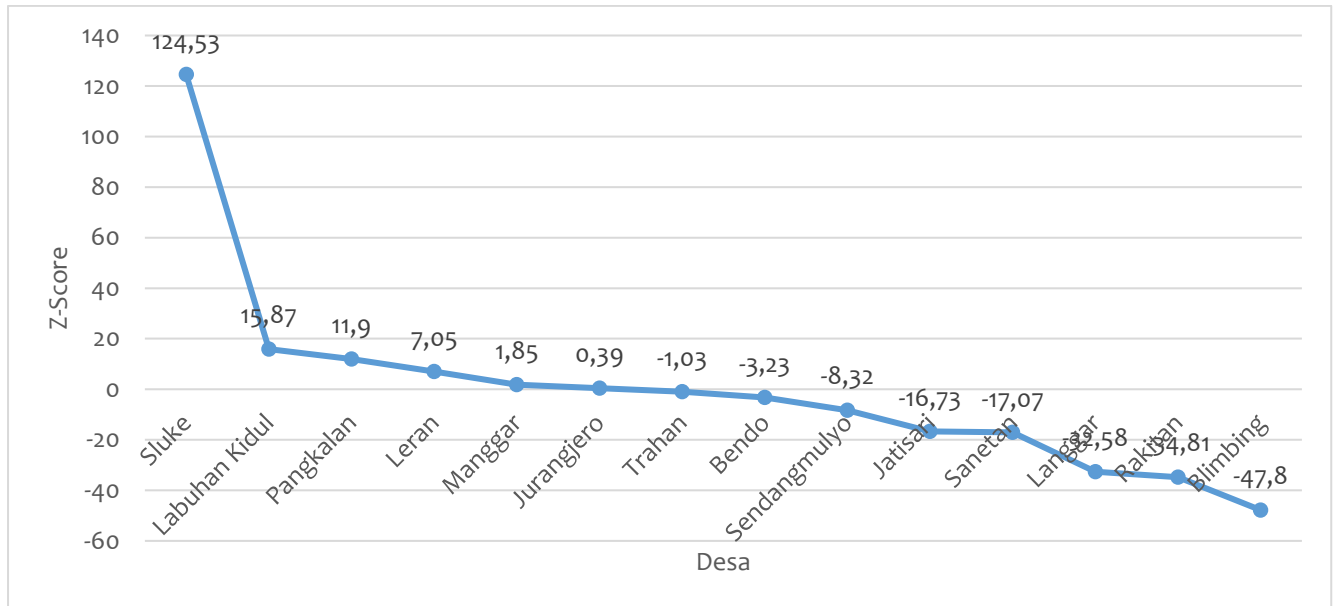
Figure 1. Mapping Results of Empowered Villages in Sarang District



Source: Results of Analysis, 2023

Figure 2. Mapping Results of Empowered Villages in Kragan District

The results of the mapping in Sluke District are shown in Figure 3. The most empowered village in this sub-district is Sluke Village, with very significant differences from other villages, for example, a z-score of 108.66 from Labuhan Kidul Village, a village with a second. Sluke Village is significantly empowered in all aspects measured. The following ranking is Labuhan Kidul Village which also excels in all aspects, such as geography, government, population, society, agriculture, economy, and housing, but its score is still lower than Sluke Village. The third rank is Pangkalan Village, which is superior in the social field, although it is quite poor in various other fields.



Source: Results of Analysis, 2023

Figure 3. Mapping Results of Empowered Villages in Sluke District

Based on previous calculations, village empowerment has been known in each sub-district. Furthermore, a cumulative calculation is carried out from the three existing sub-districts. The villages in the sub-district are 64, with Sarang, Kragan, and Sluke sub-districts having 23, 27, and 14 villages, respectively. The Empowerment ranking and categories of these villages can be shown in Table 6.

Table 6. Mapping Village Empowerment in East Rembang

Village	District	Score	Category	Ranking
Sluke	Sluke	124,53	Very Very Empowered	1
Sendangmulyo	Sarang	74,86	Very Empowered	2
Kragan	Kragan	69,03	Empowered	3
Kalipang	Sarang	66,08	Empowered	4
Pandangan Kulon	Kragan	60,09	Empowered	5
Plawangan	Kragan	60,06	Empowered	6
Woro	Kragan	28,8	Enough Empowered	7
Karangharjo	Kragan	26,69	Enough Empowered	8
Lodan Wetan	Sarang	22,39	Less Empowered	9
Labuhan Kidul	Sluke	15,87	Less Empowered	10
Sendangwaru	Kragan	15,35	Less Empowered	11
Babaktulung	Sarang	13,89	Less Empowered	12
Pangkalan	Sluke	11,9	Less Empowered	13
Lodan Kulon	Sarang	11,81	Less Empowered	14
Kebloran	Kragan	9,96	Less Empowered	15
Narukan	Kragan	9,56	Less Empowered	16
Leran	Sluke	7,05	Less Empowered	17
Karangmangu	Sarang	4,50	Less Empowered	18
Bonjor	Sarang	4,01	Less Empowered	19

Village	District	Score	Category	Ranking
Temperak	Sarang	1,99	Less Empowered	20
Manggar	Sluke	1,85	Less Empowered	21
Tanjungan	Kragan	1,75	Less Empowered	22
Sumbergayam	Kragan	0,54	Less Empowered	23
Jurangjero	Sluke	0,39	Less Empowered	24
Karanglincak	Kragan	-0,87	Less Empowered	25
Trahan	Sluke	-1,03	Less Empowered	26
Bajingjowo	Sarang	-1,73	Less Empowered	27
Nglojo	Sarang	-2,31	Not Empowered	28
Bendo	Sluke	-3,23	Not Empowered	29
Sumurtawang	Kragan	-3,98	Not Empowered	30
Balongmulyo	Kragan	-4,17	Not Empowered	31
Tegalmulyo	Kragan	-5,49	Not Empowered	32
Pandangan Wetan	Kragan	-6,2	Not Empowered	33
Kendalagung	Kragan	-7,68	Not Empowered	34
Tawangrejo	Sarang	-8,19	Not Empowered	35
Sendangmulyo	Sluke	-8,32	Not Empowered	36
Karanganyar	Kragan	-12,61	Not Empowered	37
Sendangmulyo	Kragan	-13,08	Not Empowered	38
Dadapmulyo	Sarang	-13,49	Not Empowered	39
Sumurpule	Kragan	-14,23	Not Empowered	40
Gunungmulyo	Sarang	-15,24	Not Empowered	41
Mojokerto	Kragan	-16,05	Not Empowered	42
Sampung	Sarang	-16,13	Not Empowered	43
Terjan	Kragan	-16,72	Not Empowered	44
Jatisari	Sluke	-16,73	Not Empowered	45
Pelang	Sarang	-16,91	Not Empowered	46
Sanetan	Sluke	-17,07	Not Empowered	47
Baturno	Sarang	-19,54	Not Empowered	48
Banowan	Sarang	-20,11	Not Empowered	49
Sarangmeduro	Sarang	-20,87	Not Empowered	50
Gilis	Sarang	-21,36	Not Empowered	51
Jambangan	Sarang	-22,02	Not Empowered	52
Ngasinan	Kragan	-22,89	Not Empowered	53
Sumbersari	Kragan	-25,35	Not Empowered	54
Bajingmeduro	Sarang	-27,24	Not Empowered	55
Sudan	Kragan	-27,86	Very Not Empowered	56
Tanjungsari	Kragan	-29,22	Very Not Empowered	57
Watupecah	Kragan	-32,18	Very Not Empowered	58
Langgar	Sluke	-32,58	Very Not Empowered	59

Village	District	Score	Category	Ranking
Rakitan	Sluke	-34,81	Very Not Empowered	60
Sumbermulyo	Sarang	-42,74	Very Not Empowered	61
Sendang	Kragan	-43,29	Very Not Empowered	62
Blimbing	Sluke	-47,8	Very Not Empowered	63
Gonggang	Sarang	-53,22	Very Not Empowered	64

Source: Results of Analysis, 2023

Based on Table 6, it can be seen that there are seven categories of empowered villages in East Rembang. There is one village in the Very Very Empowered category (1%), one village in the Very Empowered category (2%), four villages in the Empowered category (6%), two villages in the Enough Empowered category (3%), nineteen villages in the Less Empowered category (30%), twenty-eight villages in the Not Empowered category (44%), and nine villages in the Very Not Empowered category (14%).

3.2. Village Empowerment in East Rembang Based on Its Aspects

3.2.1. Village Empowerment in Geographic Aspects

In terms of geography, village empowerment in East Rembang is very diverse. In general, it is known that the three villages with the highest empowerment are Sluke Village, Sluke District; Sendangmulyo Village, Sarang District; and Kragan Village, Kragan District, which is close to the district capital. It is stated by Nurhidayani et al. (2016) that the distance to the sub-district capital significantly affects village empowerment. The sub-district capital is usually the center of ongoing economic, educational, socio-cultural activities, and so on, so the closer it is to the sub-district capital, the more prosperous a village will be. Conversely, the farther from the sub-district capital, the less prosperous the village is. Even so, proximity to the sub-district capital is not the only indicator. Other indicators also affect village empowerment.

The area utilized for welfare, such as for agriculture and plantations, is also an indicator of the empowerment of a village. The wider the land that can be cultivated and utilized, the more benefits will be obtained. For example, Sluke Village, Sluke District, has an extensive area, 466.12 Ha, which is also used for paddy fields, dry land, and ponds. Bangkok's land area also influences village empowerment. Land owned by a village can be used optimally, such as for opening rice fields and plantations, shops, and so on (Balafif & Madhani, 2020). Increased welfare with land ownership is also supported by research (Molina et al., 2017). Even so, the study also stated that this influence tends to be small because the existence of the land is also influenced by various other factors such as soil fertility, human resources managing it, and the type of business applied.

3.2.2. Village Empowerment in Governance Aspects

The presence of village officials shows empowerment in the aspect of government. A complete village apparatus consists of a village chief, village secretary, chief of general affairs and planners, chief of finance, and head of the village. If the position of each village apparatus is filled by officers who are complete and able to carry out their duties properly, then these apparatus will undoubtedly be able to move the community and help the community in various interests. On the other hand, if these devices cannot carry out their duties properly or even if there are no officers to fill these positions, there is no community to mobilize or empower. It is also possible that various community affairs related to these officers will be hampered or delayed. It will ultimately affect village empowerment (Setyobakti, 2017).

For example, the three villages with the highest empowerment in East Rembang all have complete village apparatus. Therefore, the village can have high empowerment because village officials can carry out their duties to become stabilizers, innovators, pioneers, and modernizers in managing village potential. As for villages with incomplete village officials, they will have lower welfare than villages with complete village officials and can carry out their roles properly. This statement is supported by Amantha (2021), who states

that village officials play an essential role in developing the village and improving community welfare. If village officials cannot carry out their roles properly and there are not even officers, then village welfare will also be disrupted.

3.2.3. Village Empowerment in Population Aspects

Residents are subjects who can make efforts to change the village. In general, a village will be empowered if it has good human resources (HR), where these human resources can proactively utilize existing natural resources (SDA) and manage village potential. The population in quantity does not affect village empowerment. It means that even though the population is enormous, they are not proactive in developing the village's potential or increasing their capabilities, so the presence of these residents does not affect village empowerment. It will provide an additional burden (Aini et al., 2018).

The ability of human resources to carry out village development and empowerment is influenced by one of the main factors, namely the educational factor. The higher the level of education in a village, the hope that more innovations will be developed to increase empowerment. In addition, higher education also allows people to earn higher incomes, which in turn will affect people's welfare. As expressed by Syamsurijal (2008), improving the education level will positively affect the level of income per capita of the community. Therefore, the population aspect in this study does not only calculate the population according to the existing data but also takes into account the education level of the village.

3.2.4. Village Empowerment in Social Aspects

Social aspects also influence village empowerment. This aspect is measured from various indicators, including the number of schools and tertiary institutions, the ease of access, and the number of teachers, lecturers, students, and students from the village. The more schools, educators, and students in a village indicate that the village is an educated village and vice versa. Research conducted by Sugiharto (2007) shows this, where the study found that some of the fishermen's considerations in sending their children to school include distance. Fishermen will choose to send them to closer schools. The assumption is that the closer the distance to school, the more children attend. Villages that have many schools will undoubtedly become more empowered. Likewise, the number of students and teaching staff also shows empowerment from the educational aspect, which will become an asset in developing various other aspects.

Another indicator that influences this is the availability of health facilities and the ease of access to these facilities. If health facilities are available, then if there are people who are sick or have an accident, they can be helped immediately. The existence of health facilities will also be a means to provide education to the public so that people always maintain their health. On the other hand, if there are no health facilities, people from the village must travel longer to get to the health facilities they need. In addition, the availability of health facilities is also crucial for realizing village empowerment; for example, when the village opens tourism where one of the aspects that must be considered in the development of a tourist village is adequate health facilities to provide tourists with a sense of security (Iriani, 2019).

The existence of waqf land also has a significant effect on village empowerment. The donated land will usually become joint property and be used for the common good. Waqf land in East Rembang is generally used for various purposes, such as the construction of mosques, schools, Islamic boarding schools, mosques, cemeteries, and health centers. Waqf can be used to improve the welfare of the people (Salmawati, 2019). The existence of waqf land plays a vital role in village empowerment. With the voluntarily given land, the community can use it for various educational, social, and economic activities to increase village empowerment (A'yuni, 2018).

Marital status is also an indicator that is measured in this aspect. Marital status will significantly impact the quality of life, where a good and harmonious marriage will improve the quality of life for each family member. It is as revealed by Astuti (2019), who researched the elderly, where the elderly who have a partner or are still in marital status, their quality of life will increase and vice versa. Even so, marriages should be carried out when the prospective husband and wife are ready to marry, so they do not marry early. Many

studies show that early marriage also hurts the sustainability of household life (Mangande et al., 2021). This research assumes that marriage is not done early and brings harmony to all family members.

Marital status is also assumed to be the opposite of divorce. Divorce will hurt each family member. Mothers who experience divorce will experience stress at a mild level, as mentioned by Asilah & Hastuti (2014). Divorce, in general, also hurts child development. Children who live in broken households where their parents are divorced will experience stunted development compared to children in general. These children will experience emotional turmoil, anxiety, to depression. This condition will make children vulnerable to being dragged into juvenile delinquencies, such as brawls, smoking, drinking, and so on, as a form of expression of the difficulties experienced in life. Not infrequently, children even attempt suicide. It then became the basis for this research to assume that marriage and reconciliation have a positive impact while divorce and divorce have a negative impact which will directly or indirectly affect village empowerment (Khairunnisa et al., 2021).

Other social aspects measured in this study are the availability of public transportation and road conditions. Public transportation is beneficial for people to carry out economic activities, for example, delivering to the center of the economy and delivering merchandise, as well as a means to save fuel by not driving individually. In addition, the existence of roads that lead people to find a living is also an aspect that is measured. It is hoped that the road can also be passed by four or more wheeled vehicles, where these vehicles are usually a means of carrying out economic activities. If there is effortless road access, the village's empowerment score will differ from villages with minimal road access. It doesn't even exist yet, so various other activities are hampered (Prayitno et al., 2020).

The research results of Farida (2013) in rural areas in Bumijawa District, Tegal Regency, also show something similar. This quantitative study concluded that villages that have high accessibility with easily accessible roads and allow access for large vehicles would have higher empowerment compared to villages with low accessibility. The research shows that there is a strong influence between the two. Even so, the study also stated that accessibility had a weak effect on the empowerment of village communities. It means that village empowerment is influenced by various other aspects, not only the accessibility factor, which in this study is indicated by the availability of public transportation, road conditions, and the possibility of roads being loaded with large vehicles.

Another indicator that is measured on the social aspect is related to the existence of an expedition or delivery service. Along with the times, many people's activities have also changed, including buying and selling activities. Currently, more and more buying and selling transactions are being carried out online through social media and marketplaces (Afrianto & Irwansyah, 2021). The availability of expeditions will enable people to open businesses, where the expedition will make it easier for people to send the products they sell to buyers. In addition, as a buyer, the existence of expeditions close to the community will also enable the community to meet various needs quickly, both in the form of personal needs and the needs of the community at large (Hasibuan & Rambe, 2020).

3.2.5. Village Empowerment in Agricultural Aspects

The agricultural aspect is the next aspect that forms the basis for determining empowered villages. Referring to BPS, the indicator that is measured to determine empowerment in this aspect is the existence of a village pond. The village pond will be a capital for the community to carry out agricultural activities. The more village reservoirs available, the more well-supported agricultural activities will be, and vice versa. Agricultural activities indeed cannot be separated from the presence of water which in this case can be produced by the village pond. Lack of water due to drought will affect the productivity of agricultural activities, so a village pond is needed to reduce this deficit. It is what Cemoro Village, Wonobojo District, Temanggung Regency has done, which is developing a village pond to meet the water deficit in the area. The reservoir is expected to meet all people's needs for water, especially for agricultural activities (Priambodo et al., 2015).

Embung nowadays is also a government program to support irrigation activities in agriculture. Even so, the use of embung often encounters problems. Among them, there is no clear management structure, the reservoir has suffered damage to the building, and the reservoir has not yet functioned as intended (Wilopo et al., 2020). The benefits of using the reservoir for village development will be seen if the use of the reservoir can be optimized. As for this study, the embung is considered to have functioned properly so that it can provide benefits to the community. It also supports the formation of an empowered village.

3.2.6. Village Empowerment in Economic Aspects

The next aspect being measured is the economic aspect. This aspect is measured from the first indicator, which relates to economic infrastructure such as markets, minimarkets, restaurants, and hotels. The availability of economic facilities and infrastructure, such as markets, certainly makes it easier for people to obtain economic resources, for example, by selling various products. The existence of various hotels, minimarkets, and restaurants also makes it possible to reduce unemployment and increase people's income. Various grocery stores, restaurants, and so on, it is a business that can be opened by the community itself, depending on each community's creativity. In general, it can be seen that various economic infrastructure facilities, such as markets, are available. Various opportunities to increase the level of the economy are also wide open. One of the influential factors, in this case, is the creativity of the community to create innovation. The critical factor for the emergence of innovation in village communities is the existence of pioneer figures and good collaboration between various village components (Sofianto, 2020).

The next indicator is the existence of financial institutions such as banks and cooperatives. Banks allow people to borrow money as initial capital for businesses or to meet other needs. For example, the capital loan from the bank will enable the community to open and grow a business so that the community can empower themselves with their business and even be able to open job vacancies for other community members. In addition, a bank in a village will also provide low-interest rates for the community so that the community will be facilitated in paying off their debts. Banks usually also provide education to the community and special cooperation programs between the bank and the government for the community that is adjusted to the existing village potential, whether in the form of agriculture, fisheries, creative industries, etc. These advantages will empower the village without getting involved with financial providers that provide considerable interest, such as online loans (Utomo, 2018). Like banks, cooperatives also support the community's economy, which is adjusted to the type of cooperative (Launuru, 2015).

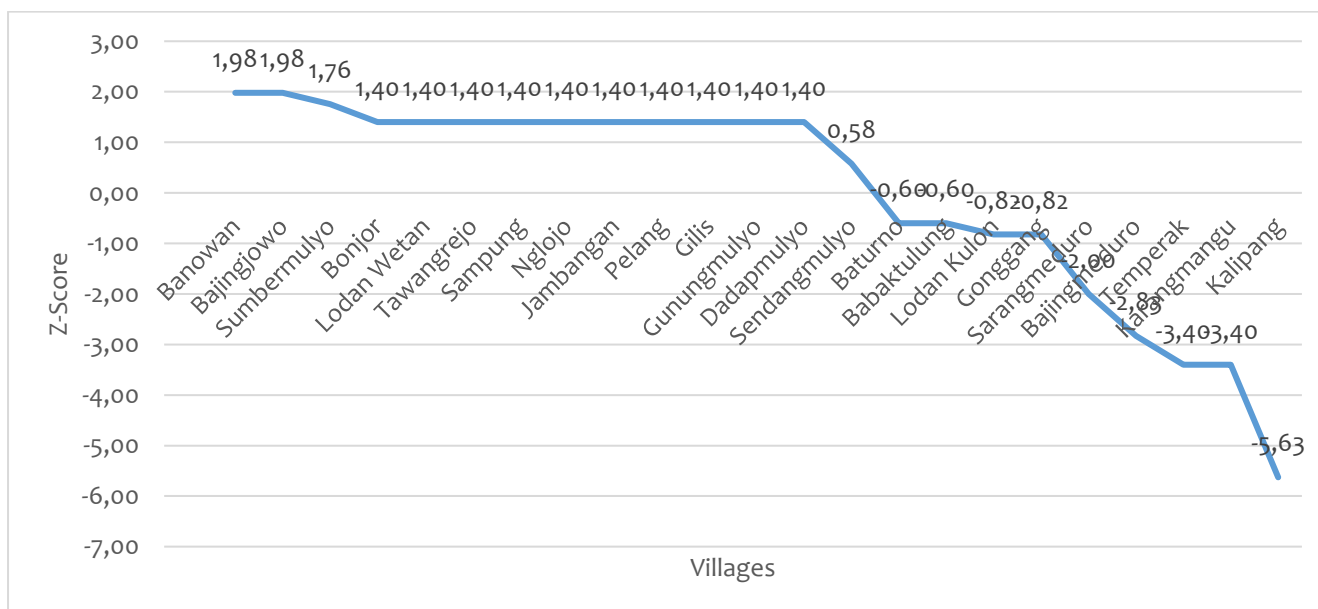
The last indicator is the means of communication. Means of communication certainly significantly affect village empowerment, considering that all aspects of life are closely related to communication, especially using the internet. The presence of cell phone provider towers will facilitate signal conditions. Subsequent signal conditions will also affect various activities and work, where the higher the signal, the easier it will be to carry out related activities. The number of operators available in the village also has an effect, where the more operators, the more choices can be made. The availability of these communication facilities enables the community to carry out various activities, including education, employment, economic transactions, and so on, so that the community is empowered by meeting all their needs (Juditha, 2020; Subiakto, 2013).

3.2.7. Village Empowerment in the Housing Aspect

The last aspect that is measured in village empowerment is the housing aspect. This aspect can be seen from the indicators in the number of families using PLN electricity. Electricity is an integral part of society, where almost all activities require electricity. Concerning empowerment, various businesses run by the community need electricity, such as supermarkets, hotels, food manufacturing businesses, printing and photocopying businesses, etc. The absence of electricity hinders the community from carrying out these various activities, so the community cannot meet their needs. Meanwhile, if electricity is available, the community can carry out various activities that make community empowered. In line with that, Sambodo et al. (2016) also stated that electricity contributes significantly to people's welfare.

3.3. Mapping Results of Disaster Resilient Villages

In addition to measuring village empowerment, this research also measures the resilience of villages in East Rembang to disasters. Disaster resilience data for each aspect and indicator are all converted into z-scores so they can be summed up, and the result of the z-score sum indicates the disaster resilience of a village. The z-score data is then sorted for each sub-district so that the ranking of the empowerment of a village in a sub-district can be mapped. The results of the mapping in Sarang District are shown in Figure 4.

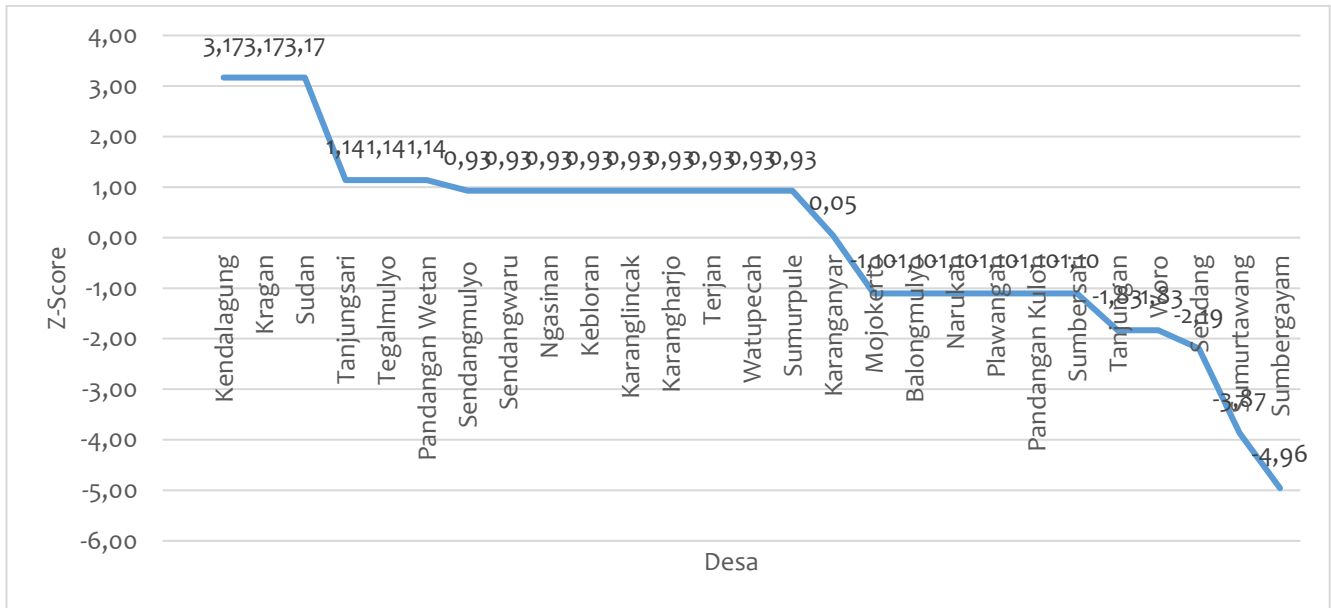


Source: Results of Analysis, 2023

Figure 4. Mapping Results of Disaster Resilient Villages in Sarang District

Sarang Sub-District has twenty-three villages where when the village's resilience to disasters is measured, there are ten different scores. Starting from the highest ranking, namely Banowan and Bajingjowo Villages, with a z-score of 1.98, to Kalipang Village in tenth place with a z-score of -5.63. Banowan and Bajingjowo villages are ranked highest because they are safe from various types of disasters, there have never been casualties during a disaster, they have disaster anticipation and mitigation facilities, and they have carried out various natural disaster mitigation efforts even though these two areas are areas prone to abrasion but do not yet have mitigation facility.

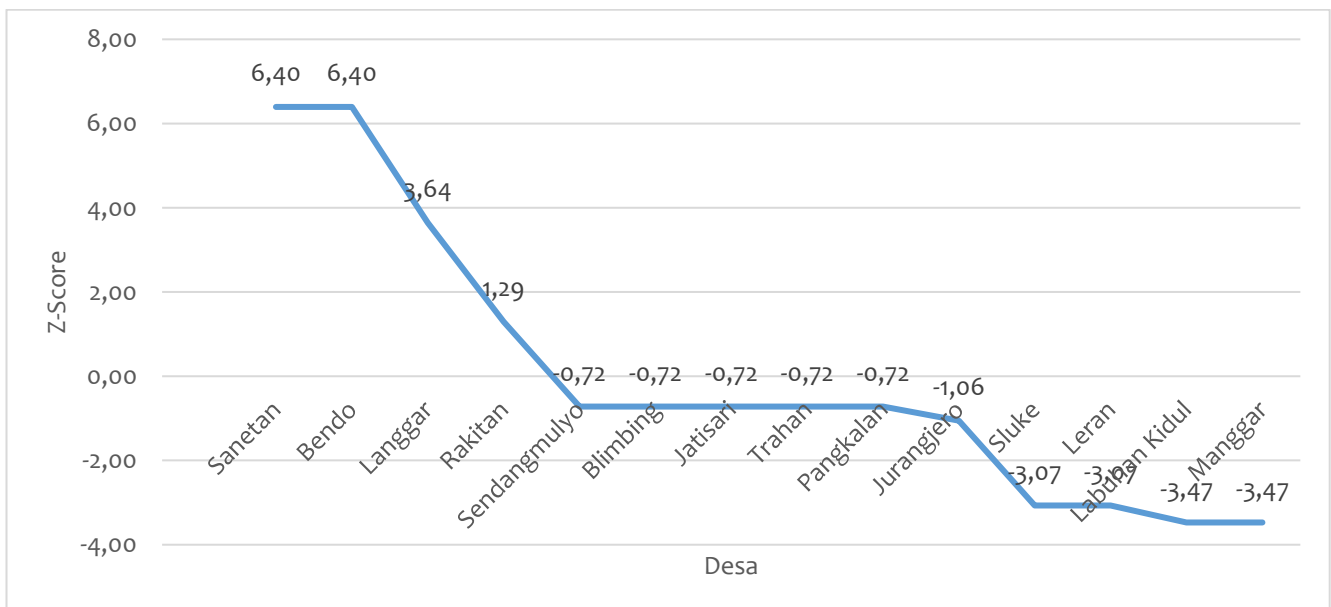
The next subdistrict is the Kragan Subdistrict which has twenty-seven villages with the final disaster resilience score consisting of nine different types of scores. Among them are the villages of Kendalagung, Kragan, and Sudan, ranked first with a score of 3.17, and Sumbergayam Village, ranked ninth with a score of -4.96. The village with the highest score can meet all the criteria for disaster resilience, namely being safe from various types of disasters, never losing any lives during a disaster, having disaster anticipation and mitigation facilities, including an early warning for a tsunami disaster, and having made various natural disaster mitigation efforts.



Source: Results of Analysis, 2023

Figure 5. Mapping Results of Disaster Resilient Villages in Kragan District

The last subdistrict is Sluke Subdistrict which has fourteen villages with a final disaster resilience score consisting of seven different scores. Among them are the villages of Sanetan and Bendo, ranked first with a score of 6.40, and the villages of Labuhan Kidul and Manggar, ranked seventh with a score of -3.47. Sanetan and Bendo villages were ranked highest because they had the highest z-scores for all aspects measured. In detail, it can be seen that both are safe from various types of disasters, there have never been casualties during a disaster, have disaster anticipation and mitigation facilities, have carried out various natural disaster mitigation efforts, and are not tsunami-prone areas so that the need to install a tsunami early warning is not urgent.



Source: Results of Analysis, 2023

Figure 6. Mapping Results of Disaster Resilient Villages in Sluke District

After measuring and mapping each village, a joint mapping of the three villages in East Rembang was carried out. The results show that most of the existing villages have the same score, with other villages in one sub-district and other villages from different sub-districts, so twenty-three ranks are obtained from all the villages measured. The results can be detailed in Table 7.

Table 7. Mapping of Disaster Resilient Villages in East Rembang

District	Village	Total Score	Category	Ranking
Sluke	Sanetan	6,40	Very Very Tough	1
Sluke	Bendo	6,40	Very Very Tough	
Sluke	Langgar	3,64	Very Tough	2
Kragan	Kendalagung	3,17	Tough	3
Kragan	Kragan	3,17	Tough	
Kragan	Sudan	3,17	Tough	
Sarang	Banowan	1,98	Tough	4
Sarang	Bajingjowo	1,98	Tough	
Sarang	Sumbermulyo	1,76	Tough	5
Sarang	Lodan Wetan	1,40	Tough	6
Sarang	Tawangrejo	1,40	Tough	
Sarang	Sampung	1,40	Tough	
Sarang	Nglojo	1,40	Tough	
Sarang	Jambangan	1,40	Tough	
Sarang	Pelang	1,40	Tough	
Sarang	Gilis	1,40	Tough	
Sarang	Gunungmulyo	1,40	Tough	
Sarang	Dadapmulyo	1,40	Tough	
Sluke	Rakitan	1,29	Tough Enough	
Kragan	Tanjungsari	1,14	Tough Enough	8
Kragan	Tegalmulyo	1,14	Tough Enough	
Kragan	Pandangan Wetan	1,14	Tough Enough	
Kragan	Sendangmulyo	0,93	Tough Enough	9
Kragan	Sendangwaru	0,93	Tough Enough	
Kragan	Ngasinan	0,93	Tough Enough	
Kragan	Kebloran	0,93	Tough Enough	
Kragan	Karanglincak	0,93	Tough Enough	
Kragan	Karangharjo	0,93	Tough Enough	
Kragan	Terjan	0,93	Tough Enough	
Kragan	Watupecah	0,93	Tough Enough	10
Kragan	Sumurpule	0,93	Tough Enough	
Sarang	Sendangmulyo	0,58	Tough Enough	11
Kragan	Karanganyar	0,05	Tough Enough	12
Sarang	Bonjor	0,00	Tough Enough	13
Sarang	Baturno	-0,60	Less Tough	

District	Village	Total Score	Category	Ranking
Sarang	Babaktulung	-0,60	Less Tough	
Sluke	Sendangmulyo	-0,72	Less Tough	
Sluke	Blimbing	-0,72	Less Tough	
Sluke	Jatisari	-0,72	Less Tough	14
Sluke	Trahan	-0,72	Less Tough	
Sluke	Pangkalan	-0,72	Less Tough	
Sarang	Lodan Kulon	-0,82	Less Tough	
Sarang	Gonggang	-0,82	Less Tough	15
Sluke	Jurangjero	-1,06	Less Tough	16
Kragan	Mojokerto	-1,10	Less Tough	
Kragan	Balongmulyo	-1,10	Less Tough	
Kragan	Narukan	-1,10	Less Tough	
Kragan	Plawangan	-1,10	Less Tough	17
Kragan	Pandangan Kulon	-1,10	Less Tough	
Kragan	Sumbersari	-1,10	Less Tough	
Kragan	Tanjungan	-1,83	Less Tough	
Kragan	Woro	-1,83	Less Tough	18
Sarang	Sarangmeduro	-2,00	Not Tough	19
Kragan	Sendang	-2,19	Not Tough	20
Sarang	Bajingmeduro	-2,83	Not Tough	21
Sluke	Sluke	-3,07	Not Tough	
Sluke	Leran	-3,07	Not Tough	22
Sarang	Temperak	-3,40	Not Tough	
Sarang	Karangmangu	-3,40	Not Tough	23
Sluke	Labuhan Kidul	-3,47	Not Tough	
Sluke	Manggar	-3,47	Not Tough	24
Kragan	Sumurtawang	-3,87	Very Not Tough	25
Kragan	Sumbergayam	-4,96	Very Not Tough	26
Sarang	Kalipang	-5,63	Very Not Tough	27

Source: Results of Analysis, 2023

Based on Table 7, it can be seen that seven categories of the resilience of villages in East Rembang to disasters. There are two villages in the Very Very Tough category (3%). There is one village (2%) in the Very Tough category. There are fifteen villages in the Tough category (23%). There are sixteen villages in the Tough Enough category (25%). Villages with the Less Tough category are eighteen villages (28%). There are nine villages in the Not Tough category (14%). Three villages are in the Very Not Tough category (5%).

3.4. The resilience of Villages in East Rembang to Disasters Based on Their Aspects

Disaster resilience in East Rembang can be measured based on several aspects described as follows:

3.4.1. Safety Value of Various Types of Disasters Based on Disaster Events

Security from various types of disaster threats exist, one of which can be seen from disaster events that have occurred before. The more disaster events occur, the more vulnerable the area is to a particular disaster and vice versa. As stated by BNPB (2022), the hazard map of an area is composed of two components, namely, the probability of a disaster and the intensity of the disaster. If the higher the probability of future disasters and the higher the intensity of disaster events, then an area's vulnerability value will be higher or mean that the safety value is low. The lower the security value, the less resilient the area is against natural disasters.

3.4.2. Safety Value of Various Types of Disaster Based on the Number of Casualties

Security from various types of disaster threats can also be seen from the number of victims during the disaster. One of the many fatalities shows the intensity of the disaster. The greater the intensity of the disaster, the more victims usually will also be, and vice versa. BNPB (2022) states that areas that have experienced disaster incidents with high fatalities have a disaster risk index in the "high" category. Among them are Aceh Province, which experienced an earthquake and tsunami in 2004 which resulted in more than 200,000 fatalities; Bengkulu Province, which experienced an earthquake in 2000 and resulted in many fatalities; and Banten Province, which was also affected by the Sunda Strait tsunami in 2018 and claimed many lives. In 2021, these three provinces will be declared to have a high disaster risk index.

3.4.3. Existence of Pre-Natural Disaster Mitigation Facility

The existence of pre-natural disaster mitigation facilities is one form of countermeasure so that disasters can be prevented. Even if it cannot be prevented, the community can be more prepared to save themselves and their families and valuables so that losses due to disasters can be reduced. The pre-natural disaster mitigation facility, which is an essential point in this research, is the existence of an early warning system (EWS). EWS is known to be able to reduce losses due to natural disasters. Previous research conducted by Adriyani et al. (2019) stated that using EWA could reduce losses due to natural disasters by up to 74.4% from before. If losses can be reduced, a village will indirectly become more resilient to disasters. It is supported by Arini et al. (2018), which state that EWS is also essential in building a disaster-ready village.

Overall, Indonesia has minimal pre-natural disaster mitigation facilities in the form of an early warning system (EWS) or natural disaster early warning system. BPS Indonesia (2020) states that in the coastal area of Central Java, there are only 89 villages by the sea that have it. This number is undoubtedly less compared to the number of villages on the coast of Central Java. Worse than that, the coastal areas in the Province of DKI Jakarta and the Bangka Belitung Islands are recorded to have only two villages with EWS facilities, Central Kalimantan Province only one village, and Jambi and South Sumatra Provinces where not even a single village has EWS facilities. Given the small number of EWS in various provinces in Indonesia, it is not surprising that in East Rembang, only a few villages have EWS facilities.

3.4.4. Existence of Natural Disaster Emergency Response Mitigation Facility

The existence of facilities that assist the mitigation process when a natural disaster occurs is also essential to have. Among these facilities are safety equipment, signs, and disaster evacuation routes. The availability of these facilities will certainly make it easier for the community to evacuate in an emergency response when a disaster occurs. Mitigation facilities at the time of the disaster, according to Supartini et al. (2017), can be done before a disaster occurs so that the facility is ready for use when a disaster occurs. Among those that can be prepared are evacuation routes accompanied by evacuation route instructions so that the evacuation process can be more easily carried out during a disaster. The facilities that have been

prepared should also be tested together with the community through disaster preparedness training, as mentioned by Tamuntuan et al. (2019).

3.4.5. Pre-Natural Disaster Mitigation Efforts

Natural disasters are a threat to humanity that can be overcome. Various efforts can be made to overcome or reduce the risk of natural disasters that are adjusted to the vulnerability of each type of disaster. When people make disaster management efforts, such as planting mangroves, not mining sand on the beach, not destroying coral reefs, normalizing waters, and so on, disaster vulnerability can be reduced. Several villages in East Rembang have made this effort, but several areas have not. Villages recorded as having carried out mitigation efforts are calculated to have higher preparedness than villages that have not carried out these mitigation efforts. This is as mentioned by Maulana et al. (2016), who have conducted research in Rembang Regency, especially on abrasion disasters; the community must carry out pre-natural disaster mitigation to carry out prevention, where mitigation can be adjusted to the socio-economic conditions of the community and existing natural conditions.

3.4.6. Tsunami Disaster Vulnerability and Existence of Special Tsunami Early Warning

East Rembang is an area located on the coast of the Rembang Regency. As a coastal area, one of the disasters that are very prone to occur is the tsunami disaster. Shidqi & Sugiri (2015) stated that the coast often experiences various natural disasters such as abrasion, tidal floods, and tsunamis. Tsunamis are very devastating disasters where the impact can swallow hundreds to millions of lives. Data compiled by BNPB (2016) mentions tremendous losses from the tsunami in various regions in Indonesia, namely four million fatalities and total losses exceeding seventy-one trillion. Given the vulnerability of the tsunami disaster, the Indonesian government then developed InaTEWS (Indonesia Tsunami Early Warning System) at several points to provide early warning of a tsunami disaster so that people can better prepare themselves (Supartini et al., 2017).

The number of InaTEWS in all regions in Indonesia is limited. BPS Indonesia (2020) states that on the coast of Central Java, there are only 48 villages that have these facilities. Several provinces even indicated that none of their villages on the coast had InaTEWS. Among these provinces are Jambi, Riau, South Sumatra, Central Kalimantan, West Kalimantan, South Kalimantan, Riau Islands, Bangka Belitung Islands, and Southeast Sulawesi. Given the small number of InaTEWS spread across villages in Indonesia, it is not surprising that only a few villages in East Rembang have InaTEWS. Several villages in East Rembang are listed as tsunami-prone areas, but these villages have not yet installed early tsunami warnings.

EWS itself is not the only tsunami disaster mitigation effort. Various other efforts can be made to make the community resilient in facing the tsunami. Among them is by increasing the capacity of the community to be more prepared for a disaster. It can be realized by cooperation between community components, such as the community and village officials, volunteers, TNI, Polri, and so on. These various elements of society can carry out training and simulations of tsunami disasters as carried out by the Serang BPBD, which are mentioned in the research of Anwar et al. (2020). In addition, so that the implementation of mitigation activities can run effectively, the Government of Serang Regency also made a legal umbrella through Regional Regulation No. 4 of 2014 concerning Disaster Management in Serang Regency, which is contained in Article 22 paragraph (2). These efforts are expected to increase the resilience of the tsunami disaster in Serang District, which can be emulated by other regions such as East Rembang.

3.5. Research Limitations

This research has two limitations. First, this study only uses data from library sources so that the truth cannot be validated or confirmed using various other techniques. Second, only use data from the National Disaster Management Agency (BNPB) from the last year, namely 2021. In fact, to see village empowerment and resilience to disasters comprehensively, data is needed to see the village's track record for several years final.

4. CONCLUSION

Based on the discussions that have been carried out, the empowerment and resilience of villages in East Rembang can be mapped into seven categories, respectively. The results show that village empowerment respectively in the categories of Very Very Empowered, Very Empowered, Empowered, Enough Empowered, Less Empowered, Not Empowered, and Very Not Empowered are 1, 1, 4, 2, 19, 28, and 9 villages. The village resilience to disasters respectively in the categories of Very Very Tough, Very Tough, Tough, Tough Enough, Less Tough, Not Tough, and Very Not Tough are 2, 1, 15, 16, 18, 9, and 3 villages. The three with the highest empowerment are Sluke Village, Sluke District; Sendangmulyo Village, Sarang District; and Kragan Village, Kragan District. The three villages with the highest disaster resilience are Sanetan, Bendo, and Langgar Villages in Sluke District. The mapping results show that the three villages with the highest empowerment are Sendangmulyo, Kalipang and Lodan Wetan Villages. Sendangmulyo Village has the highest score because of the seven aspects measured. There are three aspects with the highest significance value: population, social and economic. Kalipang Village was ranked second because it was superior geographically, populationally, socially, economically and housingly, with scores on population, social and economic aspects still below Sendangmulyo Village. Lodan Wetan Village was ranked third because it excelled in social and economic aspects.

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