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ASSESSING SURVIVAL FACTORS OF RICE FARMERS IN THE FLOOD-PRONE AREA: A CASE STUDY IN BOJONEGORO DISTRICT, INDONESIA

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Abstract: Bojonegoro is one of the largest producing districts in East Java Province, Indonesia. However, from year to year, floods become a problem that impacts the resilience of farmers in producing agricultural products. This study found out how the farmer could survive in these uncertain times. This research method is survey research. Samples were collected from 217 rice farmers in six sub-districts. The sub-districts were selected based on their vulnerability to flooding at a medium to a high level. Structural Equation Modeling (SEM) is used in this study to confirm the measurement model. This study revealed that nature, man, society, and networks significantly impact the resilience of farming communities in flood-prone areas in Bojonegoro. Meanwhile, the Shell factor is the only element that does not affect rice farmers' survival in Bojonegoro flood-prone areas. These results prove that the survival of farmers is highly dependent on factors that affect their daily lives. Meanwhile, flooding is not a problem because it only occurs on average 1-2 times per year.

Key words: survival, farmer, flood, settlement principles, SEM

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INTRODUCTION

Climate change is a worldwide issue that is extensively studied in geography due to its significant influence on natural conditions and human existence. Climate change's consequences are becoming more visible in a variety of ways around the globe. A critical challenge is addressing climate change and its harmful consequences both now and in the future. Various political initiatives have been formed on a global scale, including the G8 summit, which is considerably more serious and intensive than in the past (Sumi et al., 2010). Many studies have been conducted on the influence of climate change on the geosphere system on Earth. The circulating gases in the atmosphere; solar radiation; weather conditions; volcanic activity; sea wave; coastal destruction; and rise in sea level are all physical characteristics that may change (Letcher, 2009). Meanwhile, human life-related vulnerability include those connected to food, water, energy, shelter, and health. These are critical societal sectors, and each is vulnerable to the impacts of climate change. Because of the vulnerability to environmental changes, the influence of climate change has the potential to affect human interactions (NRC, 2010). Humans and Earth's physical systems are intimately connected. Humans, the primary cause of climate change, are the most endangered. Ocean currents, hydrology, agricultural systems, and the intensity of natural catastrophes such as floods, landslides, and volcanic eruptions that may have an influence on human survival are all factors to consider. Even though it is a concern for humans, just a few are aware of it. Flooding risk is growing globally, which must be evaluated as the influence of hazard, high risk, and susceptibility; each of these components must be addressed and studied if searching for explanations for this growth. The primary causes are the fast increase in the value placed by individuals in flood-prone areas, as well as their increasing vulnerability to their belongings. Climate change is also having an impact on the

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hydrological hazard situatiion in many places that extremely rises (Kron, 2005). The Indonesian people are suffering the effects of natural disasters such as floods caused by climate change. According to National Disaster Management Agency of Indonesia (*BNPB-Badan Nasional Penanggulangan Bencana*) statistic data, there were 1,138 flood natural disasters in Indonesia in 2020, with 188 people killed, 22 people missing, 204 people wounded, 20,011 residences destroyed, and 2886 public buildings damaged. East Java was one of the provinces that had a significant amount of flooding in 2020. East Java was hit by 117 natural disasters, which covered 31 cities and districts. This statistic represents 10.28 % of all flood disasters in Indonesia. Floods have a significant impact on the people of East Java's daily lives, particularly in the agricultural sector.

East Java is one of Indonesia's food producing provinces. This statement is based on statistics (BPS-Statistics Indonesia, 2016) showing that East Java has the greatest rice production in Indonesia. In 2020, the overall national rice output is 55,160,548 tons, whereas East Java produces 10,022,387 tons, meaning that East Java produces 18.16 % of Indonesia's total national rice demands. East Java's significance as a productive area that produces rice for domestic use is one of Indonesia's aspirations for food sustainability. The vulnerability of agricultural land areas towards climate change is another phenomenon that occurs in East Java. Floods occur on a regular basis in a some of productive locations, such as rice fields (BPS-Statistics Agency East Java, 2021), one of which is the Bojonegoro District, which is prone to flooding every year. In fact, by 2020, Bojonegoro will be East Java's third-producing district (BPS-Statistics Agency East Java, 2021). In 2020, floods struck the Bojonegoro District six times, affecting 47 villages. In previous years, the number of villages affected by floods in Bojonegoro Regency was even higher: 127 villages were affected in 2018, and 75 villages were affected in 2019. In the beginning of 2021, around 486 hectares of rice fields were flooded and threatened to crop failure. The next month, floods destroyed 2,733 hectares of rice fields in 11 sub-districts, and 546 hectares of crops were destroyed.

Numerous studies from several disciplines have been conducted on floods in Bojonegoro Regency. Anggraeni et al. (2014) explain how climate change preferences and housing locations in flood-prone areas of the Bojonegoro District are affected by floods. The result of investigated show the sustainability of farmers' food security in the flood-prone areas of Bojonegoro District (Riptanti et al., 2016). The Other researcher used GIS to do flood study in Bojonegoro District (Rosytha and Taufik, 2015). Apart from physical studies, there are several social studies related to flooding in Bojonegoro Regency. Studies on the resilience and adaptation of residents in flood-prone areas of Bojonegoro (Hartini, 2017; Wijasono et al., 2019). Analysis of the influence of public perception on emergency response plans and flood disaster preparedness in Bojonegoro Regency (Rosida and Adi, 2017; Sa'ida and Ma'ady, 2019; Syafrudin, 2018). Unfortunately, as a food-producing area in Indonesia, Bojonegoro District often suffers crop failures. Apart from the possibility of interrupting the national rice supplies, this will also have a detrimental effect on the economic condition of rice farmers. Despite this fact, rice farmers who have suffered several crop failures continue and maintain rice cultivation for decades. In contrast to prior research findings. The purpose of this study is to examine the variables that influence rice farmers' decision to relocate to flood-prone areas in Bojonegoro Regency. Because rice farmers' house and agricultural land are located in flood-prone areas in Bojonegoro District, East Java. These variables were found through the development of a measuring model based on Doxiadis' ekistics theory (Doxiadis, 1970). Human settlements are defined as locations inhabited by people that have both content and container elements. Ecology is organized into five components: nature (human), humanity (anthrophos), society (society), reflection (shell), and networks (networks). Ecism is a hypothesis used to explain human habitation (Farizkha et al., 2019).

METHOD

This study aims to determine which geographical factors contribute to survival in flood-prone areas in Bojonegoro District. This study used a quantitative method. The population are farmers community located in flood-prone areas In Bojonegoro District. Sampling was conducted using Statistic data from Bojonegoro (2021), which showed that there were 3,332 people working in the agricultural sector. Then, using the Slovin formula, the number of samples was determined to be 217 respondents. Purposive proportional sampling was used by considering to sample characteristics comprising such as: 1) farmers in flood-prone areas and 2) owners of rice fields. Samples will be taken in six sub-districts of the Bojonegoro district that have been identified as flood-prone areas based on the level of flood risk in Bengawan Solo as estimated by the government (Rahadianto et al., 2016). *Balen, Bojonegoro*, and *Trucuk* subdistricts are classified as high level, while *Kapas, Kanor*, and *Baureno* subdistricts are classified as medium level. It is then shown proportionally to the number of affected communities. There were 207 from 217 respondents whose data was obtained, who meet the data processing standards. The Structural Equation Model (SEM) and PLS (Partial Least Squares) analysis technique are used in the study measurement model. This technique was chosen because the purpose of this study is to develop a measurement model of geographic factors that cause survival. PLS is a statistical test technique used to produce measurement models that can be used to develop or build hypotheses (Ghozali, 2014). An instrument or measurement model must meet a set of requirements before it can be tested using confirmatory factor analysis (CFA). As a result, it is necessary to estimate: 1) Loading Factor value must be more than 0.6 for each item; 2) AVE (Avarage Variance Extracted) must be more than 0,5; 3) Composite Reliability value must be more than 0.7; 4). The significance test by looking at the T-statistic value must be > 1.96 (Ghozali and Latan, 2015). Measurement models that meet all of these requirements are considered valid and reliable.

RESULTS

Descriptive Analysis: This study collected data from 217 participants for one month. Five independent and one dependent variables were included in the questionnaire. The following is a descriptive analysis to find out the general opinion of respondents about the variables studied in this study. Every construct and item in this study will be analyzed. he average score indicates the value of the perception, as follows:

Table 1. Descriptive Analysis

	Mean	Std. Deviation
Nature (X1)	4.005	0.512
Man (X2)	4.033	0.633
Society (X3)	3.883	0.668
Shell (X4)	3.815	0.705
Network (X5)	3.848	0.675
Settlement Principles (X6)	4.061	0.622

Table 1. The level exiztic of farmer

Criteria	Frequency	Percent
Moderate	19	9.2
High	188	90.8
Total	207	100.0

Table 2. Level of Settlement Principles

Criteria	Frequency	Percent
Moderate	44	21.3
High	163	78.7
Total	207	100

Table 1 shows the sample answer for each item in this study instrument. Arikunto (2006) categorizes the descriptive analysis results into five types. Here are the categories such as very low or very bad (1.00 to 1.80), low or bad (1.81 to 2.60), enough or moderate (2.61 to 3.40), high or good (3.41 to 4.20), and very high or very good (4.21 to 5.00).

Of the total 213 respondents, Nature has a Mean of 4,005 and Std. Deviation 0.512. Furthermore, Man has a Mean of 4.033 and a Std. Deviation 0.633. Society has a Mean of 3.815 and Std. Deviation 0.668. Shell has Mean 3.815 and Std. Deviation 0.675. Network has a Mean 3.848 and Std. Deviation 0.675. Finally, the Settlement Principles have a Mean of 4.061 and Std. Deviation 0.622. Rice farmers' ecistics levels are classified in order to determine their level of resistance to the variables they face, which include nature, man, society, shell, and network. It is divided into three groups based on the calculation of the mean, range, and standard deviation: low (< 46.7), Medium (46.7 - 73.3) and High (> 73.3). Based on the findings of the study, Table 2 demonstrates that there are no farmers with low ecistics levels. Furthermore, some farmers have a moderate degree of enthusiasm, with a frequency of 19 or 9.2 %, while others have a high level of excitement, with a frequency of 188 or 90.8 %. The Y variable calculation shows that the categorization is divided into three groups: low (< 11.7), Medium (11.7-18.3) and High (> 18.3). Furthermore, based from the results, table 2 shows that there is no low category. According to table 3, farmers in the moderate category have a frequency of 44 or 21.3 %, while farmers with high ecistic levels have a frequency of 163 or 78.7 %. This shows farmers' ability and commitment to survive on their agricultural lands and homes, although they live in high-flooded areas. Farmers are able to survive because to their strong adaptability to their surroundings. Farmers also make significant efforts to enhance their quality of life, as indicated by the fact that the majority of farmers in Bojonegoro have strong environmental i deals.

Validity

To test the validity and reliability of each item or variable, the Measurement Model architecture uses Consistency Reliability, Indicator Reliability, Convergent validity, and Discriminant validity. In terms of reliability, it is recommended that the Cronbach Alpha (CA) and Composite Reliability (CR) values be determined with a cut-off values higher than 0.7.

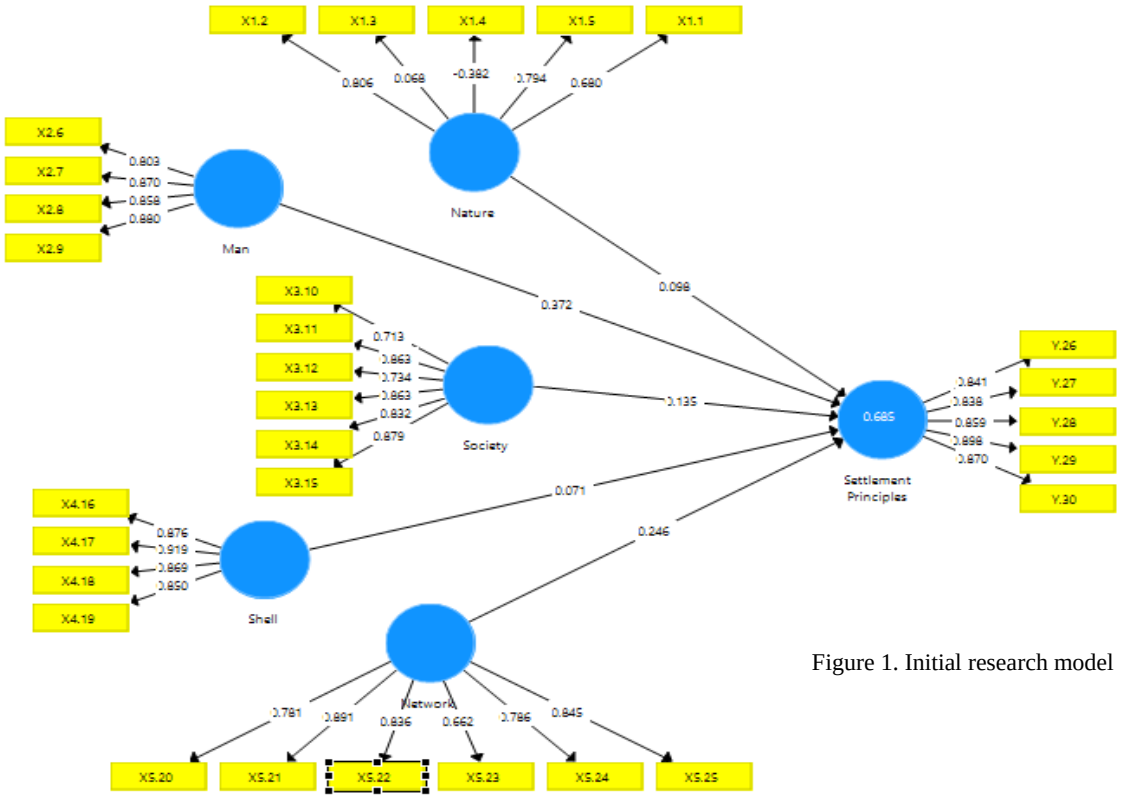

Figure 1. Initial research model

However, according to another opinion, Cronbach Alpha (CA) with a cut off value greater than 0.6 is still considered valid and reliable. Meanwhile, in this research, the Loading indicator has a value of 0.6. Although less than 0.7 loading indicator is acceptable, more than 0.4 is preferred. Furthermore, if the convergent validity conditions are fulfilled, the value of the Average Variance Extracted (AVE) must be larger than 0.5 (Hair et al., 2012). Then, to evaluate the discriminant validity of the

Fornell-Larcker criteria (Ringle et al., 2020) state that the top variable must have a higher value than the variable below it. The Fornell-Larcker Criterion has a value in this investigation that is consistent with the literature on the concept. After estimating the settlement principles measurement model, there are several results that need to be tested. The factor of loading value will be used as a parameter of validity with the Fornell-Larcker discriminant validity approach on each item of the instrument in the six research variables. The following is the value from Fornell-Larcker which will be a reference in confirming item items.

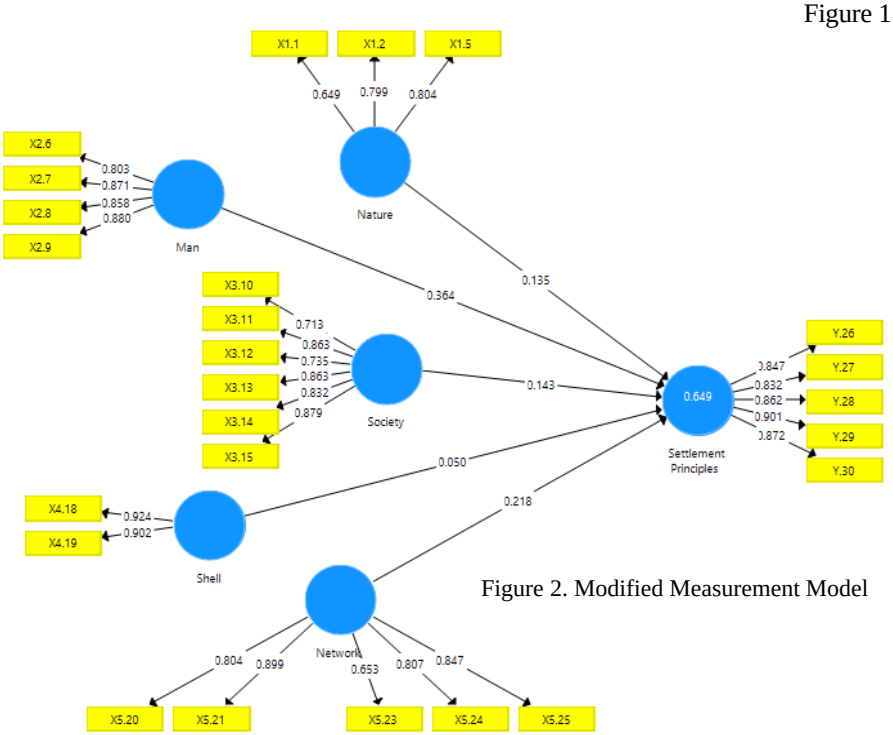

Figure 2. Modified Measurement Model

Figure 1 shows that the items X1.3 (0.068) and X1.4 (-0.382) do not fulfill the criteria for the previously determined factor loading, which is less than 0.4, and must be dropped from the model. Furthermore, items X4.16 (0.876), X4.17 (0.919), and X5.22 (0.836) must be dropped from the model because they do not meet the Fornell-Larcker criteria for discriminant validity. The value of these items does not measure the variable, therefore the value is greater than the value above it or may be considered not in accordance with the theory based on the Fornell-Larcker criteria. As a consequence, these components must be dropped from the model. The research measurement model has been modified as a result of the removed measurement model. The improved model is then retested on each construct or object, with the results given in Figure 2 below.

Table 4. First Fornell-Larcker criterion

	Man	Nature	Network	Settlement Principles	Shell	Society
Man	0.853					
Nature	0.662	0.615				
Network	0.752	0.727	0.803			
Settlement Principles	0.773	0.667	0.765	0.862		
Shell	0.746	0.710	0.804	0.733	0.879	
Society	0.728	0.690	0.824	0.738	0.865	0.817

Figure 2 shows that all of the items in the modified measurement model fulfill the criteria for factor loading > 0.4, meaning that all of the items are valid as a measuring instrument for the predetermined variables. Thus, according to the previously provided literature, the measurement model of this research fulfilled all of the criteria for evaluating the measurement model. This measurement model may also be utilized for additional investigation.

Reliability

The reliability of each variable on the measuring instrument will be tested by comparing the estimated results of the measurement model in the form of Cronbach Alpha (CA), Composite Reliability, and AVE values. The table also provides the value of the Fornell-Larcker criteria. Table 5 shows that the instrument used in this study is sufficiently reliable. By looking at the estimations, the measurement criteria in order to be valid and dependable are: 1) Loading factor value must be more than 0.6 for each item; 2) AVE (Avarage Variance Extracted) value must be greater than 0.5; and 3) Composite Reliability value must be greater than 0.7. If the loading factor value for all variables in the measurement model is more than 0.6, the AVE value in the measurement model is greater than 0.5, and the composite reliability value exceeds 0.7. This indicates that the measuring model and instrument employed meet the criteria for acceptable validity and reliability. According to the measurement model results, each tested latent variable fulfilled all of the requirements for each criteris. Furthermore, the latent variables tested in this study fulfilled validity and reliabil ity standards. As a result, these variables may be examined at the following step, namely the structural model.

Structural Model

After the measurement model has been examined, Tenenhause, Vinzi, Chatelin, and Lauro (2017) recommend evaluating the Goodness of Fit to validate the entire PLS model (Gof). He further said that GoF is divided into three categories: 0.1 (small), 0.25 (medium), and 0.36 (large). The GoF value in this study is shown in Table 4. The value of this study is (0.673) included in the large category so that the proposed model is of good quality. Furtheremore, the quality of the model used to calculate the endogenous construct is determined using R2, Q2, path coefficients, and f2. believes in scientific study that is problem-oriented worries that R2 values of 0.75, 0.50, and 0.25 on the latent variable, respectively, show a considerable, moderate, and low predictive level. Additionally, data study show that Nature, Man, Society, Shell, and Network correctly assess 64.9 % (R2=0.649) of Settlement Principles. These variables in the Settlement Principles are somewhat accurate.

Table 3. Loading, Cronbach Alpha (CA), Composite Reliability (CR), dan AVE

Construct	Loading	CA	CR	AVE
Nature		0.632	0.796	0.568
The surface of the land that makes it easier to cultivate paddy fields.	0.649			
Fertility of managed rice fields.	0.799			
Weather and Climate that supports agricultural systems.	0.804			
Man		0.876	0.915	0.728
Ease of getting food ingredients.	0.803			
Have an inner bond with the environment in which you live.	0.871			
Feel more calm and comfortable with the environment where you live so far	0.858			
Moral values are still maintained among members of society.	0.880			
Society		0.899	0.923	0.667
Balanced population composition in the neighborhood	0.713			
Good social organization.	0.863			
Traditions and culture of the community in the neighborhood	0.735			
Equitable economic development	0.863			
Good educational facilities	0.832			
Ease of access to legal and administrative matters	0.879			
Shell		0.802	0.909	0.834
Shopping facilities or markets that can meet needs.	0.924			
Good disaster management when a flood occurs	0.902			
Network		0.862	0.902	0.650
Sufficient clean water network	0.804			
Stable and affordable power supply	0.899			
Easy access to communication systems (telephone/sinyap/mobile/internet).	0.653			
Good drainage and liquid waste disposal	0.807			
Well managed waste disposal facilities.	0.847			
Settlement Principles		0.914	0.936	0.745
Maximizing the potential of the family's resources.	0.847			
Minimize the effort made to process natural resources.	0.832			
Make optimal efforts in maintaining the land owned.	0.862			
Make optimal efforts in maintaining relationships with the environment.	0.901			
Make optimal efforts to utilize human resources, natural resources, land owned, and their relationship with the environment.	0.872			

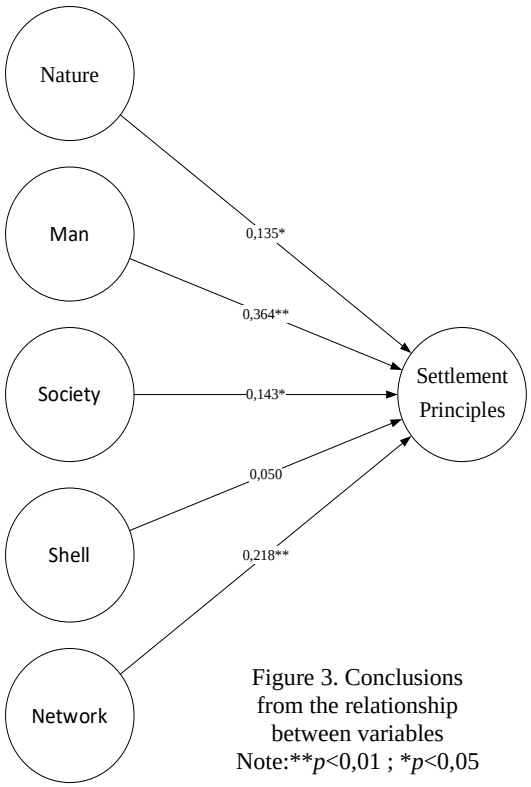

Figure 3. Conclusions from the relationship between variables
Note:**p<0,01 ; *p<0,05

Table 4. Fornell-Larcker Criterion

	Man	Nature	Network	Settlement Principles	Shell	Society
Man	0.853					
Nature	0.669	0.754				
Network	0.729	0.698	0.806			
Settlement Principles	0.751	0.665	0.727	0.863		
Shell	0.671	0.678	0.719	0.658	0.913	
Society	0.728	0.701	0.789	0.715	0.799	0.817

Table 5. Goodness of fit (Gof).

Variable	AVE	R^2	Q^2
Nature	0.568		
Man	0.728		
Society	0.667		
Shell	0.834		
Network	0.650		
Settlement Principles	0.745	0.649	0.454
Average Score	0.699	0.649	
AVE x R^2		0.453	
GoF = √ (AVE x R^2)		0.673	

Table 6. Effect size (f2)

	Settlement Principles
Settlement Principles	
Man	0.147
Nature	0.022
Network	0.042
Shell	0.002
Society	0.015

Table 9. Hypothesis Testing. Notes:**p<0,01 ; *p<0,05

	Hipotesis	β	t-value	p-value	Description
H1	Nature -> Settlement Principles	0.135	2.253	0.025*	Accepted
H2	Man -> Settlement Principles	0.364	5.060	0.000**	Accepted
H3	Society -> Settlement Principles	0.143	2.024	0.044*	Accepted
H4	Shell -> Settlement Principles	0.050	0.743	0.458	**Rejected**
H5	Network -> Settlement Principles	0.218	2.897	0.004**	Accepted

Additionally, the predictive significance of Q2 indicates that its value is greater than zero, implying that the exogenous construct is predictive of the endogenous construct. It has a Q2 rating of 0.454 on the Settlement Principles in this research. As a result, the model utilized in this work is very relevant.Additionally, the value of f2 is utilized to determine the exogenous variable's contribution to the endogenous variable. It is classified into three categories based on f2, namely low (0.02), medium (0.15), and high (0.35). While values less than 0.02 are regarded to be insignificant. According to Table 5, all factors have a

considerable effect on the Settlement Principles due to their f2 values being more than 0.02. Except for the fact that Shell has no influence on the Settlement Principles, since f2 is smaller than 0.02. To determine the importance of the construct indicators and their routes, the structural model was evaluated using Bootstrapping 5000. For the two-tailed test, the T-Values are 1.65 (significance level = 0.1), 1.96 (significance level = 0.05), and 2.58 (significance level = 0.01). Exogenous factors have a direct, indirect, and total influence on endogenous variables, as seen in Table 6. The results of this study reveal that the hypothesis H1, which Nature accepted, has a positive relationship with the Settlement Principles (= 0.135, p 0.05). Additionally, Man has a positive and significant impact on the Settlement Principles (= 0.364, p 0.01), as does Society (= 0.269, p 0.05). As a result, H2 and H3 are likewise acceptable. Shell has no positive or material impact on the Settlement Principles, and hence H4 is rejected. Finally, the Network has a considerable beneficial effect on the Settlement Principles (= 0.218, p0.01). As a result, H5 is acceptable. Additionally, Figure 3 illustrates the conclusion of the relationship between variables.

DISCUSSION

The ekistic theory of Doxiadis (Doxiadis, 1970) is widely used in studies of the planning process and in the study of settlement patterns (Lussetyowai and Adiyanto, 2020; Phokaides, 2018). However, there are multiple research using both quantitative (Anggraeni et al., 2014; Farizkha et al., 2019) qualitative methods (Lesmana et al., 2021). Using this theory, we may analyze the conditions of certain settlements and the population's survival. The results revealed that the "human" element was the most important factor affecting survival in floodplain communities around the Bengawan Solo river basin in Bojonegoro District. The R2 value found is 0.36 or 36%, which has an effect on the necessity for farmers to stay in Bojonegoro District. The following questions were asked of respondents in this human dimension: 1) Ease of obtaining food ingredients; 2) Having an inner bond with the neighborhood; 3) Feeling more at ease and secure in the environment where you live so far; and 4) Moral values that are still maintained among community members. This widely accepted hypothesis proves that farmers in flood-prone areas are not affected by objective factors, but rather by non-objective factors. Calmness and an inner relationship to the environment have the greatest impact on the farmers' responses. According to research (Wang et al., 2017), human settlement is a full integration of social, economic, natural, and ecological factors, and the appropriateness of settlements is determined not only by the objective environment, but also by the community's subjective attitude. Considering what occurred to farmers in the flooded area of Bojonegoro, farmers' subjectivity to the environment is important for their survival. According to Anggraeni et al., 2014, this human component has a detrimental effect on settlement. However, when one considers the culture of the Indonesian farming community, which is extremely emotionally attached to a place, to the tranquility of a place to live, one realizes that the human perception of the environment is indeed the most influential factor in determining the survival of the place where they live. The second significant factor is the network factor, which includes the following: 1) a good supply of drinkable water; 2) a stable and affordable electricity supply; 3) easy access to communication systems (telephone/sinyap/mobile/internet); 4) a good drainage and liquid waste disposal; and 5) well-managed waste disposal facilities. The test results indicate that this network component has a 28.1 % effect on farmers' sustainability in the Bojonegoro flood prone area. These results show that, although emotional values predominate, farmers exhibit a high level of reasoning and are realistic about the challenges they confront. Water has the greatest impact on the structure's construction, followed by power, wastewater, and waste management. While the communication network is the weakest link, since the area inhabited by these farmers now lacks a stable internet connection. As a result, a model of harmonious water management between people and water should be the primary emphasis of water management for both everyday living and agricultural demands (Cheng et al., 2018). Human-water alignment is also necessary for the development of an ecologically acceptable flood control engineering system with good standards, rational arrangements, and prudent application.

Society, or society in general, is the third most influential force. The coefficient of determination is 14.3%. This factor assesses the following: 1) the population's composition in the living environment; 2) the condition of social organization; 3) the neighborhood's traditions and culture; 4) equitable economic development; 5) good educational facilities; and 6) ease of access to legal and administrative services. The aspect that has the greatest impact on this component is the ease with which legal and administrative concerns may be accessed. Services provided by the village government, especially in access to land administration where Good village head services will also determine the preferences, adjustments and survival of farmers (Oktapriana et al., 2021). Natural factors are believed to be the fourth factor affecting farmers' ability to survive in flood-prone areas. Natural factors affecting farmer survival had a coefficient of determination of 13.5 %, the lowest of all factors. Although the study's results indicate that farmers will suffer floods in a year, either in their settlements or on their agricultural land, farmers remain due to reasons such as the ease with which agricultural land can be managed, the fertility of agricultural land, and weather and climate. Farmers suffer floods on average 1.5 times every year. This factor may be seen as a process in agricultural operations, requiring the adjustment of the planting season. Farmers must adapt by gaining a better understanding of the dynamic pattern of the growing season. Natural factors (nature) have a significant impact on the agricultural community's ability to survive in the area in which they live. An agrarian society's existence is highly dependent on the availability of agricultural land. Agricultural land held by farmers is a natural resource that must be maintained to ensure the sustainability of life, which is also a part of the farming family's ancestral history. Meanwhile, the Shell factor was the only element that did not contribute to farmers' survival in this study. These factors do not have a substantial impact on disaster management, as well as infrastructural facilities that are not a solution to the flood problem. Once a flood disaster has been mitigated, it should not be repeated. Due to variations in rainfall intensity and the length of the dry season, climate change has an effect on rice cropping patterns (Ojo and Baiyegunhi, 2021). As a result, a method for anticipating the flood disaster in Bojonegoro must include determining the cause by examining pre-existing data and patterns and then studying its link to climatic indices such as El Niño Southern Oscillation (ENSO), North Atlantic Oscillation (NAO), Indian Ocean Dipole (IOD), Pacific Decadal Oscillation (PDO), and Atlantic Multidecadal Oscillation (AMO) to ascertain the relationship between these factors (Zhang et al., 2016). Additionally, agricultural output must be increased by the use of diverse agricultural technologies (Ojo and Baiyegunhi, 2021), improved seeds, and environmentally friendly insect eradication (Govindharaj et al., 2021).

CONCLUSION

Nature, man, society, and the network all have significant impacts on the resilience of farming communities in flood-prone areas in Bojonegoro (($\beta = 0.135$, $p < 0.05$); man has an even greater impact ($\beta = 0.364$, $p < 0.01$); society ($\beta = 0.269$, $p < 0.05$); and finally, the network has an even greater impact than the others ($\beta = 0.218$, $p<0.01$). Meanwhile, the shell has a value ($\beta = 0.05$, $p > 0.05$) so the result is rejected. As a result, the shell has no role in determining whether or not the agricultural community will continue to exist. The results indicated that the three sub-districts, Bojonegoro, Balen, and Trucuk, had significant differences in the degree of resilience, with $p < 0.001$. For the highest level of resilience is Bojonegoro where the frequency of flooding is > 3 more than the other two sub-districts. The experience of receiving a flood disaster can affect the resilience level of the farming community in Bojonegoro.

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