FACTOR DETERMINATION ANALYSIS OF FARMER'S ASSETS AFTER THE TSUNAMI IN ACEH

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Abstract: Limitations of access and loss of various life assets caused by tsunami and conflicts in Aceh faced by farmers have influenced their survival. The purpose of this research is to analyze the model of factor determination of farmer's assets after the-tsunami in Aceh. This study was conducted in Aceh Province covering five areas: Aceh Barat, Aceh Besar, Pidie Jaya, Bireun and Aceh Utara. The total sample for this study was 280 farmers. Sampling method used is stratified random sampling method. This research used primary data obtained by survey using questionnaire and secondary data. Data was analyzed by using qualitative and quantitative method with Structural Equation Modeling model is by measurement model. Model 2 is used as the final model for the construct of the farmer's living assets as it demonstrates good model compatibility. It also indicates that all loading factor values are above 0.5 and all probability values are significant at a = 1%. It indicated that all indicators can explain the existing constructs.

Key word: determination, assets, farmer, post-tsunami, Aceh

A number of events occur in Aceh recently are the last stage of a long and turbulent history since Aceh became a rich merchant country controlling the Strait of Malacca. However, long years of armed and political struggle followed by fluctuating economy and natural disaster continuously have led Aceh to be one of the poorest provinces in Indonesia nowadays. There are two important events that greatly affect the economic condition of Aceh society, namely the tsunami disaster on December 26, 2004 and the Memorandum of Understanding between the Government of the Republic of Indonesia and the Free Aceh Movement (GAM), which was signed in Helsinki on August15, 2005.

The limited access and loss of various assets caused by the tsunami and conflict in Aceh faced by the farmers have affected their sustainability. The conflict and the natural disaster of (tsunami) have greatly changed the family structure in Aceh. The impact of conflict and tsunami on economic infrastructure and social facilities is also quite severe. More than half of harbors or ports, fish and shrimp ponds, rice miller markets, agricultural land, and rice fields were damaged; there was also livestock loss (UNDP, 2010). Conflict and tsunami have also destroyed the sources of income of a large number of families in Aceh, including poorest families who find it hardest to recover from their losses. These two major events have led most of the society, especially in rural areas, to lose their assets such as human assets, financial assets, physical as-

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sets, social assets, and cultural assets. Losing those assets has made them increasingly trapped in poverty.

Assets are resources that support or benefit the goal achievement of society. Generally, the society will utilize various types of assets. Type of assets which is more useful or supportive for a person's life is different for each individual. DFID (1999) divided the five types of assets that influence people's lives, namely;

a. Human assets are associated with human capability and expertise such as skill, knowledge, labor's skill, and health. The concept of human capital also involves investment in human resources. Educational and training aspect is a very important form of investment and is considered an element in human capital because human must not be separated from knowledge, skill and health.
b. Natural assets are assets that exist in nature naturally and can be used as life strategies such as agriculture land, air, water, and forests.
c. Social assets can be defined as the ability of society to work together and to achieve common goals within different groups and organizations. Burt (1992) adds that social assets are the ability of people to associate with each other and become very important power for economic life.
d. Physical assets include basic infrastructure and producers of goods needed to support human life, such as house, road, health clinic, access to information, and so on. Physical assets including tangible fixed assets and affect the system of life sustainability.
e. Financial assets are the availability of capital, including: (regular payment or pensions, savings, and provision of credit).

Life resources are important factors that need to be properly understood because each resource has different characteristics and carrying capacity for the life of every individual and society. Each resource is linked to other resources. The power of resources can bring about a strategy or steps such as training the poor, transforming relationship between society and government, and building knowledge, collective skill and infrastructure in rural areas (Mitlin 2002 and Salvestrin 2006).

Family assets also consist of a stock of resources used to get welfare (Moser 1998: Seagel & Alwang 1999; Rakodi 1999). Family assets are derived from individual, family, community, national and global stage and include natural, human, physical, financial, social/ political and location assets (Jansen et al., 2006). Physical capital consists of equipment and infrastructure; human capital assets include age, education and training, and family structure; financial assets include access to credit and savings; natural capital includes weather, land, water, and social capital encompasses family involvement in external organizations at various levels.

However, the classification of type of assets depends on the researchers and the investigation situation. In addition to human, physical, financial, social and natural capital as suggested by DFID (1999), Jansen et al. (2006) include location assets such as access to infrastructure and service provided for society. However, in most studies such as a research which was conducted by DFID (1999), access to infrastructure and service provided for society is put under physical capital. Ferguson and Murray (2001) classified assets into five types, namely human, financial, physical, personal, and social assets. Natural assets are put into physical assets. In this study, natural assets are included in the category of physical assets, and also incorporate cultural assets because the people of Aceh have a different character from people in other areas. Therefore, it is necessary to analyze the factor determination of assets of farmer after the tsunami in Aceh by using SEM model, which is by measurement model. The purpose of this research is to analyze the factor determination of assets of farmer after the tsunami in Aceh.

RESEARCH METHOD

Population and Type of Data

The population of this research is farmers in Aceh after the tsunami, which covers five regencies, namely West Aceh, Aceh Besar, Pidie Jaya, Bireun, and North Aceh. Sampling was done pur-

posively; the sample involved is 280 farmers. Types of data used are qualitative and quantitative data; the data sources are primary and secondary data. Primary data is cross-section data collected through direct observation and interview, which were conducted by distributing questionnaires to farmers in research sites; secondary data was obtained from related institutions.

Data Analysis

The analytical tool which was used in this research is Confirmatory Factor Analysis (CFA) model contained in SEM. This factor determination analysis (CFA) is used to test the measurement model (Hair et al., 2006).This analysis will find whether existing indicators can explain a construct or not (Santoso, S. 2012). This analysis will be carried out to test each dimension of known asset variable based on the previous studies. Maximum likelihood method was used to estimate 17 indicators of five asset constructs formed. Figure 2 shows the factor determination model for life asset.

Data analysis was done by using measurement model in Structural Equation Modeling (SEM). Model determination or known as the Confirmatory Factor Analysis (CFA) is a process that allows researchers to use multiple indicators to obtain an exogenous latent variable or endogenous variable called latent factor or latent construct. Each latent variable has various sizes or indicators. Indicator selection and determination of each latent factor is done based on theories or studies conducted before this research. With CFA model, the researchers have to first determine the number of desired factors in a set of latent variables and in which factor each of these indicators will be included to before running the analysis. CFA will show the extent to which the factor specification predicted by the researchers corresponds to the actual reality. In other words, CFA is a tool that allows us to accept or reject the existing theory.

In the form of equation, factor validation theory can be represented by some equations as follows:

$$
\begin{aligned}
x_1 &= \lambda_{x11}\xi_1 + \delta_1 \\
x_2 &= \lambda_{22}\xi_2 + \delta_2 \qquad (1.1) \\
&- \\
&- \\
&- \\
x_n &= \lambda_{xn}\xi_n + \delta_n
\end{aligned}
$$

In which,

$x_1 \ldots x_n$ = indicator which determines construct

$\xi_1 \ldots \xi_n$ = construct which is determined by indicator x

λ_{x11} = 'path' which represents the relationship between latent factor (ξ_1) and determinant variable (x_1).

δ = error term

This determination model involves constructs with no causality and correlation between them. This model only calculates covariant estimation by using equations that represent the theory to be tested. Covariance matrix is then compared to the actual covariance matrix calculated from the indicator data. This determination model is said to be worth it if both covariance matrices are almost identical. Latent variable is associated with indicators through measurement models in the form of factor analysis. Each latent variable is modeled as a factor that underlies the related indicator (Andriani, D. 2013). Factor loading that connects latent variables with indicator which can be known is labeled ë ("lambda"). The error in the measurement model is denoted by ξ (ksi). The measurement model can be illustrated in Figure 1.

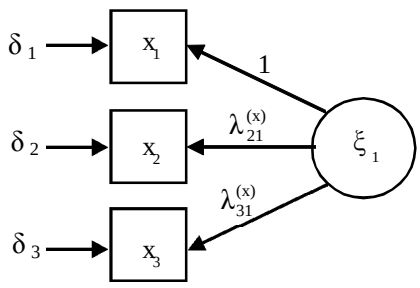

Figure 1 SEM measurement model

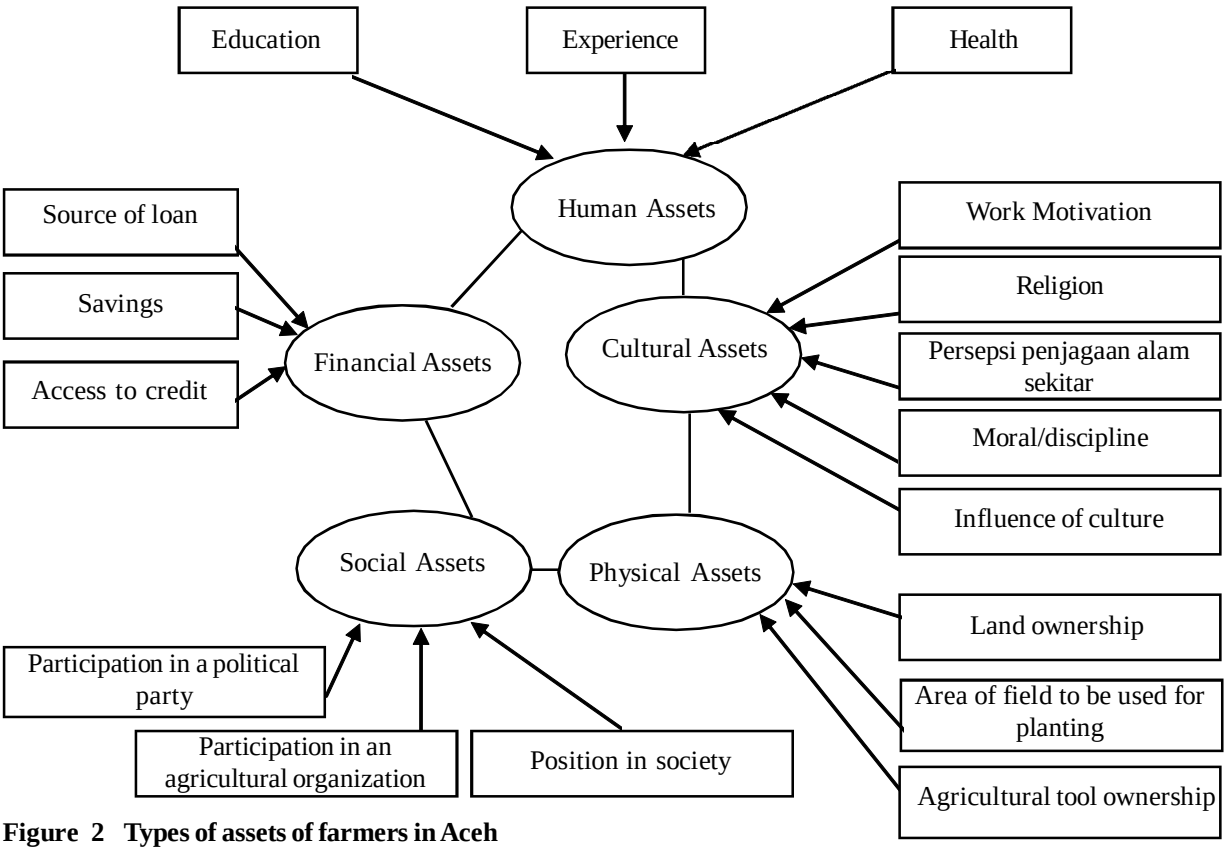

Figure 2 Types of assets of farmers in Aceh

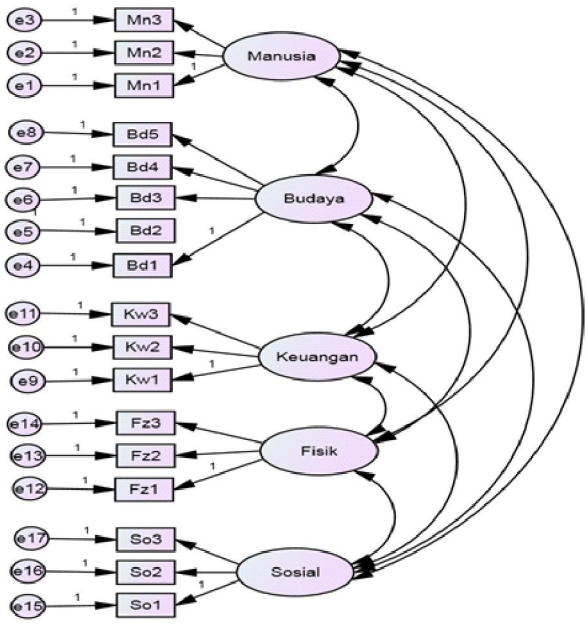

Figure 3 Model 1 of factor determination of farmer's assets

This study used five types of assets owned by farmers. It can be seen in Figure 2. Based on Figure 2, we can determine model of factor determination for farmer's assets as Figure 3.

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Results and Discussions

Factor Determination Analysis

There are various indicators that represent every type of assets. The types of assets consist of human assets, cultural assets, financial assets, physical assets, and social assets; it is called construct. The analysis results found that this model do not have problem of covariance matrix among variable of assets that is not positive; this indicates that the model is acceptable. Model 1 of factor determination of assets of farmers can be seen in Figure 3.

The analysis results of model 1 found that the value of x^2 (CMIN) is 237.104 with degree of free-

dom amounted to 109; probability value of 0.000; and has resulted in CMIN/ DF of 2.175, more than one and less than 5, as suggested by many authors about the model equivalence aspect in factor determination model. The value of the model equivalence index mostly has reached equivalence, at least (GFI = 0.952, AGFI = 0.933, CFI = 0.926, NFI = 0.874, RFI = 0.842, IFI = 0.928, TLI = 0.908, RMSEA = 0.046). These results indicate that the correspondence of data with the hypothesized model is good. However, this model found that indicator Bd3 (farmer's perception of environment preservation), Bd5 (farmer's attitude and morale), and Fz1 (ownership of farming tools) show insignificant relationship with the representative factors, namely cultural and physical assets. Coefficient values are also found very low (0.087, 0.009 and -0.079), and indicator Kw2 (savings) also has a negative loading factor of -0.681, although significant with the factor it represents, namely finance. However, according to Joreskog (1993), the one which has a loading factor less than 0.3 must be removed from analysis in order to obtain good model equivalence. Therefore, this model will be estimated by eliminating the indicator Bd3, Bd5, Fz1 and Kw2, and this model is called Model 2 (Figure 4). Based on the situation above, the model must be estimated again.

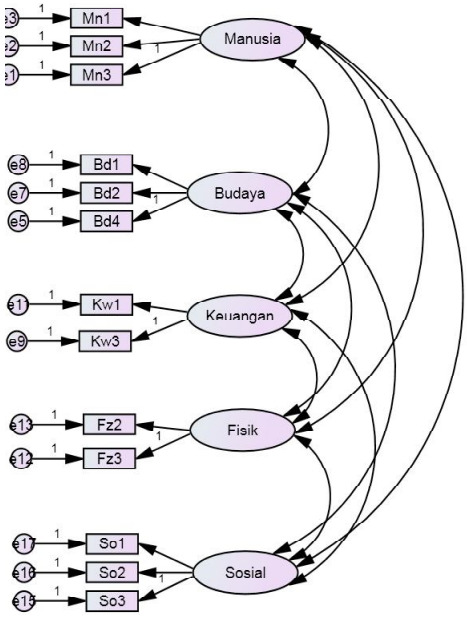

Figure 4

The analysis results of model 2 found that the value of x^2 (CMIN) has been reduced to 84.233 with degree of freedom of 55 and probability value of 0.007. In addition, other equivalence values also meet the recommended values. The value of CMIN/ DF= 1.532, which is more than 1 and less than 5 as suggested, GFI value= 0.977, AGFI= 0.962, NFI= 0.946, RFI= 0.924, IFI= 0.981, TLI= 0.972, CFI= 0.980 more that 0.90 as suggested, and the value of RMSEA= 0.046, less than 0.1 as suggested. These results indicate that the correspondence of data with the hypothesized model is good. Therefore, Model 2 is used as the final model for construct of farmer's assets.

Table 1 shows the regression value of all factor loading values, indicating a number above 0.5 and all P (probability) values are significant at α= 1%. P value is 0,000 which is far below 0.05, which indicates that all indicators can explain the existing constructs.

Furthermore, the analysis results also found that the parameter estimation value of all correlation values is less than 1, indicating the absence of *multicollinearity* problems in the model. In addition, all indicators have loading significant at $p < 0.05$, which validates the relationship between indicator and the measured construct.

Furthermore, from the relationship between the variable of farmer's assets, the results of the analysis found only six significant relationships, namely the relationship between human assets and cultural and financial assets, between financial assets and physical and social assets, between cultural assets and physical assets, as well as physical assets and social assets. Relationship which involves human assets and physical and social assets is not significant. Relationship between cultural assets and financial and social significance is also not significant. This explains that financial assets are the most important element of asset in the context of farmer's life through its positive influence on several types of assets and have a high correlation value to other assets. Then, it is followed by human, cultural, and physical assets. The influence of financial assets is the strongest influence on physical assets; the correlation value is 0.696, which indicates that an in-

Table 1

Indicator			Coeficient	S.E.	C.R.	P	Loading factor
Mn3	<—	Human	2.813	.646	4.355	***	.724
Mn2	<—	Human	.592	.123	4.812	***	.521
Mn1	<—	Human	.360	.082	4.399	***	.512
Bd4	<—	Culture	.968	.063	15.352	***	.704
Bd2	<—	Culture	1.033	.067	15.350	***	.739
Bd1	<—	Culture	1.208	.078	15.512	***	.886
Kw3	<—	Financial	1.431	.140	10.197	***	.690
Kw1	<—	Financial	1.072	.269	3.983	***	.487
Fz3	<—	Physical	1.002	.102	9.801	***	.781
Fz2	<—	Physical	.975	.102	9.528	***	.803
So3	<—	Social	1.431	.140	10.197	***	.843
So2	<—	Social	.552	.063	8.786	***	.724
So1	<—	Social	.702	.069	10.237	***	.521

Source: Results of data analysis with SEM method

Table 2 Relationship between farmer's assets

Relationship between assets			Covariance	S.E.	C.R.	P	Correlation
Human	<—>	Culture	.093	.030	3.140	.002	.185
Financial	<—>	Physical	.272	.068	3.984	***	.696
Physical	<—>	Social	.305	.073	4.182	***	.239
Human	<—>	Financial	.090	.034	2.647	.008	.308
Human	<—>	Physical	.026	.071	.362	.717	.022
Human	<—>	Social	.031	.057	.542	.588	.032
Culture	<—>	Financial	.015	.014	1.039	.299	.089
Culture	<—>	Physical	.111	.036	3.053	.002	.165
Culture	<—>	Social	-.043	.028	-1.506	.132	-.079
Financial	<—>	Social	.091	.034	2.693	.007	.286

Source: Results of data analysis with SEM method

crease of one unit in financial assets will increase physical assets of 0.696 units. Then, it is followed by the influence of human assets on financial assets (0.308), and financial assets on social assets (0.286), and physical assets on social assets (0.239) (Table 2).

The results of this study indicate that an increase in financial assets will increase physical assets, human assets, and social assets of farmers. Conversely, an increase in human assets, physical assets, and social assets will also increase financial assets. Increase in financial assets will increase human assets, physical assets, and social assets of farmers. In addition, according to Rahmah (2003), human assets are an important input to the economic growth of a country. It can be a driver to other inputs. However, its quality can be improved.

The results of this study are similar to those obtained by Roslina (2011) that human assets and financial assets are the most important assets in the context of the life of aquaculture entrepreneurs in Kedah. However, the results of this study are also different from those obtained by Sahri, M. al. (2011), that the most influential assets in fishermen's life in

East Java are social assets. Naning (2011) also argues that assets which have the greatest value on apple farmers in East Java are physical assets. Tito Indra, S. (2013) found that natural assets and financial assets have a profound effect on rice farmers due to vulnerability factor.

CONCLUSIONS

Based on the results of research that has been done by using factor determination analysis of farmer's assets, Model 2 is a model that shows good correspondence of data with the model hypothesized. Therefore, Model 2 is used as the final model for farmer's asset construct. It also shows that all factor loading values are above 0.5, and all P (probability) values are significant at á = 1%. P value amounted to 0.000, which is far below 0.05, indicating that all indicators can explain the existing constructs.

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