Measurement of natural environment strategy to create an innovation and competitive advantage

Meyzi Heriyanto[a*], Achmad Fajri Febrian[a], Tito Handoko[b] and Syofian[c]

[a]Department of Business Administration, Universitas Riau, Indonesia
[b]Department of Government Studies, Universitas Riau, Indonesia
[c]Department Of Public Administration, Universitas Riau, Indonesia

CHRONICLE	ABSTRACT
	In the last decade, the natural environment has become increasingly concerned. The issue of natural damage is an obstacle for oil palm industry, although knowledge of the natural environment is possessed by the palm oil industry, which is currently unknown what motivates the palm oil industry to care about the natural environment. This paper aims to measure the model of the natural environment strategy to create innovation and competitive advantage in the palm oil industry using Structural Equation Modeling (SEM) methods. The model adopts a Resource-Based View (RBV) approach to identify competitive strengths. The RBV theory represents that organizations with the right resources coupled with the right management skills and abilities will develop competitive strength and organizational performance. The results produced by AMOS graphics version 23, SEM statistical software, confirm the adequacy of the model for companies engaged in the palm oil industry. The questionnaire was distributed to palm oil industries in Riau Province, Indonesia with a sample size of 115 respondents. Natural environment strategy was found to be a better predictor of innovation and competitive advantage than any external resources. The results of the study show that there was a gap where previous research tends to get a competitive advantage from increasing innovation. However, the findings of this paper have two explanations, first is the core of the resource-based view is that companies that are aware of the natural environment will get a sustainable competitive advantage. Second, innovation cannot be an important resource for creating a competitive advantage. Innovation will be created in the palm oil industry in Riau Province if the company wants to improve business processes and implement good corporate governance through investment in information and communication technology. The most potential benefit from the findings of this study is the strategic planning of the palm oil industry, to generate innovation and competitive advantage from awareness of the natural environment.

1. Introduction

The palm oil industry in Indonesia has contributed for achieving the Sustainable Development Goals (SDGs), especially in reducing poorness and providing solutions to economic gap (Hasan & Hidayat, 2018; Purba, 2019; Purnomo et al., 2018). The palm oil industry in Indonesia has been estimated to provide 17.5 million jobs and contribute 319 trillion rupiah of export value each year. Based on statistical data from the Association of Indonesian Palm Oil Entrepreneurs (GAPKI), in an uncertain global economic situation after the 2019 pandemic corona virus disease (COVID-19), until February 2020 the palm oil industry has contributed foreign exchange of USD 3.5 billion to Indonesia. Therefore, Indonesia's trade balance in 2020 has a surplus of USD 1.9 billion. That value is generated from non-oil and gas export revenues of USD 4 billion and foreign exchange expenditure for oil and gas imports of USD 2.1 billion (Sardjono, 2018).

* Corresponding author.

E-mail address: meyzi.heriyanto@lecturer.unri.ac.id (M. Heriyanto)

According to data from the World Economic Forum (2018), the development of the palm oil industry has a negative impact. In the past decade, the palm oil industry has faced a negative campaign (Basiron & Simeh, 2005; Yasin et al., 2017), since the palm oil industry is not environmentally friendly. The impact of palm oil plantations in Indonesia is considered unsustainable (Hooijer et al., 2012; Murdiyarso, Hergoualc'H & Verchot, 2010), creating a damaged natural environment (Alang Mahat, 2012; Mekhilef, Siga, & Saidur, 2011), deforestation, and destruction of biodiversity (Fitzherbert et al., 2008; Vijay, Pimm, Jenkins, & Smith, 2016).

Natural environmental issues in the next few decades will focus on sustainable natural resource strategies (Hart, 1995; Hart & Dowell, 2011; Shisanya, 2017). This is due to the scarcity of natural resources which is increasingly limited, causing obstacles to exploit external resources (Al-Majed, Adebayo, & Hossain, 2012). According to The Organization for Economic Co-operation and Development (OECD) environmental outlook to 2050, the greatest environmental impact will be felt by developing countries, who are less ready to manage and adapt. The OECD (2019) suggests alternative measures to maximize competitive advantage are innovative solutions based on resources. OECD recommendations are in accordance with the conditions of the global business environment after the COVID-19 pandemic. The world economy is predicted to decline in 2020 (Fernandes, 2020). But the palm oil industry in Indonesia is still able to survive because consumer demand for Crude Palm Oil (CPO) as a food ingredient is very high.

Considering the uncertain global economy in the future, palm oil industry needs a suitable business strategy. Natural environment strategies based on innovation and resources including new subject areas in strategic management science (Gatti et al., 2019; Hasan & Hidayat, 2018; Iskandar et al., 2018; Utterback, 1974; Yusoff, 2006). The development of resource-based innovation strategy refers to Resources-based View (RBV) theory (Penrose, 1959). The RBV starts from the classic approach in strategy formulation which generally starts from an assessment of the company's competencies and resources, where distinctive or different resources from competitors can become the fundamental of competitive advantage (Huang et al., 2015; Wernerfelt, 1984). RBV theory views companies as a collection of resources and capabilities (Penrose, 1959; Peteraf, 1993; Wernerfelt, 2013). The RBV assumption is that companies compete based on resources and capabilities.

The creation of competitive advantage based on RBV relates to Creation Theory of Entrepreneurial Action (Alvarez & Barney, 2007). Resource-oriented entrepreneurial action can lead to new innovations that can compete to achieve competitive advantage (Ashenbaum et al., 2012; Mostafa et al., 2005; Pérez-Luño et al., 2016; Purnomo et al., 2019). This theory explains the entrepreneurial opportunities created from the learning process rather than being discovered or discovery (Febrian et al., 2018).According to Wang (1998), competitive advantage based on RBV reflects; (1) timeliness, (2) accuracy of product size, (3) accuracy of product size, (3) product consistency over time, (4) product completeness, and (5) product accuracy.

Based on the literature review (Hooley, Broderick, & Möller, 1998; Newbert, 2008; Wong & Karia, 2010; Zikmund, McLeod, & Gilbert, 2003), the RBV is a suitable approach for designing strategies to achieve competitive advantage through exploiting the company's internal resources(Grant, 1996). According toSambamurthy et al. (2003), companies must be able to recognize resource determinants, whether from supply chain limitations or from continuous innovation efforts. Barney (1991) and Sharma & Zeller (1997) state that resource-based innovation is influenced by the company's natural environment strategy. According to Sharma & Vredenburg (1998), natural environmental strategies can be measured through; (1) modification of business operating activities, (2) autonomy in the production process, (3) proactive in the natural environment, (4) able to manage environmental preservation, (5) implementation of environmental inspection, and (6) knowledge sharing.

Competitive advantage is the result of a company's ability to generate Schumpeterian rent (Lavie, 2006; Sisakht, Orumieh, & Talebi, 2014). Schumpeterian rent comes from dynamic capabilities to manage company resources. Foss and Lyngsie (2011) and Hitt et al. (2012) argue that capability is a source for achieving Competitive Advantage. Competitive Advantage comes from the company's capacity and ability (Antoncic & Hisrich, 2001; Day, 1984; Mithas et al., 2011) to utilize its organizational resources in Schumpeterian competition and environmental change (Foss & Lyngsie, 2011; Lumpkin & Dess, 2001). Schumpeterian believes that economic rent is obtained from the results of continuous innovation (Block, Fisch, & van Praag, 2017; Cantner, Goethner, & Silbereisen, 2017).

Amit and Schoemaker (1993) explained the importance of being able to effectively solve natural environmental problems through innovation (Schienstock, 2009). Being able to innovate is seen as the entrepreneurial strategy-making processes that companies use (Feldman, 2014; Ireland, Covin, & Kuratko, 2009; Porter, 1996; Saleh & Wang, 1993; Sambamurthy et al., 2003; Teece, Pisano, & Shuen, 1997). Regarding the natural environmental problems caused by the palm oil industry in Indonesia, the innovation strategy is an effective solution. There is a consensus that the natural environment has played a significant role in business activities during the Covid-19 pandemic and in the future. The consequence is the competition of the palm oil industries to innovate through exploitation of the natural environment.

Innovation is an effort to create, process, and actualize new ideas and practices in a corporate ecosystem. Something that can stimulate innovation is encouragement in an organizational environment (Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004; Jenkins, 2014; Rogers, Singhal, & Quinlan, 2019). According to Reguia (2014) the innovation process can be carried out through market research to identify market sizes and customer preferences or requirements specifically, so companies can create and offer products according to customer and market needs. Indicators that can be used as a measure of

innovation are (1) Developing new products, (2) Improving the appearance and performance of existing products, (3) Producing special products, (4) Investing in research and development facilities to gain competitive advantage, (5) Innovation in marketing techniques, and (6) Innovation in the production process (Greenhalgh et al., 2004; Reguia, 2014; Rogers, 1983; Rogers et al., 2019).

The initial hypothesis is built on the view of previous research that recommends innovation strategic development to create new technologies that are environmentally friendly. Several research results prove that innovation stimulates business growth and becomes an important factor of competitive advantage (Siqueira& Cosh, 2008; Xie et al., 2013; Zortea-Johnston et al., 2012). According to Liu (2013) in the future, business will be limited and dependent on the ecosystem. Strategic and competitive advantages in the future come from capabilities that enhance economic activity that is environmentally sustainable (Febrian et al., 2018; S. Sharma & Vredenburg, 1998). However, the phenomenon that occurs in the oil palm industry is not in accordance with the explanation of previous studies in the science of strategic management, then it becomes a theoretical gap. Criticism on the negative impact of the existence of the palm oil industry has often been carried out by academics (Fitzherbert et al., 2008; Gilroy et al., 2015; Khatun et al., 2017; Rist et al., 2010; Tan et al., 2009), practitioners (Obidzinski et al., 2012), and non-governance organizations. Based on the description and empirical gap above, the research question of this paper is to try to analyze the strategic influence of the natural environment on innovation and competitive advantage in the palm oil industry in Riau Province, Indonesia.

2. Methodology

Quantitative studies have been carried out of a population of 233 palm oil industries in Riau Province, Indonesia. The determination of the sample size for the population to be selected uses the Slovin formula in Ghozali (2014), which is:

$$n = \frac{N}{1 + Nd^2} = \frac{233}{1 + 233(0,05)^2} = 147,24 \tag{1}$$

where n represents Sample size; N denotes Population size and d states the acceptable sampling error (5%). Sample obtained by using Slovin's formula is 147.24 which is rounded to 147 palm oil industries, as seen in Table 1. Then, the sample size for each sub-population was carried out using a proportional random sampling technique with Sugyono's formula in Riduwan (2010).

$$n_i = \frac{N_i}{N} \times n \tag{2}$$

where n_i represents sample proportion; N denotes the Population size and n states the Sample size.

Table 1
The Sample Proportion of Palm Oil Industries in Riau Province

No	Palm oil companies (city)	Total Population (Companies)	Sample proportion
1	Pekanbaru	2	$(2 \times 147)/233 = 1$
2	Bengkalis	21	$(21 \times 147)/233 = 13$
3	Rokan Hulu	18	$(18 \times 147)/233 = 11$
4	Rokan Hilir	25	$(25 \times 147)/233 = 16$
5	Siak	19	$(19 \times 147)/233 = 12$
6	Kampar	32	$(32 \times 147)/233 = 20$
7	Pelalawan	30	$(30 \times 147)/233 = 19$
8	Kuansing	18	$(18 \times 147)/233 = 11$
9	Indragiri Hulu	53	$(53 \times 147)/233 = 33$
10	Indragiri Hilir	12	$(12 \times 147)/233 = 8$
11	Dumai	3	$(3 \times 147)/233 = 2$
	Total	233	147

Data collection techniques is based on survey methods.We explain the research objectives and the questions to be filled in when meeting respondents. Each respondent will receive a questionnaire package. The package was collected by researchers one week later after distribution. We also confirmed the respondent's anonymity when retrieving the completed questionnaire. The data is collected by the owner or manager or a company leader in the palm oil industry that has been sampled. 115 questionnaire packages were returned and completely filled out. This shows that the response rate in this study is 78.23%. We have conducted Structural Equation Modeling (SEM) tests with AMOS 23 software to produce statistical data from 115 respondents (Hair et al., 2012). We intend to use SEM techniques to test the validity of theoretical models. Ghozali (2014) defines SEM as a statistical methodology that takes a confirmation approach to the analysis of structural theories that contains some real phenomena. In the SEM test, there are two aspects that become important points. First, the causal process is understood as representing a series of structural equations (regression), and second, the structural relationship can be modeled visually to support a clear conceptualization of the theory under investigation (Chin, 1998; Hair et al., 2012). The hypothesized model can then be tested statistically in a simultaneous analysis of the entire system of variables to determine the extent of

the respondents' data consistency. If Goodness of Fit meets the SEM requirements, the model argues for the reasonable relationship postulated between variables. Whereas if it is inadequate, the tenacity of the relationship between variables must be rejected. AMOS testing is conducted through Confirmatory Factor Analysis (CFA) Measurement Model and Structural Equation Model (SEM). The CFA Measurement Model investigates the unidimensionality of indicators that explain a latent variable. SEM testing is done with two measurements(Blunch, 2017; Byrne, 2013; Thakkar, 2020). First, measure the suitability of the model. Second, measure the significance of causality through the regression coefficient test. Structural model analysis is conducted in three stages. First test the conceptual model, if the results do not meet SEM standards, followed by the second test to give modification treatment to the model developed after taking into account the modification index and justification of the existing theory. If the second test results are still below the general standard of SEM, then the third step must be to eliminate indicators that have a small critical ratio of a loading factor of 1.96, because this indicator is seen as not having the same dimensions as other variables to explain a latent variable (Byrne, 2013). The loading factor is used to assess the suitability, suitability or unidimensionality of the indicators that form a latent dimension or variable.

3. Results and discussion

We have discussed the results according to Goodness off it test (Chi-Squared), Parsimony-adjusted index (RMSEA), Confirmatory fit Index (CFI), Parameter estimates, and Critical Ratio (CR).The final model test results are evaluated based on the goodness of fit indices criteria in Table 2, with the model criteria and their critical values that have data suitability presented.

Table 2
Evaluation of the Overall Goodness of Fit Indices Model

Goodness of fit index	Cut-off Value	Model results*	Explanation
χ^2 – Chi-square	Expected to be small	60.606	Good
Sign. Probability	≥ 0.05	0.526	Good
CMIN/DF	≤ 2.00	0.978	Good
GFI	≥ 0.90	0.927	Good
AGFI	≥ 0.90	0.893	Moderate
TLI	≥ 0.95	1.026	Good
CFI	≥ 0.95	1.000	Good
RMSEA	≤ 0.08	0.000	Good

Goodness of Fit (Chi-Square) is calculated through statistics χ^2 divided by levels of freedom. The default model has a discrepancy of 60.606, and the model was in accordance with the actual data. Assuming that the Default model is correct, the P-value (Sign. Probability) of getting a discrepancy as large as 60.606 is 0.526, which is more than 0.05 and shows significant. The parsimony-adjusted index (RMSEA) value of 0.05 or less will indicate the suitability of the model in terms of degrees of freedom (Byrne, 2013). The declaration is based on a subjective judgment which cannot be assumed to be true, then it makes more sense than the requirement for precise conformance with the RMSEA equal to 0.000. Browne and Cudeck (1993) also argue that a value of 0.08 or less for the RMSEA would indicate a reasonable error estimate and would not want to employ a model with a RMSEA greater than 0.1. The model of this paper shows a RMSEA value of 0.000, shows that the hypothesis of the research model is in accordance with the data. The comparative fit index (CFI) shows an increase in the suitability of the model hypothesized with the baseline model. The cut-off value for CFI is greater than or equal to 0.95. Values less than 0.95 indicate the inadequacy of the model. In the model we tested, the CFI value was 1.000, which indicates a good fit between the research model and the sample data obtained.
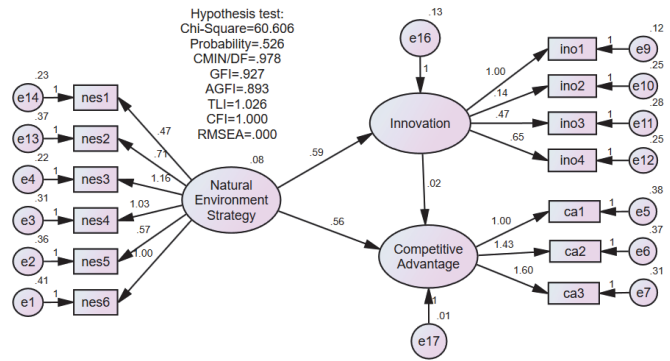

Fig. 1. The Natural Environment Strategy, Innovation and Competitive Advantage theoretical model (created by AMOS Graphics v. 23)

Based on the evaluation of the AMOS model, Fig. 1 shows that the overall evaluation of the constructed model has produced critical values above. Thus, it is stated that the model can be accepted and in accordance with the data, the next step is hypothesis testing. According to Browne and Cudeck (1993), hypothesis testing procedures, confidence intervals, and claims for efficiency in the maximum likelihood or least squares estimate generalized by AMOS v23 depend on certain statistical

distribution assumptions. However, observation must be independent. We reviewed statistically significant estimates to evaluate the reasonableness of the parameter estimates or path coefficients. This is to see whether the factor is practically important for the latent variable and whether a positive or negative direction can be considered logical, for the estimate to be significant, the Critical Ratio (CR) result must be more than 1.96. The results of hypothesis testing are presented in Table 3.

Table 3
Hypothesis Testing Results

	Hypothesis			Standardized Regression Weight	Critical Ratio (CR)	Probability	Explanation
H_1	Natural environmental strategy (X_1)	→	Innovation (Y_1)	0.591	2.031	0.042	Significant
H_2	Natural environmental strategy (X_1)	→	Competitive advantage (Y_2)	0.563	2.026	0.043	Significant
H_3	Innovation (Y_1)	→	Competitive advantage (Y_2)	0.017	0.147	0.883	Not significant

*significant at level 5%

The critical ratio is the parameter estimate divided by the estimated standard error. If the assumption of the appropriate distribution is met, this statistic has a standard normal distribution under the null hypothesis that the parameter has a population value of zero. The critical ratio has the interpretation that for each parameter that is not constrained, the square of its critical ratio, approx, the sum of the chi-squared statistic will increase if the analysis is repeated with the parameter set at zero. The CR formula is as follows;

$$z = \frac{\bar{X} - \mu}{\sigma / \sqrt{\eta}} \tag{3}$$

where $\bar{X}, \mu, \sigma$ and η represent sample mean, population mean, standard deviation and error, respectively. Based on Table 3, two hypotheses have a significant effect and one hypothesis is not significant. The hypothesis accepted and supported by empirical data is that the natural environment strategy has a significant effect on innovation (H_1). The probability of getting a critical ratio as large as 2.031 in absolute (P-value) is 0.042. In other words, the regression weight for Natural Environment Strategy in the prediction of Innovation is significantly different from zero at the 0.05 level (two-tailed). The probability of getting a critical ratio is 2.026 with absolute value (P-value) of 0.043. In other words, the regression weight for the Natural Environment Strategy in the prediction of Competitive Advantage (H_2) differs significantly from zero at the 0.05 level. Furthermore, the third hypothesis (H_3) is rejected because it is not supported by the empirical data obtained. The probability of getting a critical ratio is 0.147 with absolute value (P-value) of 0.883. In other words, the regression weights for Innovation in the prediction of Competitive Advantage are not significantly different from zero at the 0.05 level.

The first hypothesis has been stated as the strategy of the natural environmental strategy to have a significant influence on proven innovation.This is evidenced by theProbability(P-value) smaller than 0.05 level (0.42), which means significant. Based on SEM test results, the theory and research results proposed by Cohen (2006), Fiol (1996), Hart (2017), Porter & Van Der Linde (2017), Ryszko (2016), Sharma & Vredenburg (1998) and Yang et al., (2019) have been confirmed. Development of a natural environment strategy requires companies to be able to innovate to create new technologies that are environmentally friendly. Basically, the effort to innovate is very important because it can provide an important way to adapt to changes in markets, technology, and competition (Iskandar et al., 2018; Yusoff, 2006). Bansal and Roth (2000) suggest that companies use positive natural environmental policies such as meeting government-mandated regulations. In fact, the palm oil industry in Riau, Indonesia has made improvements in the production process to prevent pollution, develop new products, improve the quality of existing products, invest in product development facilities, innovate in marketing techniques and innovate in the production process with value. The second hypothesis has been stated as a natural environmental strategy to have a significant influence on competitive advantage, the effect has been proven because the probability (P-value) is smaller than 0.05 (0.043), which means significant. Thus, we confirm the theories and research results of Hart and Dowell (2011), Ko and Liu (2017), Kotabe and Murray (2004), Porter and Van Der Linde (2017) and Yaacob (2007). The research findings represent that companies have managed the environment as a source of competitive advantage. Hart (2017) states that the core of the natural resource-based view of the company understands the role of the natural environment as a source of continuous competitive advantage. Although considered an important effort to introduce and maintain company capability, discussing issues related to natural environmental issues is complex. However, successful integration of the natural environment into a company's strategic planning process is represented in managing organizational capabilities to be valuable, obtain scarce resources, and the products produced are not easily imitated by competitors (Judge & Douglas, 1998). The third hypothesis, innovation has a significant effect on competitive advantage has not been proven.The SEM model test results obtained probability (P-value) more than 0.05 (0.883), which means not significant. These results cannot yet confirm and support the research argumentation by Barton (1995), Hax and Majluf (1988), Lewis et al., (2002), Motwani et al. (1999), and Wolff and Pett (2006). They argue that innovation encourages business growth and is also a factor of competitive advantage. Empirical conditions show that innovation has a significant influence on competitive advantage, if through investment in information and communication technology (ICT). The reason is innovation as an antecedent of competitive advantage which is intellectual capital will produce competitive advantage if accompanied by ICT investment. This is because innovation certainly creates change (Barney, 1991). Research on the relationship between the two and their influence on the company's competitive advantage is expected

to contribute to business development, the use of ICTs, and the development of knowledge in the field of strategic management. Given today, innovation is still scarce in Indonesia, while the use of ICTs in corporate management systems is quite extensive.

4. Conclusion

The natural environment strategy that has been implemented will be followed by innovations to produce environmentally friendly products. Based on empirical evidence from the Palm Oil Industry in Riau Province, company leaders have seen the environment as a source of competitive advantage that must be processed with the Resource-Based View (RBV) based Entrepreneurial Action approach. These findings confirm the RBV theory (Barney, 1991; Penrose, 1959; Wernerfelt, 1984) and in accordance with the statement by Hart (1995) the core of the company's natural resources perspective is competition managing the ability to execute the natural environment to gain competitive advantage in the future. Other findings can be explained as a discrepancy between phenomena and theories. Innovation is not an antecedent factor for creating a competitive advantage. Innovation will be created in the Palm Oil Industry in Riau Province if the company wants to improve business processes and good corporate governance through investment in information and communication technology, increasing human resource competence, increasing production support infrastructure, and other factors. The challenges of empirical research in the field of natural environment strategy in the future, need to be improved, especially for the measurement of indicators used, as a company's effort to improve the company's image, reputation, assessment and positive public perception of the implementation of natural environment strategies carried out by the company. A limitation of this study is that we did not conduct research on a larger scale such as one country, to obtain better data accuracy. Through small data, the risk of error and bias data will be more potential to be discovered during the data analysis process. Recommendations for future researchers are to focus on involving other variables, using different data analysis methods, and using larger-scale data samples so that research results can be diverse.

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