ANALYZING SUSTAINABILITY OF SMES IN AUTOMOTIVE COMPONENT INDUSTRY IN BEKASI REGENCY

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ABSTRACT

This research aim to analyze sustainability of SMEs in automotive component industry. Specifically has two main objectives, finding the relationship between sustainability and each variable, and finding the current sustainability pattern of SME in automotive component industry. The topic addressed due to the nature of industry (material and waste) where sustainability is undeniable. Supported by the growing number of SME in industry, where the effect of collective SMEs can be as big as corporation. The result of this study help to understand the current sustainability practice and as input for companies in industry. This research specifically conducted in Bekasi Regency and used the YDBA definition for SME. There are six variables that used to analyze sustainability practice in the industry, they are energy consumption, water consumption, waste management, environment preservation, equality in society, and noise and emission management. This research is conducted quantitatively by conduct survey in 30 companies. The result then analyze by using multiple regression analysis (standard and stepwise) to test the hypothesis. The results of the research found that the current sustainability practice of SME in the automotive component industry have positive significance relationship in water consumption, waste management, and noise and emission management; negative un-significant relationship with energy consumption; and positive un-significant relationship with environment preservation and equality in society. The second analysis by using stepwise shows that there are three necessary variable contribute to the current sustainability, they are water consumption, waste management, and noise and emission management.

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Keywords: Automotive component industry, Bekasi, SME, Sustainability.

Contribution/ Originality

This study is one of very few studies which have investigated about industrial symbiosis in Indonesia. Industrial symbiosis approach in managing environment among industry and in this research automotive industry used as the cases. Industrial symbiosis approach previously applied among different industry but in this research industrial symbiosis try to applied among same industry, that is automotive industry.

1. INTRODUCTION

Indonesia automotive component industry, both for cars and motorcycles is one of the industry's that growing rapidly, have the high-value and most promising in Indonesia [1]. This industry is dominated by small and medium enterprise (SME) that produced non-brand and hyper-price sensitive product, as the result of consumer demand for various product quality and price.

In automotive component industry, most of the raw materials used are categorized as un-renewable resources (iron, steel, aluminum, silver, copper, etc.). While the major environmental wastes generated by the automotive manufacturing industry include: machine lubricants and coolants; aqueous and solvent cleaning systems; paint; and scrap metals and plastics [2]. From the critical point of view, it is sure that this concept cannot be ignored by companies, which want to be successful in the future [3]. The customer and shareholder as the part of society becoming more and more conscious toward the sustainability issue, that also influence their purchasing decision. A study by Wilkinson, et al. [4] revealed that top management support, human resource management, employee empowerment, teamwork and reward systems have been important factors for achieving sustainability, on the one hand (as cited in Kulkarni, et al. [2]). Due to this condition sustainability is a term that should be integrated into all parts of the companies in every industry in every country, including automotive component industry in Indonesia. As stated before, the tools in measuring the sustainability are still developing and the latest research by Zavodna [5] try to measure sustainability by using Balanced Scorecard (BSC). Zavodna [5] suggest six goals that become the target of sustainability that is measured by using BSC, they are: lowering energy consumption, lowering water consumption, waste reduction, environment preservation, equality in society, and lowering noise and emissions. The sustainability is becoming more and more important not only for the big enterprises, but also in SME. It is because the effect of unsustainable practice of collective SMEs can be as big as the large corporations. It is supported by World Business Council for Sustainable Development and SNV [6] that stated that collectively SMEs have considerable environmental impact. Based on the explanation above, , the objective of present research are: 1. To determine the relationship between sustainability and company activity in energy consumption, water consumption, waste management, environment preservation, equality in society, and noise and emission management. 2. To determine the current pattern or the fit model of sustainability in the industry. The main limitation is the industry, present research only conducted in the automotive component industry. Based on the company size, this research limited to SME, based on the YDBA definition. The SME definition based on YDBA, only applicable for

automotive and automotive component industry, therefore might not be applied effectively for other industry.

2. THEORETICAL REVIEW

The word sustainable was first introduce in a report published in 1972 called "The limits to growth" [7]. The writers of the report "Limits of growth" described "sustainable": We are searching for a model output that represents a world system that is sustainable without sudden and uncontrollable collapse and capable of satisfying the basic material requirements of its entire people" [8]. The definition of sustainability development was introduced by the World Commission on Environment and Development [9]. It stated that sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. After the introduction of the term by World Commission on Environment and Development, there has been a development of three spheres (essential aspects) of sustainability development which discussed by Harris [10]. 1. Environmental: An environmentally sustainable system must maintain a stable resource base, avoiding over-exploitation of renewable resource systems or environmental sink functions, and depleting non-renewable resources only to the extent that investment is made in adequate substitutes. This includes maintenance of biodiversity, atmospheric stability, and other ecosystem functions not ordinarily classed as economic resources. 2. Social: A socially sustainable system must achieve fairness in distribution and opportunity, adequate provision of social services including health and education, gender equity, and political accountability and participation. 3. Economic: An economically sustainable system must be able to produce goods and services on a continuing basis, to maintain manageable levels of government and external debt, and to avoid extreme sectorial imbalances which damage agricultural or industrial production. In the extensive discussion of sustainability, various entities started to define their role and responsibilities to create the sustainable world, and one of them is the corporation. In addition to adopting policies and undertaking actions to improve their sustainability, corporations are also developing tools for monitoring, assessing, and reporting their environmental and sustainability performance [11]. As the issue becoming more and more important, especially for the environment, ISO develop ISO 14000 that address various aspect of environmental management, ISO 26000 that provides guidance on how businesses and organizations can operate in a socially responsible way, ISO 14001 that address management system standard, and ISO 9001 for quality management. The next issue to address is the tools to measure the sustainability in the business. There are various approach introduce to measure sustainability in a company, one of them is introduced by Zavodna [5] introduce balance scorecard with a set of suggested variables used to measure the sustainability in the business. Using the suggested variables of Zavodna [5] the following list of indicators then use in this research:
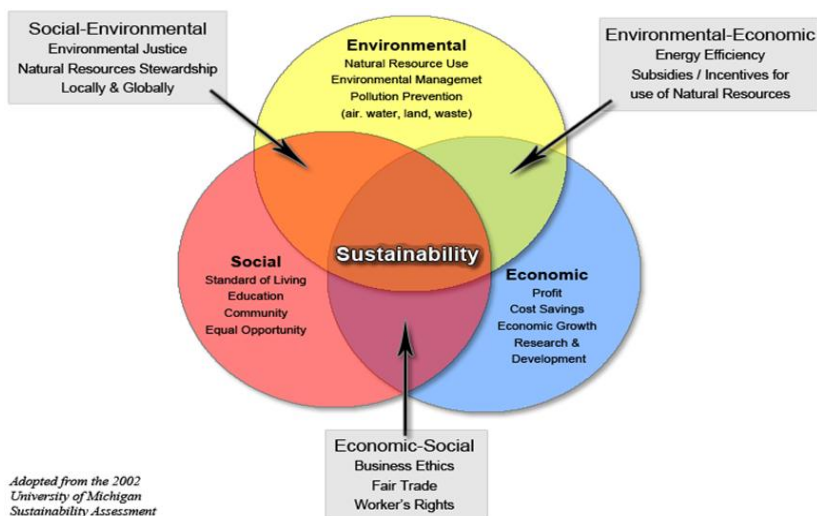
Figure-1. The Three Spheres of Sustainability
Source: Adapted from Sustainability Assessment and Reporting for the University of Michigan's Ann Arbor Campus (2002)

Table-1. The Variables and Indicator of Research

Variable	Definition	Indicators
Energy Consumption	Energy consumption in this research not only refers to the amount of energy that consume by the company, but also what energy that is consumed (renewable or un-renewable), and the consideration of choosing the energy.	1. Energy consumption from renewable resources 2. Lowering Consumption of energy (year) 3. Average consumption of Vehicle Fuel
Water Consumption	Water consumption in this research refers to the expenditure of water that has been supplied to satisfy the needs of the company for non-production activities. It also refers to the activity to improve the effectiveness of water consumption	1. Average consumption of drinkable water 2. Average consumption of Hot Water 3. Management of Waste Water
Waste Management	Waste management in this research refers to the collection, removal, processing, and disposal of materials that considered waste. It also refers to the activity to reduce the amount of waste produced.	1. Number of Waste Containers 2. Percentage of Recycled Waste 3. Percentage of Assorted Waste: paper, plastic, glass, bio-waste 4. Average disposal cost
Environment Preservation	Environment preservation in this research refers to the activities to maintain the present condition of company surround condition that has not been distorted.	1. Investments for the savings of nature / environment 2. Percentage of costs going back to the environmental protection 3. Percentage of office supplies recycled
Variable	Definition	Indicators
Equality in Society	Equality in society refers to the company's ability to provide equal treatment to all of members of society. Specifically, in this research, it refers to concern on local employee, gender diversity, local resources, and attention to the employee health and safety.	1. Percentage of local employees 2. Percentage of woman in management 3. Percentage of material from local resources 4. Percentage of certified suppliers 5. Number of safety improvement projects
Noise and Emissions Management	Noise and emission management in this research refers to company's concern and ability to manage and minimize the noise and emission produced	1. Air emission 2. Greenhouse gas emission 3. Average work week hours 4. Average overtime work hours
		Continue

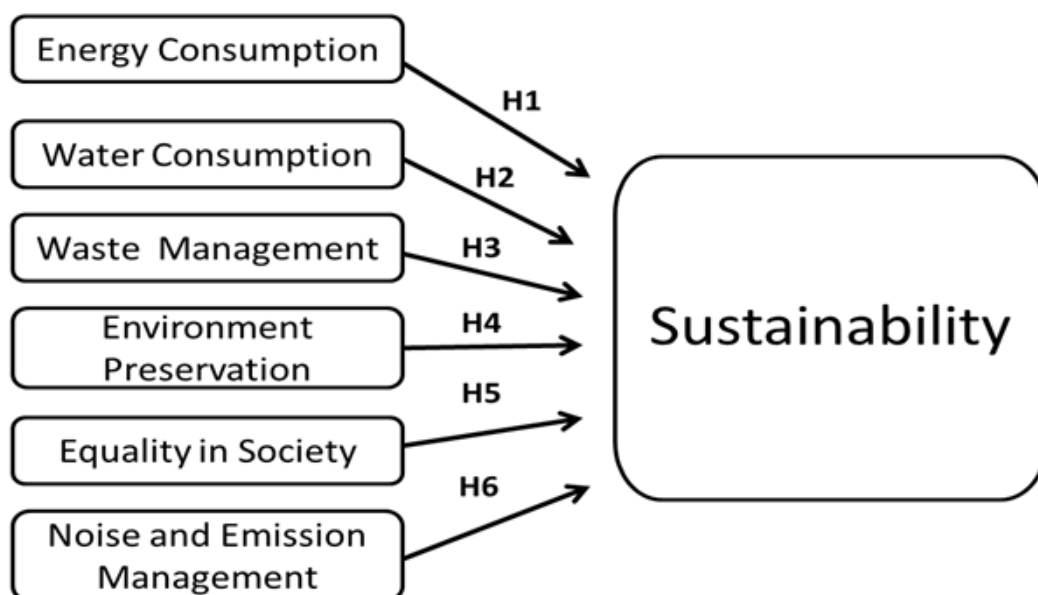| Sustainability	Sustainability in this research refers to the ability of the company to conduct their activities by maintaining a stable natural resources for the present and the future, providing fair distribution and opportunity for society, and maintaining the continuity of the company activity to produce goods and services.	1. Energy consumption 2. Water consumption 3. Waste management 4. Environment Preservation 5. Equality in society 6. Noise and emissions management

Source: Zavodna [5]

To create more understanding toward the research, the conceptual framework is developed. It is shown in Figure below, there are six independent variables and one dependent variable to answer the problem statement proposed in the previous chapter. There will be six hypotheses in this framework, measuring the relationship of each independent variable (predictors) with the dependent variable (criterion variable), that will answer the first problem statement.

Based on Figure 2. there are six hypotheses in this research. After conduct the literature review, a number of hypotheses can be constructed, they are:

Hypothesis 1: There is positive significant relationship between energy consumption and sustainability

Hypothesis 2: There is positive significant relationship between water consumption and sustainability

Figure-2. Theoretical Framework

Source: Zavodna [5]

Hypothesis 3: There is positive significant relationship between waste management and sustainability

Hypothesis 4: There is positive significant relationship between environment preservation and sustainability

Hypothesis 5: There is positive significant relationship between equality in society and sustainability

Hypothesis 6: There is positive significant relationship between noise and emission management, and sustainability

3. METHOD

The present research is an empirical study that designed based on the quantitative approach, where statistical analysis will be used to prove the hypotheses in the previous chapter. The analysis of the present research used both descriptive and inferential statistic. The population of this research is the SME in automotive component industry that located in Bekasi Regency. The population choose based on the consideration that Bekasi is one of the center of Industrial in Indonesia, where majority of automotive component cluster located. The sampling size in this research is 30 companies. The amount is represent the result of this research since it already fulfill the requirement for the big sample. The sampling technique is non-probability sampling that is purposive sampling. Purposive sampling is a form of non-probability sampling in which decisions concerning the individuals to be included in the sample are taken by the researcher, based upon a variety of criteria which may include specialist knowledge of the research issue, or capacity and willingness to participate in the research. In this research, the criteria is the company (a legal entity) in automotive component industry categorized based on YDBA definition, and located in Bekasi Regency. The hypothesis testing will be done by using two method of multiple linear regression, they are standard (enter) and fit-model (stepwise). Multiple regression analysis is a statistical technique that is powerful and flexible to develop a mathematical relationship between a metric dependent variable and two or more independent variables [12]. It is used to analyze the relationship between independent variable and dependent variable. If the result shows that the relationship exist, means the information that we had in independent variables can improving the accuracy to predict the value of dependent variable.

4. RESULT AND ANALYSIS

The standard multiple regression analysis conducted in this research using energy consumption, water consumption, waste management, environment preservation, equality in society, noise and emission management as predictors (independent variable) and sustainability as the criterion variable (dependent variable).

Table-2. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.930[a]	.865	.830	1.775789	2.089

a. Predictors: (Constant), TNE, TEC, TWM, TES, TEP, TWC

b. Dependent Variable: TS

The amount of Adjusted R Square in the table above indicate the amount of variance in the dependent variable that independent variable or predictors account for when the whole predictors taken in a group. The table above shows that a set of predictors (energy consumption, water consumption, waste management, environment preservation, equality in society, noise and emission management), account for 83% of variance in sustainability. The formula of multiple regression usually developed by looking at the unstandardized coefficients B. Because the independent variables of this research were measured in different measurement units, the formula was supposed to be constructed using standardized coefficients Standardized constant amount for the value is the easier way to define the effects regardless measurement units differences. In the enter method, each variable is included in the final model, regardless of whether it is statistically significant. Therefore, the standardized formula based on the coefficient table is:

$$S = -0.202 \, EC + 0.523 \, WC + 0.273 \, WM + 0.156 \, EP + 0.119 \, ES + 0.317 \, NEM$$

Based on the discussion above the current sustainability pattern can be generated by looking at the model 3 that says that there are 3 variables that necessary to predict sustainability at SME in automotive component industry.

Table-3. Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.471	2.184		1.131	.270
	EC	-.474	.236	-.202	-2.009	.056
	WC	.834	.178	.523	4.687	.000
	WM	.307	.113	.273	2.729	.012
	EP	.183	.109	.156	1.681	.106
	ES	.176	.133	.119	1.326	.198
	NE	.376	.103	.317	3.645	.001

a. Dependent Variable: S

They are Water Consumption, Waste Management, and Noise and Emission Management. The current sustainability pattern is:

$$S = 0.455 \, WC + 0.389 \, WM + 0.350 \, NEM$$

This research made to answer two problem statements. The first problem statement is to find the relationship between each independent variable toward dependent variable. The researcher draw the hypotheses to predict the result of research, based on the literature review that presented in previous chapter. However, not all of hypothesis is accepted, there are certain condition based on the data gathered and the sample characteristic that become the reason for this condition.

1. Energy Consumption toward Sustainability of SME in Automotive Component Industry.

   The first hypothesis predict that there are positive significant relationship between energy consumption and sustainability. While the result of data analysis by using SPSS shows that the amount of standardize coefficient B is (-0.202) and the value of significance is 0.056. The negative sign in the standardize coefficient B value indicates the negative relationship is exist

between energy consumption and sustainability. While the level of significance is bigger than 0.05 (margin of error = 5%) indicates that the relationship is un-significant. Therefore the first hypothesis is rejected. Not-significant means there is no special contribution that can differ energy consumption with the other variable toward sustainability or it means the correlation is zero. After looking at the set of data that gathered from 30 respondents, the result indicates that the respondent that involved in this research agree that the moment they focus on energy consumption, in this case, invest in renewable energy, keep minimizing the energy consumption and keep paying attention to sustainability in choosing the energy, it will result to the lower sustainability level of the company. The study indicates that focus being sustainable in energy consumption will reduce the sustainability instead. The example of renewable energy that presented in the questionnaire is solar energy, the most feasible renewable energy that can be utilized, however for SME, this utilization of solar energy will result in more investment to make. They will need to install the panel and sacrificed certain amount of money. Well for this size of enterprises, they prefer to allocate the money for the other activities to improve the performance of the company. Therefore they can conclude that by making more investment in energy, it will reduce the company sustainability, it could be in the economic, social, and environment sustainability. It is supported by the statement of Fatimah, et al. [13] that presented in the literature review mentioning that the characteristic of SME is insufficient capital investments, therefore they also lack of innovative technology. In the other side, various literatures mentioned that the energy consumption will result in sustainability, this variable still not becoming the goal of SME in automotive component industry to achieve sustainable practice. It is supported by Linnenluecke and Griffiths [14] mention that sustainability requires organizational change and adaption in different levels. Every organization and industry has their own goal in sustainability that different from one to another.

2. Water Consumption toward Sustainability of SME in Automotive Component Industry.

The second hypothesis predict that there are positive significant relationship between water consumption and sustainability. Compared to the result of data analysis, the amount of standardize coefficient B is (+0.523) where positive sign indicates positive relationship, and the significance value is 0.000 which is less than 0.05 (5% margin of error) that means the positive relationship that exist is significance. Therefore the second hypothesis is accepted. Significant means there is special contribution that can differ water consumption with the other variable toward sustainability or it means the correlation is not zero. The research indicates that the SME in automotive component industry agree that by improving activities in hazardous waste water disposal, put an effort to re-use the water from non-production activities, and concern to minimize the water usage, will improve the sustainability of the company. It means that they agree on that activity in water consumption will help the company to become more sustainable it could be in social, economic, and environment and it becomes one of their goal in sustainability. It is align with Sodhi and Yatskovskaya [15] that also agree on the company activities on sustaining the water consumption.

3. Waste Management toward Sustainability of SME in Automotive Component Industry.

The third hypothesis predict that there are positive significant relationship between waste management and sustainability. The result of data analysis, the amount of standardize coefficient B is (+0.273) where positive sign indicates positive relationship, and the significance value is 0.012 which is less than 0.05 (5% margin of error) that means the positive relationship that exist is significance. Therefore the third hypothesis is accepted. Significant means there is special contribution that can differ waste management with the other variable toward sustainability or it means the correlation is not zero. The result indicates that the respondent believe by minimizing the waste production, re-use and recycle, sort the waste, and keep trying to improve the waste processing, it will result in the higher sustainability for the company. Means that waste management is becoming the important factors and becoming one of sustainability goal in the SME in automotive component industry. It is also supported by Ali, et al. [16] that proper solid waste disposal is an important component of environmental sanitation and sustainability.

4. Environment Preservation toward Sustainability of SME in Automotive Component Industry.

The fourth hypothesis predict that there are positive significant relationship between environment preservation and sustainability. The result of data analysis shows that the amount of standardize coefficient B is (+0.156) which indicates positive relationship and the significance is 0.106 which indicates the established relationship is un-significant. Therefore the fourth hypothesis is rejected. It indicates that even though the company agree that preserved the environment will contribute to the sustainability, the contribution to the sustainability is not significant. It means there is no special contribution that can differ environment preservation with the other variable toward sustainability or it means the correlation is zero. Looking at the data, the respond at the each statement under environment preservation is good enough, two third of the respondent ever do more than half of the total activities that included in the questionnaire. But when looking at the respond to the statement S4, "This company practicing sustainability by keep trying and concern on environment preservation", the majority respondent respond by low scale. It means that the respondent do not confident enough to say that their effort in preserving the environment can contribute to the sustainability. Since strong definition of sustainability that related to the environment preservation said that sustainability means that every component or subsystem of the natural environment, every species, and every physical stock must be preserved [17] while the respondent just do the tiny part of it.

5. Equality in Society toward Sustainability of SME in Automotive Component Industry .

The fifth hypothesis predict that there are positive significant relationship between equality in society and sustainability. The result of data analysis shows that the amount of standardize coefficient B is (+0.119) which indicates positive relationship and the significance is 0.198 which indicates the established relationship is un-significant. Therefore the fifth hypothesis is rejected. It indicates that even though the company agree that equality in society t will contribute to the sustainability, the contribution to the sustainability is not significant. It means

there is no special contribution that can differ equality in society with the other variable toward sustainability or it means the correlation is zero. The data shows that even though most of company respond each statement of equality in society statement with high scale, some of the respondent provide lower scale in responding to the S5 that is "This company practicing sustainability by keep trying and concern on equality in society" with the high scale. It means the company do not confidence enough to respond with high scale, or a line with their respond toward statement under equality in society variable. It is related toward their goal in sustainability, it shows that the current main concern on sustainability of SME in automotive component company is not on providing the equality in society. In fact the score in this variable is almost perfect, but it is not included in the company's goal in sustainability.

6. Noise and Emission Management toward Sustainability of SME in Automotive Component Industry.

The sixth hypothesis predict that there are positive significant relationship between noise and emission management and sustainability. The result of data analysis shows that the amount of standardized coefficient B is (+0.317) where the positive sign means the positive relationship, indicates that the establish positive relationship is significant. Therefore the sixth hypothesis is accepted. Significant means there is special contribution that can differ noise and emission management with the other variable toward sustainability or it means the correlation is not zero..

This result indicates the respondent agree that noise and emission management can improve the sustainability practice of the company. In this study, noise and emission management include the concern of choosing the technology that produce less noise and emission, put an effort to prevent the issue of increasing average temperature, and highly consider the additional working hour that can cause more noise and emission. The noise and emission management seen as an important issue for the company, it also supported by Randolph and Masters [18] that emission is the problem of the century and Olayinka [19] that mention that there is imminent health risk of noise to the exposed population. The second problem statement of this research is find the current pattern (fit-model) of sustainability by using stepwise in linear regression. The result of data analysis shows that there are three variables that necessarily account or contribute significantly toward sustainability of SME in automotive component industry in Bekasi Regency. These three variables are water consumption, waste management, and noise and emission management. Water consumption has its own special contribution, that different from waste management and noise and emission management. Waste management has its own special contribution, that different from water consumption and noise and emission management. Noise and emission management also has its own special contribution, that different from water consumption and waste management.

5. CONCLUSION

The objective of this research is to analyze the relationship between energy consumption, water consumption, waste management, environment preservation, equality in society, and noise

and emission management toward sustainability in the SME in automotive component industry. This research also aim to know the current sustainability pattern of SME in automotive component industry, especially in Bekasi Regency. After conducting analysis to achieve research objectives, there are several results obtained:

1. The multiple regression shows that 3 variable has positive relationship and significant, they are water consumption, waste management, and noise and emission management. One variable that is energy consumption has negative relationship and un-significant. While the rest two variables environment preservation and equality in society having positive relationship but not-significant. It is due to the respondent feedback that is not confident enough to include the two variables sustainability.

2. After test the data with regression linear by using stepwise in SPSS, it is found that there are three variables that necessary contribute to the current sustainability pattern, they are water consumption, waste management, and noise and emission management.

$$S = 0.455 \, WC + 0.389 \, WM + 0.350 \, NEM$$

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