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Corporate Social Responsibility Program Toward Sustainability Crude Palm Oil Industry Using Analytic Hierarchy Process

Fuad Halimoen[1], Alvi Syahrin[2], Herman Mawengkang[3]

[1] *Graduate School of Environment Management, University of Sumatera Utara, Indonesia*
[2] *Graduate School of Environment Management, University of Sumatera Utara, Indonesia*
[3] *Departement of Mathematics, University of Sumatera Utara, Indonesia*

Abstract - ***During the last few decades, particularly in Indonesia, most business firms are expected to proactively take part in supporting the basic needs of society and developing environment. In responding to this expectations and pressure business firms have adopted a set of program call Corporate Social responsibility (CSR). Social and environmental problems are so big, generally, such that the firms may face difficulties in finding solutions effectively and efficiently. The consequence is the firms may only waste their shareholders resources. The business firm considered in this paper is crude palm oil (CPO) industry. The research was conducted in some villages in Riau province of Indonesia in which there are several palm oil mills. A set of activities program of CSR was formulated to meet the expectations of the society toward sustainable CPO industry . We use Analytic Hierarchy Process (AHP) to find the priority of the program. The Social Aspect has come out as the most need for the society rather than the Economic Aspect.***

Keywords: *Sustainable, AHP, Crude palm oil, Society needs*

1. INTRODUCTION

Nowadays, most of business firms or industries have made a change in their paradigm thinking from only to earn profit for their shareholders (owners) to meeting societies' expectations. These expectations may include taking responsibility due to the activities of firms that may harm the environment and to take care the welfare of society. In Indonesia, particularly for business firms which utilize natural resources, there is an obligation for these firms to share responsibilities for societies and the environment. This is due to the fulfillment of Indonesian Constitution in Article 33 and Government Decree no. 40/2007. The activities of business firms that share their responsibilities toward society is called Corporate Social Responsibility (CSR).

It can be said that CSR is a new corporate behaviour and management philosophy. This new paradigm of thinking is getting more popular and has been adopted by industries worldwide ([1], [5], [6]). While there are variations of the CSR definition, a commonly used definition is "firm actions designed to improve social or environmental conditions" ([7], [8], [21]).

CSR occurs by contributing some set of resources (such as people or money) for a social benefit (outside the normal scope of the firm), or to comply with legislation, for instance in environmental improvement [14]. It is further considered to be in firms' best long term interest to be socially responsible [5]. For example, by enhancing the societal environment in which firms exist, they contribute to the wealth development of that society. Long-term, this increases their market size in the form of new customers ([1], [2]).

These claims are some of the specific reasons why we have chosen to address CSR from a strategic perspective. The support of the educational system (to increase the size and quality of a future recruitment pool) and environmental improvement programs to achieve cost savings and value chain efficiencies, are other examples of CSR with a fundamental strategic intent ([19], [9], [13]). All these ultimately positively affect firm share price ([19], [9]).

Overall, CSR is empirically supported to provide a direct- and indirect impact on firm performance. Direct impact can appear in the form of positive financial performance, while indirect impact can be enhanced brand image or market reputation ([2], [3], [4], [14], [21], [18]). Hence, CSR is considered to be a part of the strategic management field ([2], [10], [11]). Since the strategic management concept entail a systematic analysis of internal and external factors associated with customers and the organization itself, it supports the design of optimal management practices. In turn this supports the alignment of firm level policies and strategic priorities thus are interrelated to CSR.

In this paper we focus on crude palm oil industry located in Riau Province of Indonesia. The main reason for considering this kind of industry is due to the fact that

Indonesian crude palm oil industry has become number one in the world, in terms of the palm oil production. The positive part of this industry is to give much support for Indonesian economic development. Unfortunately, it creates serious environmental problem in the production process. . On the input side, crude palm oil mill uses much water in production process and consumes high energy. On the output side , manufacturing process generates large quantity of wastewater, solid waste/ by-product and air pollution.

Currently consumers, companies and governments have increased their attention towards the environment. Increased exposure in the media on environmental issues in conjunction with the escalating increase in the environmental resources depletion, human toxicity levels and ecosystem quality deterioration have made our entire society more aware of environmental damage. Companies, in turn, are investing more in the assessment of the environmental impact of their products and services.

Research in the CSR field is important for two main reasons. CSR has strategic management implications and can influence how society, stakeholders and firms interact [12]. It also has the potential to improve overall firm performance based on a number of direct and indirect benefits ([5], [20]). [27] discuss about how to formulate strategic management of CSR particularly concerning with sustainable development and green economy.

From literature most research addressing CSR take several avenues, for instance by using a specific theory perspective, or to assess firm level outcomes (performance). CSR related research can also address strategic intent and firm level choices regarding the enablement or operationalization of CSR.

In Indonesia the main objective of CSR is to contribute some set of firms' resources, such as money or human), to improve social welfare, or to comply with legislation. Therefore our research addresses avenue of choosing the right CSR program to be implemented for social benefit, simultaneously to achieve sustainable palm oil industry. We use Analytic Hierarchy Process (AHP) to get the result. This is also to enhance the understanding of CSR for business firms, particularly in palm oil industry in terms of putting CSR in a strategic management perspective.

2. ANALYTIC HIERARCHY PROCESS (AHP)

The AHP is a mathematical method for analysing complex decisions with multiple attributes ([15], [16]). It aggregates separate performance indicators into an integrated performance indicator [24]. When applying AHP, a hierarchical decision schema is constructed by decomposing the decision problem into its decision elements. The preferences for the attributes are compared in a pairwise manner and numerical techniques are used to derive quantitative values from these comparisons [26]. The decision maker has the option of expressing his or her intensity of preference on a nine point scale. If two attributes are of equal importance, a value of 1 is given in the comparison, while a 9 indicates the absolute importance of one criterion over the other [16].

Pairwise comparison data can be analysed using either regression methods or the eigenvalue technique. In the eigenvalue technique, reciprocal matrices of pairwise comparisons are constructed. Using these pairwise comparisons, the relative weights of attributes can be estimated. The right eigenvector of the largest eigenvalue of matrix A (Eq. (1)) estimates the relative importance of attributes.

$$\mathrm{A} = \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & \vdots & \vdots & \vdots \\ a_{m1} & a_{m2} & \cdots & a_{mn} \end{bmatrix} \quad (1)$$

where a_{mn} is the pairwise comparison rating and represents the relative degree of importance of criterion m over criterion n. In the AHP approach, the eigenvector is scaled to add up to 1 to obtain the weights. Based on properties of reciprocal matrices, the consistency of pairwise judgements can be calculated. [15] has shown that the largest eigenvalue, γ_{max}, of a reciprocal matrix A is always greater than or equal to n (number of rows or columns). If the pairwise comparisons do not include any inconsistencies, then $\gamma_{max} = n$. The more consistent the comparisons, the closer the value of computed γ_{max} to n. A Consistency Ratio (CR) measures the consistency of the pairwise comparisons and as a rule of thumb, a CR value of 10% or less is considered acceptable [15].

In group decision making, several axiomatic conditions such as separability, unanimity, homogeneity and power conditions have to be satisfied in order to aggregate individual judgements ([17] [22]), proved that the geometric mean is consistent and upholds the above mentioned axiomatic conditions. Following the notation of [23] for p individuals, the geometric mean of composite judgement of their a_{mn} values (a_{mn} values are quantitative measures of each respondent's judgement concerning the relative degree of importance of attribute m over attribute n), is defined as:

$$a^{*}_{mn} = \sqrt[p]{\prod_{k=1}^{p} a^{k}_{mn}} \quad (2)$$

Using geometrically averaged a^*_{mn} values, a set of numerical weights w_1, w_2,..., w_i can be computed to represent the relative degree of importance among the decision attributes and a set of numerical weights v_1, ..., v_2,..., v_p to represent the relative importance of p individual's (or group's) judgements. Both of these numerical weights sum to one [25].

3. AHP MODELING FOR IMPLEMENTING CSR

This research was conducted at several villages in Riau Province of Indonesia. There are several palm oil industries in the area. Firstly, we defined the goal of the CSR program for that area in terms of sustainability, therefore the criteria should be in three aspects, i.e., Economics, Social, and Environment. Lastly, we addressed the alternatives that would be able to meet the goal, based on the needs of the society. We can express the hierarchy structure of AHP as follows.

i) The main goal : To develop CSR program in the focused area in a way to establish a sustainable palm oil industry.

ii) Criteria needed in order to fulfill the Goal are:
- To develop social civilization
- To develop economic resources for the society
- To conserve clean environment

iii) Alternatives to meet these criteria
- Education fund aid
- Fund to start small business
- Healthcare
- Skill training for small business
- Creating partnership with palm oil farmers
- Processing liquid waste
- Aid to build worship places
- Repairing road

Using diagram the hierarchy structure of AHP can be shown as in Figure 1.

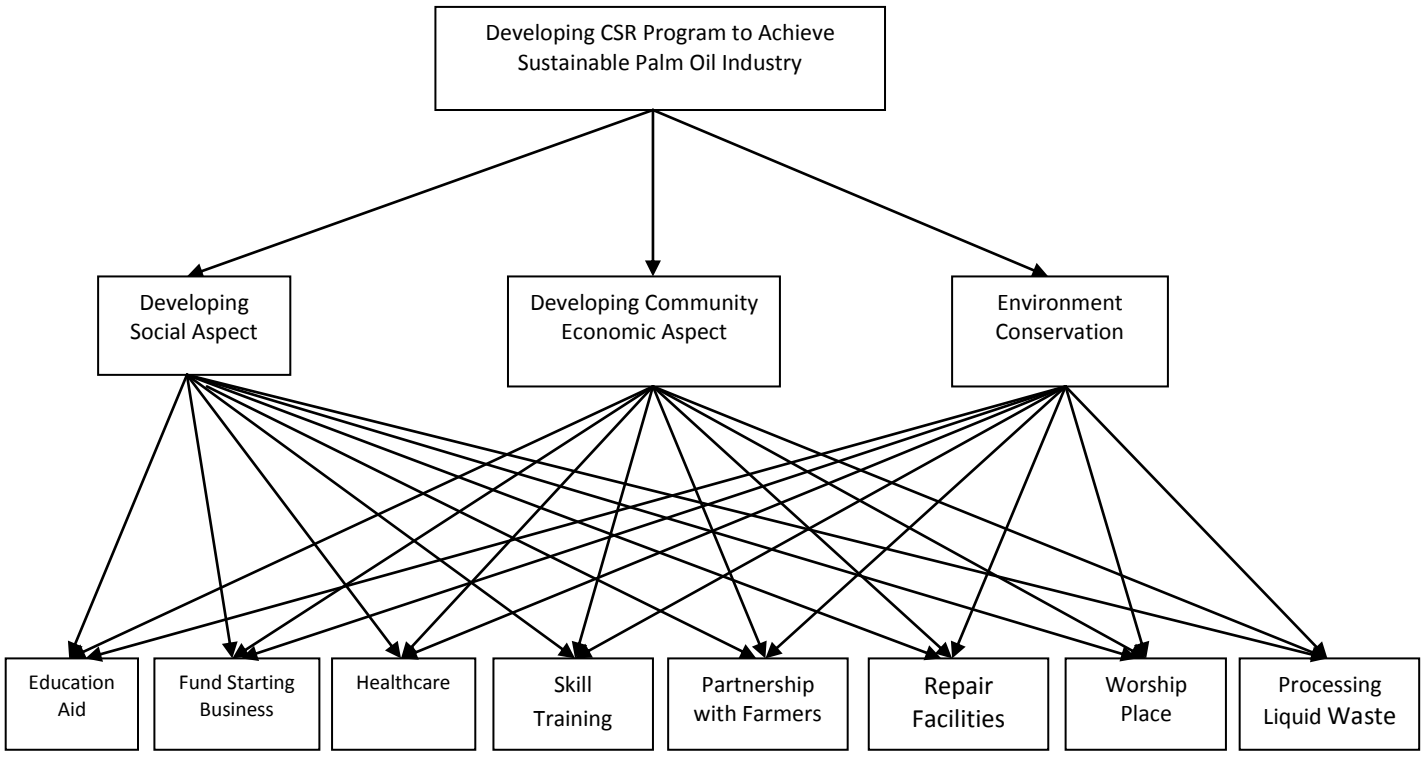

Figure -1: Hierarchy Diagram of AHP for the CSR Program

We distributed the questionnaire regarding to those criteria and alternatives mentioned before. The respondents were people from the villages where this research was conducted and it was considered that they fully understood for each item. The objective from these questionnaire is to get a pairwise comparison matrix.

4. THE RESULTING MATRICS

The following matrices are obtained after processing the questionnaire from respondents.

4.1. Pairwise comparison matrix of criteria

We processed the questionnaire result in term of criteria. Then we used geometric mean in order to get the weight of criteria. The result is shown in table 1.

Table -1: Pairwise comparison matrics of criteria

	Social Aspect	Economic Aspect	Environment Conservation
Social Aspect	1.00	0.7401	1.7321
Economic Aspect	1.3512	1.00	0.9391
Environment Conservation	0.5773	1.,0648	1.00

From table 1 we can see that social aspect is more preferred than environment conservation with scale 1.7321, economic aspect is more preferred than social aspect with scale 1.3512, while environment aspect is more preferred than economic aspect (1.0648).

Then we calculate the priority weight for this criteria in such a way the palm oil industry would be able to design the action of the CSR program for meeting the ultimate goal.

By using Expert Choice version 11 software the weight for criteria was obtained as follows. The weight of Social Aspect is 0.360, Economic Aspect is 0.359 and Environment conservation is 0.282. Therefore in terms of priority we have Social Aspect is in level 1. The inconsistency ratio is 0.09 (<0.1). Therefore this result is acceptable.

4.2. Comparison Matrices for Alternatives.

Regarding the criteria of Social Aspect, based on the questionnaire results, we did the pairwise comparison for each alternative. Table 2 shows the geometric mean result.

Table -2: Pairwise Comparison Matrix of Each Alternative for Criteria Social Aspect

	Education aid	Fund Starting Business	Healthcare	Skill Training	Partner ship	Processing Waste	Worship Place	Repairing Road
Education aid	1	5.00	0.50	3.9843	0.9391	1.1607	1.1362	2.5900
Fund starting business		1	0.1643	1.7321	0.2697	0.2778	0.2778	0.2125
Healthcare			1	5.5444	5.6637	0.9789	2.1407	3.2011
Skill training				1	0.3689	0.2730	0.3333	0.2000
Partnership with farmers					1	0.6687	0.3333	0.2991
Processing Waste						1	0.5774	0.5774
Worship place							1	0.5373
Repairing road								1

From Table 2 we can get pairwise alternative program in a way to answer what sort of program which is more important in terms of developing social aspect. Then we calculate the priority weight using Expert Choice 11. The result shows that, regarding the criteria Social Aspect, the first priority is Healthcare (the weight is 0.274), second Education (0.160). and then Repairing Road (0.159). This result is acceptable due to the result of inconsistency ratio 0.06.

The geometric mean of alternatives comparison matrix for Environment Conservation criteria is shown in Table 3.

Tabel -3: Pairwise Comparison Matrix of Each Alternative for Environment Conservation Aspect

	Education Aid	Fund Starting Business	Healthcare	Skill Training	Partner ship	Processing Waste	Worship Place	Repairing Road
Education Aid	1	1.7321	0.4387	1.000	0.2533	0.1111	0.3333	0.2000
Fund Starting Business		1	0.2000	0.4387	0.1462	0.1111	0.2510	0.1429
Bantuan kesehatan			1	1.1607	0.2374	0.1462	0.2730	0.2730
Skill Training				1	0.1260	0.1111	0.2510	0.2000
Partnership with Farmers					1	0.1791	0.5774	1.000
Processing Waste						1	3.8730	7.9373
Worship Place							1	0.9573
Repairing Road								1

For this criteria (Environment Conservation), based on the pairwise comparison result, we get priority program toward the goal to achieve sustainable palm oil industry. The first priority is Waste Processing program with weight 0.214. The second priority comes Road Repairing with weight 0.189, and then healthcare (weight 0.133). The result shows that the people of the village would prefer more on Processing the industry waste rather than Healthcare or Education. It is reasonable for the criteria to be met is Environment Conservation and the inconsistency ratio is 0.08.

The overall result expressed in hierarchy diagram can be found in Figure 2

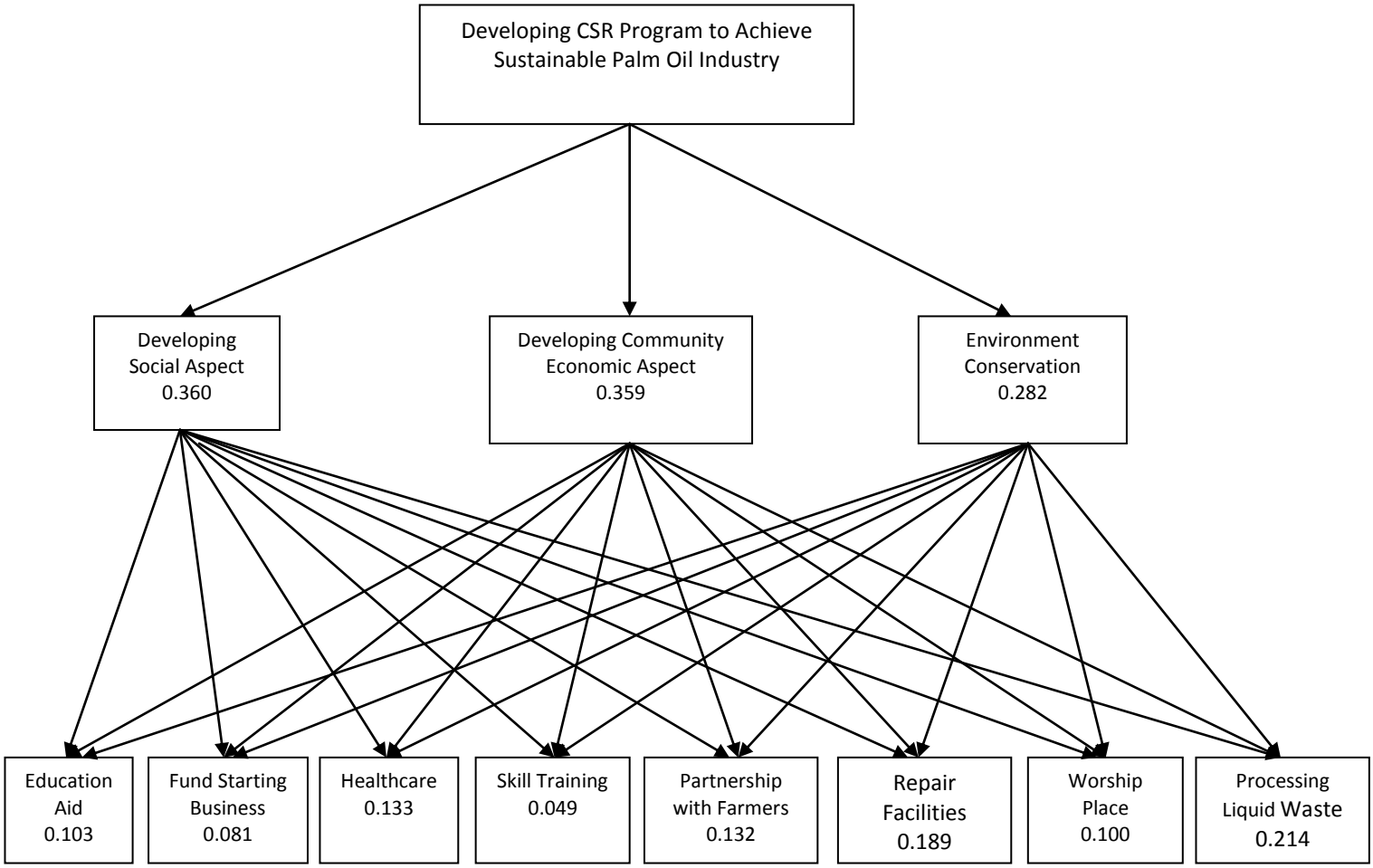

Figure -2: Synthesis Result for Priority Weight to Achieve Sustainable Palm Oil Industry

The result from AHP shows that the Social Aspect has turned up to be the first priority for the CSR program compared with Economic Aid and Environment. It should be noted the people in the area realized that the CSR program is offered by the firms. For the Alternatives, from Fig. 2, the order of priority can be seen in Table 3.

Table -4: Order of Priority to Fulfill Sustainable Palm Oil Industry

No.	Alternatives	Weight
1	Processing liquid waste	0,214
2	Repairing road	0,189
3	Healthcare	0,133
4	Partnership with farmers	0,132
5	Education	0,103
6	Worship place	0,100
7	Fund for starting business	0,081
8	Skill training	0,049

From Table 4, we can conclude that the people in the area, in terms of Social Aspect, the most preference is about to handle the waste from the industry. In reality, this result is reasonable, due to the fact that palm oil industries generate liquid waste which can harm health and surrounding ecology.

5. CONCLUSIONS

CSR program is not something to be discussed theoretically. It is a program that needs to be implemented for the society and environment. This paper presents what programs of CSR which is necessarily to be offered by business firms, in our case, palm oil industry. We use AHP to find out the priority of the program. The main Goal of the CSR program is to achieve a sustainable industry.

This research was conducted in several villages at Riau province of Indonesia. The most preference of the people is in Social Aspect with the activity of the industry is to process the liquid waste in order to conserve health and ecology.

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