The Supporting and Interdiction Factor of the Implementation of Supply Chain Management in PT Z Using Interpretative Structural Modeling Method

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Abstract. The Indonesian palm oil industry is expected to always be able to increase the implementation of Sustainable in order to reduce environmental impacts, compete in market competition. Environmental issues in the form of environmental destruction by national oil producers by international NGOs have had a significant effect on Indonesia. This issue was rolled out in the form of a report where oil palm producers ignored government and environmental and social regulations. PT Z is a state-owned company. Even though SSCM has implemented in the company, in its implementation there are still many problems. This study aims to learn about the factors that support and interdict in implementing sustainability supply chain management (SSCM) at PT Z using ISM. Based on the ISM calculations, the results show that for have sustainable operations we have to develop infrastructure, facilities and the access to sophisticated technology, implementing sustainable waste management, integrating sustainable operations into proactive plans are the most influential factors in implementing SSCM in PT Z and supporting infrastructure are not optimal, technology is not efficient, stakeholder perceptions are not optimal are the most influential interdiction factors.

1. Introduction
The current competitive condition of the palm oil business in global markets is volatile and unpredictable and is characterized by changes in consumer needs and desires. To continue to compete with other companies, a company must know the key indicators that determine its success in the business, one of which is to implement sustainability of supply chain management. Components, processes and information power flows are important to applied a system of supply chain management simultaneously, therefore there are top leader arrangements to increase awareness in terms of care the situation. Today if the companies want to survive in the global market they had to care about the environmental [1-2]. Environmental issues in the form of environmental destruction by national oil producers by international NGOs have had a significant effect on the palm oil industry in Indonesia. This issue was rolled out in the form of a report in which Indonesian palm oil producers ignored government and environmental and social regulations, abusing membership in the Roundtable Sustainable Palm Oil (RSPO). Integration of sustainability with SCM required in almost all industries in collaboration with all parties include government, suppliers, and customers [3]. Sustainable supply chains must look at the environmental aspects from all of the company’s activity, but also pay
attention to aspects of financial benefits [4-5].

PT Z as a company that has an ISO 9001 certified quality management system, the effectiveness management of ISO 14000 certified environmental activities, HSE certified occupational safety and health management (SMK3), RSPO and ISPO certified sustainable supply chain management, of course must be supported by a planned, sustainable and sustainable production process sustainable. Companies must carry out activities from the start point in building products to end-users. To produce products that can give best service to consumers [6-8]. Although PT Z has run the SSCM system but in its application there are still come with many problems. One of the problems faced by PT Z, there is an unavailable of information that is sufficient to achieve the goal of sustainability in management, does not have sufficient budget allocation for sustainability operations, and adoption of technological tools sustainability is not efficient, there is no provision that effectively to confirm the direction guidelines for sustainability imposed, perception the factory management participants are not the equivalent as the upper management. SCM is one aspect that can be used to produce competitive advantage. Supply chains are all stages involved directly or indirectly in meeting consumer demand. The consumers referred to in this case include producers, suppliers, transporters, warehouses, retailers and end users [9-11].

The concentrate of Supply Chain Sustainability is to adopt and develop widely on the issue of its sustainability from the beginning to end. The matter point of sustainability must begin from the initial process from raw materials from delivery to end consumers. Sustainability issues must also integrate issues and flows that go beyond the core of Supply Chain Management [12-14]. As explained earlier, sustainable SCM integrated by sustainable development and supply chain management which contains three dimensions, namely integrating the environment, economic and social issues that influence the strategy of the company.

2. Research Methods
The study was at PT Z, which is a factory that processing a palm oil. The method used in this study is as follows [15-17] Data processing conducted includes the information of the consensus of management in implementing sustainability supply chain management. By using Interpretative Structural Modeling (ISM). The Techniques of Collecting Data used in this study are as follows:

- Journal by searching google scholar
- Field Research
- Questionnaire
  Questionnaire made by collecting data by distribute questions to some respondents provide answers in accordance with the statement about and then answered and measured interpretive structural modeling methods.
- Data Processing
  The method used is the Interpretative Structural Modeling (ISM) method

The first step that needs to be taken in an ISM analysis is determining elements in accordance with the existing problem. Subsequently arranged sub-elements on each element selected. The selection of elements and application of sub elements was obtained from the results of discussions with experts. The following symbols (V,A,X,O) are symbols of the assessment of variables and attributes. It can be seen in Table 1.
Table 1. Symbols and definition of variables

| Symbol | Definition                                                                 |
|--------|---------------------------------------------------------------------------|
| V      | Element- i is more important / main / important, than the j-element       |
| A      | The j-element is more important / main / role, than i-element             |
| X      | The two elements of ij are equally important / primary / instrumental     |
| O      | The two elements of ij are both not important / primary / instrumental    |

The assessment results are arranged in a SSIM which is write down in the range of matrix table through converting V, A, X, O into quantities 1 and 0. The arrangement of elements is established on the Structural Self Matrix (SSM) based on system V, A, O, as shown in Table 2:

Table 2. Symbols and evaluation of variables

| Symbol | Assessment                                                                 |
|--------|---------------------------------------------------------------------------|
| V      | if $e_{ij} = 1$ and $e_{ji} = 0$                                          |
| A      | if $e_{ij} = 0$ and $e_{ji} = 1$                                          |
| X      | if $e_{ij} = 1$ and $e_{ji} = 1$                                          |
| O      | if $e_{ij} = 0$ and $e_{ji} = 0$                                          |

Then the milieu changed into a closed milieu. This is done to justify the matrix to meet the transitivity rules i.e. if a marks B and B marks C, then A must mark C. A value of 1 means there is an appropriate correlation between the i-th and the j-element, where as $e_{ij} = 0$ means that around is no the appropriate correlation between the i-th and the j-th element.

The next step, the SSM is changed to the reachability matrix by changing VAXO to 1 and 0, then testing the transitivity rules, until a closed matrix occurs. The matrix that has fulfilled the transitivity is continued by processing to get the reachability matrix, to get the Power Driver (DP) and Dependence (D). The final stage is to group sub-elements into 4 sectors as shown in Table 3.

- Dependent variables that have weak support (AUTONOMOUS), variables in this section are generally not related to the system, the relationship is minimal.
- Dependent variables that have weak support strongly- (DEPENDENT), the variables included in this group are independent variables
- Dependent variables that have strong support strongly (LINKAGE), variables in this section must be studied carefully because their interactions can have an impact and feedback on the system.
- Dependent variables that have strong support weak (INDEPENDENT) variables in this section hold a strong influence on the system and determine the success of the program.

Table 3. Section element group

| IV. Independent | III. Linkage |
|-----------------|--------------|
| Strong Support  | Strongly Dependent |
| weak Dependent  | Variable |

| I. Autonomous | II. Autonomous |
|---------------|----------------|
| Weak Support – | Weak Support – |
| weak          | Strongly       |
| Dependent Variable | Dependent Variable |

3. Results and Discussion

3.1. Interpretative Structural Modelling (ISM)
Criteria for questionnaire supporting factors for supply chain management sustainability, as shown in
Table 4:

| No | Aspects that support sustainable enactment                      |
|----|------------------------------------------------------------------|
| 1  | Satisfactory financial plan                                     |
| 2  | Development of substructure support and services for sustainable operations |
| 3  | Admission to advanced technology for sustainable operations     |
| 4  | Increase public consciousness about the sustainable yields       |
| 5  | Enforce effective government guidelines and laws                |
| 6  | Implement sustainable waste management                          |
| 7  | Integrate ongoing operations into proactive plans               |

Questionnaire criteria for interdicting supply chain management sustainability, can be seen in Table 5:

Table 5: SSCM interdiction factor

| No | Obstacles to organizational development for sustainability             |
|----|------------------------------------------------------------------------|
| 1  | Leader assurance is not prime                                         |
| 2  | Financial restrictions                                                 |
| 3  | Inefficient expertise                                                  |
| 4  | Incompetent legal outline                                              |
| 5  | Supporting substructure is not ideal yet                               |
| 6  | Stakeholders’ perceptions still different                              |
| 7  | Deficiency of sustainable unused supervision                          |

3.2. SSIM Interdiction Factors

In this process the variable is made contextual relationship by making one variable i and the other variable j. Where the relationship between the two variables is described by (as shown in Table 6):

| V | Variable i is more important / main / role than the variable j |
| A | Variable j is more important / main / role than variable i     |
| X | Both variables are equally important / main / role             |
| O | The two variables are not equally important / primary / instrumental |

Table 6: Aggregate table of Structural Self Interaction Matrix (SSIM) interdiction factors

| Aggregate |
|-----------|
| No | A1 | A2 | A3 | A4 | A5 | A6 | A7 |
|-----|----|----|----|----|----|----|----|
| A1  | V  | A  | O  | A  | A  | V  |
| A2  | A  | A  | A  | A  | A  | V  |
| A3  | V  | X  | X  | V  |
| A4  | A  | A  | V  |
| A5  | X  | V  |
| A6  | X  |
| A7  |    |    |    |    |    |    |    |

The next step, a reachability matrix is built and shown in Table 7.
Table 7. Reachability matrix (RM) interdiction factor

| Reachability Matrix |
|---------------------|
| No     | A1 | A2 | A3 | A4 | A5 | A6 | A7 |
| A1     | 1  | 1  | 0  | 0  | 0  | 0  | 1  |
| A2     | 0  | 1  | 0  | 0  | 0  | 0  | 1  |
| A3     | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| A4     | 0  | 1  | 0  | 1  | 0  | 0  | 1  |
| A5     | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| A6     | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| A7     | 0  | 0  | 0  | 0  | 0  | 1  | 1  |

The transivity rule for interdiction factors must be analyze and it can be seen in Table 8.

Table 8. Analysis of transivity rule interdiction factors

| Analysis of Transivity Rule |
|-----------------------------|
| No     | A1 | A2 | A3 | A4 | A5 | A6 | A7 | DP |
| A1     | 1  | 1  | 0  | 0  | 0  | 0  | 1  | 3  |
| A2     | 0  | 1  | 0  | 0  | 0  | 0  | 1  | 2  |
| A3     | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 7  |
| A4     | 0  | 1  | 0  | 1  | 0  | 0  | 1  | 3  |
| A5     | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 7  |
| A6     | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 7  |
| A7     | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 2  |
| DP     | 4  | 6  | 3  | 4  | 3  | 4  | 7  |

After all of the step above, as a hierarchical structure, the constrain, the lack, and all of the interdiction factor shown clearly in Figure 1.

![Figure 1](image-url)
4. Conclusions
Supporting factors are the results that, developing infrastructure support and services for sustainable processes, access to innovative technology for sustainability, enforcing government procedures and reactive laws, executing sustainable waste management, are the most significant supporting factors in SSCM application at PT Z. The interdiction factor is the result that unproductive technology, supporting conveniences and substructure are not optimal, and stakeholders' perceptions that differ as a main factor interdiction the implementation of SSCM in PT Z.

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