Measurement of perception and implementation of sustainable supply chain management at PT Tetra Pak Indonesia

Helena J Kristina¹, Agustina Christiani²*, Eric Jobiliong², Letycia Therio³, Reza Andreanto³

¹ Industrial Engineering Study Program, Universitas Tarumanegara, Jakarta, Indonesia
² Industrial Engineering Study Program, Faculty of Science and Technology, Universitas Pelita Harapan, Lippo Village, Tangerang, Indonesia
³ PT Tetra Pak Indonesia

Corresponding author: agustina.christiani@uph.edu

Abstract. Sustainable supply chain management (SSCM) is a form of proactive action taken by the company and its supply chain to remain competitive by introducing products and production processes that are environmentally friendly and socially responsible. PT Tetra Pak Indonesia as a company engaged in the processing and packaging for food and beverages, is committed to reduce the environmental impact of all operations and prioritize environmental aspects for each product and solution offered. Although there have been many sustainability efforts undertaken by PT Tetra Pak Indonesia, the perspective and implementation of its sustainable supply chain management has never been measured. This research was conducted to measure the perception and implementation of sustainable supply chain management (SSCM) activities of PT. Tetra Pak Indonesia, in order to add information about the development of sustainable supply chain management practices in Indonesia. Data were collected in two ways: in depth interviews and questionnaires. Based on the result of interview and questionnaire, PT. Tetra Pak Indonesia gets an actual implementation index value of 0.88, and has an overall perception index value of 0.85. This indicates that PT. Tetra Pak Indonesia is a company that has a perception towards sustainability and has actually implemented SSCM activities.

1. Introduction

Sustainable supply chain management (SSCM) is a form of proactive action taken by the company and its supply chain to remain competitive by introducing products and production processes that are environmentally friendly and socially responsible. SSCM is defined as “the strategic, transparent integration and achievement of an organization’s social, environmental, and economic goals in the systemic coordination of key interorganizational business processes for improving the long-term economic performance of the individual company and its supply chains” [1]. Meanwhile according to Pagell and Wu [2], “to be truly sustainable a supply chain would at worst do no net harm to natural or social systems while still producing a profit over an extended period of time; a truly sustainable supply chain could, customers willing, continue to do business forever.”
PT Tetra Pak Indonesia is a company engaged in the processing and packaging for food and beverages. Besides packaging, Tetra Pak also sells packaging machines to process food or drinks. Tetra Pak upholds the motto "PROTECTS WHAT'S GOOD," which reflects Tetra Pak's vision to deliver food and beverages that are safe and available, everywhere. Tetra Pak is committed to reduce the environmental impact of all operations and prioritize environmental aspects for each product and solution offered. The market segment of Tetra Pak are large scale industries (middle to upper class industries) because Tetra Pak packaging has higher prices compared to other packaging.

Tetra Pak packaging can be recycled, therefore Tetra Pak promotes their products as sustainable products. Beverage carton consist of 75% fiber (paper) and 20% low density polyethylene (LDPE), and 5% aluminum [3]. All paper comes from forests in Europe, while polyethylene and aluminum (Poly-Al) comes from suppliers. All materials are combined and then sent to Indonesia in the form of finished rolls. The closest converter factory that combines paper with Poly-Al is located in Singapore. There is FSC (Forest Stewardship Council) certification, which is a certification for derivative products originating from the forest, for the paper material. FSC certification is made to ensure that the forest used to make products is not illegal forest but well-managed forest. For its aluminum material, there is ASI (Aluminum Stewardship Initiative) certification. Aluminum suppliers who want to become Tetra Pak suppliers must have ASI certification. Polyethylene materials are made from Bio-based polymers which also have a code of conduct for sugar cane traceability for farmers [4].

Although there have been many sustainability efforts undertaken by PT Tetra Pak Indonesia, the perspective and implementation of its sustainable supply chain management has never been measured. This research was conducted to measure the perception and implementation of sustainable supply chain management (SSCM) activities of PT. Tetra Pak Indonesia, in order to add information about the development of sustainable supply chain management practices in Indonesia.

2. Research Methods
This research was an exploratory study. Methods of data collection were done in two ways, in depth interviews and questionnaires. The questionnaire to measure sustainable supply chain management (SSCM) consisted of two parts, which had been developed by Hanafi, Kristina and Poernama [5]. The first part aimed to determine the company's perception of the importance of SSCM activities for the company. While the second questionnaire aimed to find out how the company's perceptions regarding the implementation of SSCM activities have been carried out. Both questionnaires used the same questions. These questions were adopted from Pagell and Wu (2009) which generally discussed the company's policy on sustainability and based on the best sustainability practices that have been carried out by companies around the world. Detailed contents of the five key SSCM topics used in the questionnaire and the in depth interview can be seen in Table 1.

| Five key SSCM topics | Detailed content (Pagell and Wu, 2009; Hanafi et al, 2017) |
|----------------------|----------------------------------------------------------|
| 1) Orientations, awareness and commonalities of perceptions toward sustainability | - Sustainability fits the current business model  
- Proactive stance / organizational commitment: the company has a commitment to use processes or produce products that lead to environmental sustainability.  
- Internal supply chain integration: the company has an integrated internal supply chain.  
- Touchstone value/ guardrail usage in decision making: companies use boundaries / guidelines (guardrail) that define sustainability as a guide in making a decision.  
- Daily conversation about sustainability: sustainability issues are part of daily conversation (not something that is discussed at a particular event).  
- Integrate environmental efforts into the entire organization: there are efforts by companies to integrate environmental sustainability into the entire organization in daily practice.  
- CSR Activities: The company carries out CSR activities  
- Licensing: The company sells the design / name / work process to other parties |
Five key SSCM topics

2) ensuring supplier continuity
- Decommoditize inputs: in order to create continuity between the company and the supplier, the company explicitly treats it as if the supplier is providing scarce / strategic input.
- Supplier development: the company engages in supplier development activities designed to help suppliers become more sustainable.
- Reducing supplier risk: there are efforts by companies to help reduce the risk of suppliers.
- Supplier development to improve other supply chains
- Continuity of suppliers: the company strives to guarantee all suppliers in the entire supply chain to remain in business by helping to ensure they get a decent quality of life now and in the future.
- Transparency: the transparency of the company regarding detailed information of the flow of money in the supply chain.
- Supplier interaction: Suppliers work together to improve the overall chain of the company.

3) reconceptualize the chain
- Reconceptualizing what the chain does: companies redefine business processes in the supply chain to make the company more environmentally sustainable (for example by redesigning products or processes).
- Reconceptualizing who is in the chain: the company redefines the concept of who is explicitly involved in the supply chain in order to make the company more sustainable.
- Closed loops / reverse logistics: the company operates a closed loop system or reverse logistics.
- Adding new suppliers to spur change / innovation
- Collaborate with customers

4) Supply chain management practices
- Supplier selection: the company selects suppliers based on the sustainability offered
- Collaborate with suppliers
- Traceability: the company has the ability to track where goods and materials come from.
- Supplier certification: companies require suppliers to have a certificate (eg ISO 9000 or ISO 14000) before making a selection.
- Buy on total cost not price: a company's decision to make a purchase is not only based on a short-term economic perspective, but also a long-term perspective.
- Total Quality Management: the company applies the TQM management philosophy.
- Just In Time: the company implemented a JIT production strategy.
- Commitment to employees: the company practices human resources that can improve the welfare and commitment of its employees to the organization.
- Maintain and / or build culture formally: the company formally maintains and / or develops a culture that respects people and the environment.
- Local chain usage: The company takes raw materials from the closest source to reduce transportation costs and maximize the freshness of the product
- Life cycle thinking / analysis: Companies make decisions based on life cycle thinking / analysis

5) Performance measurement
- Developed own certification: The company develops its own certification to support sustainability
- Measurement and reward systems linked to sustainability: There are measurement and reward systems related to sustainability in the company.
- Sustainability helps companies in recruiting or motivating employees

The next step is to recapitulate the results of the interview and collect the questionnaire data. The first questionnaire collected was a questionnaire to measure the company's perception of the importance of implementing SSCM activities. This questionnaire consisted of 34 questions and used a Likert scale to measure the importance of SSCM activities, namely 1 for very insignificant, 2 for insignificant, 3 for neutral, 4 for significant, and 5 for very significant. Then the index value of each topic is calculated by dividing the total value by the maximum value for each topic. Finally the index
value of each topic is added up and divided by the number of topics (5 topics) to find the index value of the company's perception of the importance of SSCM activities of all key topics.

The second questionnaire was collected to find out the actual implementation of SSCM activities by the company. The answers of 34 questions then converted to a weighting value: 0 for "no", 0.5 for "limited", and 1 for "yes". After that, the index value was calculated based on SSCM activities have been carried out for each topic. Then each index value on each key topic is added up, and divided by 5 according to the number of topics available to find the overall value of the company's perception index in the implementation of SSCM activities. The last step is analyzing the data and discussing the relationship between the results of measuring the company's perception in the implementation of SSCM activities at PT. Tetra Pak Indonesia.

3. Results and Discussion

Based on the questionnaire collected, the results of perceived degree of importance of SSCM activities at PT Tetra Pak Indonesia can be seen in Table 2.

| No | Key Topics                                           | Total value | Maximum value | Index value |
|----|------------------------------------------------------|-------------|---------------|-------------|
| 1  | Orientations, awareness and commonalities of perceptions toward sustainability | 38          | 40            | 0.95        |
| 2  | ensuring supplier continuity                        | 30          | 35            | 0.86        |
| 3  | reconceptualize the chain                           | 22          | 25            | 0.88        |
| 4  | Supply chain management practices                    | 54          | 55            | 0.98        |
| 5  | Performance measurement                              | 15          | 15            | 1.00        |
|    | **Total**                                            | **4.65**    |               |             |
|    | **Average**                                          | **0.93**    |               |             |

Based on the result from Table 2, it is found that the average index value of the degree of importance of SSCM activities at PT Tetra Pak Indonesia is 0.93 (out of 1.00). It means that Tetra Pak has a high awareness of the sustainability of supply chain management and considers SSCM activities to be an important activity. Meanwhile table 3 summarizes the questionnaire result of company's perceptions regarding the implementation of SSCM activities.

| No | Key Topics                                           | Total value | Maximum value | Index value |
|----|------------------------------------------------------|-------------|---------------|-------------|
| 1  | Orientations, awareness and commonalities of perceptions toward sustainability | 6.5         | 8             | 0.81        |
| 2  | ensuring supplier continuity                        | 7.0         | 7             | 1.00        |
| 3  | reconceptualize the chain                           | 4.5         | 5             | 0.90        |
| 4  | Supply chain management practices                    | 11.0        | 11            | 1.00        |
| 5  | Performance measurement                              | 2.5         | 3             | 0.83        |
|    | **Total**                                            | **4.54**    |               |             |
|    | **Average**                                          | **0.91**    |               |             |

It can be seen from Table 3, the index value of the perception of the implementation of SSCM activities is 0.91. This means that Tetra Pak has a perception that the sustainability of the supply chain for its UBC recycling has been implemented. After getting the perception index value of SSCM activities and the value of the company's perception index in implementing SSCM activities, then the overall perception index value (as seen in Table 4) can be calculated by multiplying those two index values. The maximum overall index value is 1, therefore an index value of 0.5 is the limit that indicates
that a company has begun to have a perception toward SSCM. Based on Table 4, it can be seen that Tetra Pak’s overall index value of SSCM perception is 0.85. This indicates that, Tetra Pak realizes the importance of implementing sustainable supply chain management activities. Tetra Pak Indonesia has already implemented the SSCM activities because these activities bring many benefits.

The next step taken was to summarize the results of the in-depth interview which showed the actual implementation of PT Tetra Pak Indonesia to the SSCM activities, and to match them to the framework of five key SSCM topics. The matching results of the implementation of SSCM activities were then converted into weight values to get the actual implementation index, using standardization in Table 5. The calculation of the actual implementation index can be seen in Table 6.

### Table 4. Overall index value of SSCM perception

| Index value of importance perception | 0.93 |
| Index value of implementation perception | 0.91 |
| Overall index value of SSCM perception | 0.85 |

### Table 5. Standardization of weighting values from matching interview answers and implementation data

| Interview answers | Notes | Weighting value |
|--------------------|-------|----------------|
| correct            | The company carries out sustainability activities, consistent with the information presented, outlines the principles of the five key topics of SSCM, and is supported by implementation data | 1 |
| Almost correct     | The company conducts sustainability activities but has limited or little amount of implementation. | 0.5 |
| Incorrect          | The company does not carry out sustainable activities at all | 0 |

### Table 6. Calculation of the actual implementation index

| Five Key SSCM topics                                          | Matching results the interview answers on the implementation of Tetra Pak SSCM activities | Weighting values | Weighting values average |
|---------------------------------------------------------------|---------------------------------------------------------------------------------------|-----------------|--------------------------|
| 1) Orientations, awareness and commonalities of perceptions toward sustainability | • Proactive stance / organizational commitment: Tetra Pak offers packaging with renewable materials.  
• Sustainability fits into the current business model: Tetra Pak has FSC (Forest Stewardship Council) certification for its paper material and a code of conduct for sugar cane traceability to farmers for its biobased polymers, as well as ASI (Aluminum Stewardship Initiative) certification for its aluminum material.  
• Touchstone value in decision making: At PT Tetra Pak Indonesia, there are many guidelines/ instructions related to the activities/programs for material procurement, innovation, waste management, report management, accountability, accuracy, etc.  
• Sustainability issues are part of daily conversation: For Tetra Pak, sustainability as daily conversation has been carried out, even included in the Tetra Pak product profile, offers and support to customers, including extensive consumer joint activities.  
• The company carries out CSR activities: Construction of a reading house made from recycled UBC in Cirebon and an educational program to the community.  
• There is an effort from the company to integrate environmental sustainability into the entire organization in daily practice: Tetra Pak packaging can be recycled as a whole, which can be recycled | 1 | 0.81 |
| Five Key SSCM topics | Matching results the interview answers on the implementation of Tetra Pak SSCM activities | Weighting values | Weighting values average |
|----------------------|----------------------------------------------------------------------------------|-----------------|-------------------------|
| 2) ensuring supplier continuity | used as raw material for other industries. Paper/carton can be recycled back into paper and polyAl can be recycled into wave roof/polyAl board.  
• The company has an integrated internal supply chain: Tetra Pak prioritizes quality and food safety regardless of whoever is a qualified and certified vendor (limited).  
• Licensing: The company does not sell the design/name/work process to other parties  
• The company is involved in supplier development activities to help suppliers become more sustainable: Tetra Pak develops suppliers to get more insight for their business  
• There are efforts from companies to help reduce the risk of suppliers: Tetra Pak makes every project well planned, no sudden requests that cause suppliers need to take risks for supplying sudden requests  
• The company strives to guarantee all suppliers in the entire supply chain to remain in business by helping to ensure they get a decent quality of life in the present and into the future: Included in the FSC Chain of Custody and development in other materials/processes.  
• There is a transparency from the company regarding detailed information on the flow of money in the supply chain: There is a report on every flow of funds.  
• Suppliers work together to improve the overall chain of the company: Tetra Pak is influencing their suppliers to take on Continuous Improvement methodology to minimize and improve their own and Tetra Pak losses throughout the value.  
• In order to create continuity between the company and the supplier, the company explicitly treats it as if the supplier provides a rare/strategic input: Tetra Pak does a good relationship with the supplier and gather the input to maintain and improve their performances. | 0.5 | 1 |
| 3) reconceptualize the chain | The company reconceptualize business processes in the supply chain to make the company more environmentally sustainable (for example by redesigning products or processes): Tetra Pak makes changes continually to adjust the sustainability of business processes, for example the carbon footprint stamp throughout the entire plant's operations.  
• The company reconceptualize who is explicitly involved in the supply chain with the aim of making the company more sustainable: The company uses the FSC certification system in selecting paper sources from well-managed forests and aluminum suppliers with ASI (Aluminum Stewardship Initiative) certification.  
• The company operates a reverse logistics system: Tetra Pak reverse logistics system is still under development and research (limited)  
• The company adds new suppliers to spur change/innovation in the framework of sustainability: Tetra Pak changed the incompetence supplier with the competence one.  
• The company collaborates with customers: Through collaboration events or sales support. | 1 | 0.9 |
Five Key SSCM topics | Matching results the interview answers on the implementation of Tetra Pak SSCM activities | Weighting values | Weighting values average
--- | --- | --- | ---
4) Supply chain management practices | • The company selects suppliers based on the sustainability offered: Tetra Pak ensures that the material is a renewable resource, comes from a responsible source, and can be recycled. | 1 | 1
| • The company has the ability to track where materials come from: FSC code / FSC labels on Tetra Pak packaging. | 1 | 1
| • There is collaboration between companies and suppliers: Tetra Pak conducts educational activities with FSC. | 1 | 1
| • The company applies the TQM management philosophy: An integrated approach to food safety and quality. | 1 | 1
| • The company implemented the Just In Time production strategy: Tetra Pak is implementing JIT as their WCM program. | 1 | 1
| • The company gets raw materials from closest sources to reduce transportation costs and maximize freshness of the product: Meet the standards and criteria for raw materials needed. | 1 | 1
| • Companies make decisions based on life cycle thinking/analysis: Tetra Pak does really care about the impact of their business processes on the environment, every production done by the supplier must be save to the environment. | 1 | 1
| • The company formally maintains and/or develops a culture that respects people and the environment: A commitment to remain responsible for waste management even after the product is sold to customers. | 1 | 1
| • The company's decision to make a purchase is not only based on the short-term economic perspective, but also on the long-term: Tetra Pak basically does the cost analysis for 1 year | 1 | 1

5) Performance measurement | • The company does not develop its own certification to support sustainability: Tetra Pak prefers to use the world certification body that is credible to its field (limited) | 0.5 | 0.67
| • Sustainability helps companies in recruiting or motivating employees: The company practices human resource development that can improve the welfare and commitment of its employees to the organization as reflected in the slogan "Protect People" where Tetra Pak improves the quality of its human resources, upholds gender equality, and provides training. | 1 | 1
| • There is a measurement and reward system related to sustainability in the company: Sustainability is seen and practiced as identity, responsibility and commitment. (limited) | 0.5 | 0.88

It can be seen that PT. Tetra Pak Indonesia gets an actual implementation index value of SSCM activities of 0.88. This indicates that PT. Tetra Pak Indonesia is a company that has implemented most of SSCM activities. There are several things to be considered from the assessment of the SSCM Tetra Pak activities questionnaire. Table 7 shows the key topics of sustainability perception to be improved. The results of the questionnaire on the key topics of orientation, awareness and commonalities on perception toward SSCM have a low perceived value of importance in the licensing activity. In addition, licensing was also not implemented by PT Tetra Pak Indonesia. Tetra Pak does
not sell designs/names /work processes to other parties to protect the "Tetra Pak" brand, because maintaining brand names in SSCM is important. It is also intended to prevent bad quality of raw material or buyers who do not manage waste properly, thus reducing the company's image.

### Table 7. SSCM key topics to be improved

| Key topics                                                      | Content                                                  | Perception on degree of importance | Perception on implementation | note                                                                 |
|----------------------------------------------------------------|-----------------------------------------------------------|------------------------------------|-----------------------------|----------------------------------------------------------------------|
| Orientations, awareness and commonalities of perceptions toward sustainability | Licensing: the company sells the design / name / work process to other parties | 3                                  | No                          | -                                                                   |
|                                                                | Internal supply chain integration: the company has an integrated internal supply chain | 5                                  | Limited                     | Tetra Pak prioritizes quality and food safety regardless of whoever is a qualified and certified vendor |
| Reconceptualize the chain                                       | Closed loops / reverse logistics: the company operates a closed loop system or reverse logistics | 4                                  | Limited                     | Tetra Pak reverse logistics system is still under development and research |
|                                                                | Developed own certification: The company develops its own certification to support sustainability | 5                                  | Limited                     | Tetra Pak prefers to use the world certification body that is credible to its field |
| Performance measurement                                         | Measurement and reward systems linked to sustainability: There are measurement and reward systems related to sustainability in the company | 5                                  | Limited                     | Sustainability is seen and practiced as identity, responsibility and commitment |

Tetra Pak Indonesia also has a limited reverse logistic system, which is still under development and research. This indicates that the UBC recycling supply chain has not yet reached the closed loop so it is not sustainable yet. If the UBC recycling supply chain has not yet reached the closed loop, there are still some UBCs that cannot be recycled. Currently, there is no special treatment for UBC that cannot be recycled, for example: damaged UBCs are only buried in the ground. In addition, the waste reduction rate by collecting partners: Waste4Change and EcoBali, reaches around 80%. This indicates that the UBC collection at the collecting partner is still not in the closed loop.

Tetra Pak also has a limited certification where Tetra Pak prefers to use the world certification bodies that can be trusted and in accordance to their fields such as FSC for paper and ASI for aluminum. FSC and ASI certification serves to ensure the quality of paper and aluminum used so that UBC can be recycled. However, in 2017, only 42 percent of Tetra Pak packaging were FSC certified. This also indirectly impedes the sustainability of the UBC recycling supply chain. Measurement and reward systems related to sustainability in Tetra Pak are also still limited. This will also have an impact on the recycling supply chain. In the environment division, Tetra Pak does not have a measurement tool to measure the sustainability of its partners’ business to support the sustainability of UBC's recycling supply chain.

### 4. Conclusion

PT.Tetra Pak Indonesia gets an actual implementation index value of SSCM activities of 0.88, and has an overall perception index value of 0.85. This indicates that PT. Tetra Pak Indonesia is a company that has a perception towards sustainability and has actually implemented SSCM activities. This is
also supported by the fact that Tetra Pak is a foreign investment company that has many branches in various countries, so that sustainable business management for Tetra Pak is an identity and commitment, which is reflected in each of its business strategies that are committed to the UN Sustainable Development Goals. For PT. Tetra Pak Indonesia, sustainability is seen and practiced as an identity, responsibility and commitment, where the performance measurements and reward systems related to internal continuous improvement towards sustainability in the company is still limited, as well as the reverse logistics system, which needs to be improved in the future to maintain its sustainability.

References
[1] Carter C and Rogers DS 2008 A framework of sustainable supply chain management: moving toward new theory International Journal of Physical Distribution & Logistics Management 38(5) 360-387.
[2] PagellM and Wu Z 2009 Building a more complete theory of sustainable supply chain management using case studies of 10 exemplars Journal of Supply Chain Management 45(2) 37-56.
[3] Agamuthu P and Visvanathan C 2014 Extended producers’ responsibility schemes for used beverage carton recycling Waste Management & Research 32(1):1-3
[4] Tetra Pak 2019Sustainability in Action: Sustainability Report 2019 Available at: https://assets.tetrapak.com/static/documents/sustainability/sustainability-report2019.pdf (accessed on 18 September 2019)
[5] Hanafi J, Kristina H J and Poernama O 2017. Preliminary research on the perception and implementation of sustainable supply chain in indonesian companies Sustainability Through Innovation in Product Life Cycle Design 141-150, Singapore, Springer.