

Development of Supply Chain Management Sustainability Index (SCMsi)

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Abstract—The reason for the Sustainable Development Goals (SDG) is to sustain the preservation of planet and prosperity of society. Thus, it is necessary for corporations to have a reliable, relevant and standardized sustainability supply chain management (SSCM) reporting practice. Companies' proper disclosure of its supply chain management information will enable stakeholders to evaluate the firm's supply chain management performance efficiently. Using content analysis, this study proposes a development of a comprehensive SSCM disclosure checklist i.e., Supply Chain Management Sustainability Index (SCMsi). SSCM is an all-inclusive view of supply chain processes, logistics and technologies that considers the environmental, social, economic and legal aspects of a supply chain's components. It will become a benchmark in the reporting of SSCM indicators, besides acting as monitoring mechanism to measure listed companies in advancing sustainable development agenda. This paper will be useful for organization in identifying ideal criteria of SCMsi that will contribute towards the best practices of supply chain management.

Keywords: Supply Chain Management Sustainability Index, SDG12, Annual Report, Content Analysis

1. Introduction

The field of sustainable Consumption and Production (SCP) has turned out to be increasingly imperative in the recent years. Therefore, in realizing the Sustainable Development Goals (SDG) 12, it needs a solid national framework for sustainable consumption and production that is combined into the national and sectorial plans, sustainable business practices and consumer behaviour, together with compliance with the international norms on the management of hazardous chemicals and wastes. Shifting to the targets of the SDG 12 will require essential changes in how society operates, including our livelihoods. SDG 12 recommends businesses, governments, and individual consumers to grasp sustainable practices

and effectively choose sustainably produced products and services through sustainability standards and labelling systems. The supplier is one of the key players who ensures the sustainable consumption and production under the SDG 12. One way to realize the attainment of the SDG 12 is by maintaining a good relationship with the supplier via a code of conduct. Suppliers (including all third-party providers, associates, contractors, sub-contractors, and partners) together with staff are encouraged to familiarize themselves with the Code of Conduct: At the same time, the code of conduct emphasizes the processes and procedures in the operational activities (within the supply chain) that is intended to minimize the negative environmental impact on the firm. The company communicates on the terms and conditions and have an agreement with the suppliers that are dealing with supplying goods to the company itself, subsidiaries, and affiliates throughout the world.

As one of the developing countries, Malaysia continue to emphasize the importance of environmental, social and governance (ESG) matters among Malaysian public-listed companies. Malaysia's fifth Prime Minister, Datuk Seri Abdullah Ahmad Badawi in his 2007's budget speech stated that the Malaysian public-listed companies are require to furnish their corporate social responsibility (CSR) initiatives in the annual reports. Companies must report on the reasons regarding the failure to provide ESG information in the annual reports. Not only that, Malaysian government has shown efforts in supporting the 2030 Development Agenda and its SDG, whereby the main purpose of these 17 SDG is to sustain the preservation of planet and prosperity of society by emphasizing the importance of good health and well-being, gender equality, quality education, as well as responsible consumption and production. Therefore, it is necessary for corporations of a country to have a reliable, relevant and standardized

sustainability supply chain management (SSCM) reporting practice. It is essential for a company to disclose its supply chain management information in a proper way that will enable the stakeholders to evaluate the firm's supply chain management performance efficiently. Therefore, the development of supply chain management sustainability index (SCMSi) is timely.

The SSCM disclosure strategy is also important for companies in providing information to stakeholders. Many companies have limited visibility of their supply chain information, have a poor understanding of their capabilities for capturing and reporting this information, and have not overtly considered their supply chain information disclosure strategy [1]. This would impede companies to disclose a comprehensive information to stakeholders. It is advanced that a comprehensive SSCM disclosure checklist is imperative for Malaysian public companies as most standards and guidelines on SSCM are from western countries. It is hoped that the new SSCM specifically developed for Malaysia can become a benchmark for reporting a more relevant and accurate SSCM by companies.

This paper adds to the growing literature on the SSCM and sustainable development and fills the research gap between the two areas. The findings are expected to provide a new benchmark of a comprehensive SCMSi as a new point of reference, as a tool, and as a monitoring mechanism to measure the listed companies in advancing sustainable development agenda specifically in realizing the SDG 12. This paper will be useful to an organization to take into consideration in identifying of an ideal criteria of SCMSi that should be contributed towards the best practices of supply chain management. The paper will contribute to an effective monitoring mechanism, as it is important to improve the Supplier's Code of Conduct, by the inclusion of the Supplier's Code of Conduct and Supply Chain Management in sustainability reporting. Therefore, the focus of this study is to develop a sustainability supply chain management index of listed companies in Malaysia.

2. Literature Review

As defined by the Oslo Symposium in 1994, Sustainable Consumption and Production (SCP) is about *"the use of services and related products, which respond to basic needs and bring a better quality of life while minimizing the use of natural resources and toxic materials as well as the emissions of waste and pollutants over the life cycle of the service or product so as not to jeopardize the needs of further generations"* [2]. From this time, the field of SCP has turned out to be increasingly imperative in the recent years and apparently, the

concept of sustainability development is closely related to SCP. The most popular definition of sustainable development is Brundtland's definition which was the *"ability to make development sustainable - to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs"* [3]. Thus, both concepts act as a tool by ensuring environmental sustainability in national economic development. Sustainable development in Malaysia has always been considered adequately and made the country be ranked with regard of environmental sustainability 38th among 146 countries worldwide, and the second in Asia with regard to environmental sustainability [4].

In the year 2002, the United Nations General Assembly proclaimed a programme namely the UN Decade of Education for Sustainable Development and on 25 September 2015, the global community at the United Nations agreed to the 2030 Global Agenda entitled 'Transforming our world: The 2030 Agenda for Sustainable Development' which create a set SDG. The ultimate goal of the SDG is to promote a new worldview and provide the beginnings of a plan to end poverty without imposing significant costs on Earth's life support systems [5]. Therefore, in realizing the SDG 12, it needs a solid national framework for SCP that is combined into the national and sectorial plans, sustainable business practices and consumer behaviour, together with compliance with the international norms on the management of hazardous chemicals and wastes. Participation of diverse stakeholders and perspectives is required in ensuring sustainability development [6].

Furthermore, SDG 12 recommends businesses, governments, and individual consumers to grasp sustainable practices and effectively choose sustainably produced products and services through sustainability standards and labelling systems. Thus, supplier is one of the key players who ensures the SCP under the SDG 12. One way to realize the attainment of the SDG 12 is by maintaining a good relationship with the supplier via a code of conduct. Suppliers (including all third-party providers, associates, contractors, sub-contractors, and partners) together with staff are encouraged to familiarize themselves with the Code of Conduct. At the same time, the code of conduct emphasizes the processes and procedures in the operational activities (within the supply chain) that is intended to minimize the negative environmental impact on the firm. The company communicates on the terms and conditions, and have an agreement with the suppliers that are dealing with supplying goods to the company itself, subsidiaries, and affiliates throughout the world. Nowadays, supply chain is exposing.

As one of the developing countries, Malaysia continue to emphasize the importance of ESG matters among Malaysian public-listed companies. Malaysia's fifth Prime Minister, Datuk Seri Abdullah Ahmad Badawi in his 2007's budget speech stated that the Malaysian public-listed companies are require to furnish their CSR initiatives in the annual reports. Companies must report on the reasons regarding the failure to provide ESG information in the annual reports. Not only that, Malaysian government supporting the 2030 Development Agenda and its SDG, whereby the main purpose of these 17 SDG is to sustain the preservation of planet and prosperity of society by emphasizing the importance of good health and well-being, gender equality, quality education, as well as responsible consumption and production. Therefore, it is necessary for corporations of a country to have a reliable, relevant and standardized sustainability supply chain management reporting practice. It is essential for a company to disclose its supply chain management information in a proper way that will enable the stakeholders to evaluate the firm's supply chain management performance efficiently. Therefore, the development of SCMSi in this research is timely.

SSCM is required to make sure principle of sustainability can be implemented well by integrating all the actors in the industry [7]. Besides that, SSCM can be used to address issues of socio-environmental and improve the performance of community, helps in making important decisions in supply chain as well as improving the organizational change. Supply chain sustainability has three principal benefits. Firstly, it addresses internal business risk, secondly it adds value to the business itself and thirdly it has the potential to benefit stakeholders (both individuals and companies) related to the supply chain [8].

Globalization, increasing uncertainty and scarcity of resources, higher pressure from regulatory bodies and NGOs, outsourcing and increasing consumer awareness on environmental quality and social conditions related to the products and service used are some of the significant drivers behind the emerging focus on sustainability in supply chain [9]. At present, there are no well-established standards developed to measure the sustainability-related performance of an organization which are the main reasons behind the missing transparency and the conflicting information regarding the sustainability performance SSCM will provide a coherent and standardized set of sustainability performance indicators (SPIs) or the assessment of the sustainability initiatives and their implementation. The traditional supply chain measures such as 'customer satisfaction' are not sufficient to describe the performance related to sustainable SCs as they

were designed primarily for the performance measurement of SCs in general. Hence, there is a critical need to standardized the list of SPIs and integrated higher-order concept of sustainability in supply chain. SPIs have to be designed in a way that they can be well communicated to everyone involved in supply chain [9].

Issues such as incorrectly labelled horse meat, unsafe toys, illegal dumping, to exploitative work practices lead to the need of supply chain management disclosure [10]. In this regard, supply chain management disclosure refers to the release of accurate, comprehensive and cogent information about the supply chain into the public domain. The need to have a holistic SSCM disclosure is important as companies grapple with frequently conflicting demands from internal and external stakeholders, they are faced with a range of impediments in their attempts to gather ever-greater quantities of high-quality, detailed and reliable data across a multi-tiered, fragmented and geographically-dispersed supply chain [10].

3. Development of Supply Chain Management Sustainability Index

This study used the content analysis, which is a method of codifying the text (or content) of a piece of writing or categories depending on selected criteria [11]. As cited in Milne and Adler, Krippendorff (1980, pp. 130-132) identified three types of reliability for content analysis [12]:

1. Stability refers to the ability of a judge to code data the same way over time. It is the weakest of reliability tests. Assessing stability involves a test-retest procedure where annual reports will be analyzed by a coder could again be analyzed by the same coder later. If the coding was the same for each time, then the stability of the content analysis would be perfect.
2. Reproducibility is to measure the extent to which coding is the same when multiple coders involved. This refer to inter-rater reliability, involves assessing the proportion of coding errors between the various coders.
3. Accuracy measure of reliability involves assessing coding performance against a predetermined standard set by a panel of experts, or known from previous experiments and studies.

The definition for "content analysis" that has been widely used by past researchers was usefully defined by Abbot and Monsen as: "A technique for gathering data that consists of codifying qualitative

information in anecdotal and literary form into categories in order to derive quantitative scales of varying levels of complexity” [13].

A pilot test involving the observation of companies’ annual reports and companies’ sustainability reports will be conducted to find any items that are not relevant to the scope of study. There are several steps involved in developing the final version of SCMSi. The steps are as follows:

- 1) Identification of the SCMSi basic items using GRIv4 and NACRA 2018
- 2) Removal of several items
- 3) Reference to previous studies;
- 4) Modification of index by adding the ideal criteria
- 5) Removal / Addition of (SCMSi items by comparing basic SCMSi items and actual SCMSi disclosures available in annual reports and sustainability reports and companies’ websites
- 6) Validation of items by experienced scholars and industrial practitioners; and
- 7) Preparation of final version of SCMSi (See Table 1)

Table 1: Final version of SCMSi

	Category	Items	Source
1.	Product responsibility - Customer Health and Safety	1. Report the percentage of significant product and service categories for which health and safety impacts are assessed for improvement.	[14] / [15]
		2. Report the total number of incidents of non-compliance with regulations and voluntary codes concerning the health and safety impacts of products and services within the reporting period, by Incidents of non-compliance with regulations resulting in a fine or penalty	[14]
		3. Report the total number of incidents of non-compliance with regulations and voluntary codes concerning the health and safety impacts of products and services within the reporting period, by incidents of non-compliance with regulations resulting in a warning	[14]
		4. Report the total number of incidents of non-compliance with regulations and voluntary codes concerning the health and safety impacts of products and services within the reporting period, by incidents of non-compliance with voluntary codes	[14]
		5. If the organization has not identified any non-compliance with regulations and voluntary codes, a brief statement of this fact is sufficient.	[14]
2	Product and Service Labelling - Report whether the following product and service information is required by the organization’s procedures for product and service	6. The sourcing of components of the product or service	[14]

	information and labelling	7. Content, particularly with regard to substances that might produce an environmental or social impact	[14]
		8. Safe use of the product or service	[14]
		9. Disposal of the product and environmental/social impacts	[14]
		10. Other (explain)	[14]
3	Marketing Communications	11. Report whether the organization sells products that are: Banned in certain markets	[14]
		12. Report whether the organization sells products that are: The subject of stakeholder questions or public debate	[14]
		13. Report how the organization has responded to questions or concerns regarding these products	[14]
4	Customer Privacy	14. Report the total number of substantiated complaints received concerning breaches of customer privacy, categorized by Complaints received from outside parties and substantiated by the organization	[14]
		15. Report the total number of substantiated complaints received concerning breaches of customer privacy, categorized by Complaints from regulatory bodies	[14]
		16. Report the total number of identified leaks, thefts, or losses of customer data.	[14]
		17. If the organization has not identified any substantiated complaints, a brief statement of this fact is sufficient	[14]
5	Compliance	18. Report the total monetary value of significant fines for non-compliance with laws and regulations concerning the provision and use of products and services	[14]
		19. If the organization has not identified any non-compliance with laws or regulations, a brief statement of this fact is sufficient.	[14]
6	Society - Supplier Assessment for Impacts on Society	20. Report the percentage of new suppliers that were screened using criteria for impacts on society.	[14]
		21. Report the number of suppliers subject to assessments for impacts on society	[14]
		22. Report the number of suppliers identified as having significant actual and potential negative impacts on society.	[14]
		23. Report the significant actual and potential negative impacts on society identified in the supply chain	[14]
		24. Report the percentage of suppliers identified as having significant actual and potential negative impacts on society with which improvements were agreed upon as a result of assessment.	[14]
7	Human Rights - Supplier Human Rights Assessment	25. Report the percentage of suppliers identified as having significant actual and potential negative impacts on society with which relationships were terminated as a result of assessment, and why	[14]
		26. Report the percentage of new suppliers that were screened using human rights criteria.	[14]
		27. Report the number of suppliers subject to human rights impact assessments.	[14]
		28. Report the number of suppliers identified as having significant actual and potential negative human rights impacts	[14]
		29. Report the significant actual and potential negative human rights impacts identified in the supply chain.	[14]
		30. Report the percentage of suppliers identified as having significant actual and potential negative human rights impacts with which improvements were agreed upon as a result of assessment.	[14]
		31. Report the percentage of suppliers identified as having significant actual and potential negative human rights impacts with which	[14]

		relationships were terminated as a result of assessment, and why	
8	Labor Practices and Decent Work - Supplier Assessment for Labor Practices	32. Report the percentage of new suppliers that were screened using labor practices criteria.	[14]
		33. Report the number of suppliers subject to impact assessments for labor practices	
		34. Report the number of suppliers identified as having significant actual and potential negative impacts for labor practices.	
		35. Report the significant actual and potential negative impacts for labor practices identified in the supply chain	
		36. Report the percentage of suppliers identified as having significant actual and potential negative impacts for labor practices with which improvements were agreed upon as a result of assessment.	
		37. Report the percentage of suppliers identified as having significant actual and potential negative impacts for labor practices with which relationships were terminated as a result of assessment, and why	
9	Environment - Supplier Environmental Assessment	38. Report the percentage of new suppliers that were screened using environmental criteria.	[14]
		39. Report the number of suppliers subject to environmental impact assessments	[14]
		40. Report the number of suppliers identified as having significant actual and potential negative environmental impacts.	[14]
		41. Report the significant actual and potential negative environmental impacts identified in the supply chain.	[14]
		42. Report the percentage of suppliers identified as having significant actual and potential negative environmental impacts with which improvements were agreed upon as a result of assessment.	[14]
		43. Report the percentage of suppliers identified as having significant actual and potential negative	[14]

		environmental impacts with which relationships were terminated as a result of assessment, and why	
10	Procurement	44. Report the percentage of the procurement budget used for significant locations of operation spent on suppliers local to that operation (such as percentage of products and services purchased locally).	[14]
		45. Report the organization's geographical definition of 'local'	[14]
		46. Report the definition used for 'significant locations of operation'.	[14]
11	Policies	47. Terms & Conditions of Supplier Registration	[15] Co. website
		48. General Terms & Conditions of Purchase Order for Services & Products	Co. website
		49. Bidder Agreement	Company website
		50. Supplier Pre Qualification/Selection criteria	Co. website
		51. Online Supplier Registration Checklist	Co. website
		52. Supplier Self-Registration User Guide	Co. website
		53. Supplier Code of Conduct – including standard forms of contracts introduced by the Malaysian Institute of Architects (PAM) and Institute of Engineers Malaysia (IEM)	Co. website / annual report
		54. Supplier evaluation and selection	Annual report
		55. Price competitiveness comparison	Annual report
		56. Supplier performance review – eg Contractor criteria score chart, Materiality Matrix, Audit	Annual report
		57. Technology, innovation & process enhancement – eg Life cycle product	Annual report
		58. Workshop with stakeholders	Co. website / annual report
12	Stakeholders engagement	59. Vendor Development Programme	Annual report
		60. Active member of Vendor Association	Annual report

4. Calculation of the Supply Chain Management Sustainability Index

The SCMSi will be developed by adding all the items covering the all the dimensions. SCMSi will be developed by using the dichotomous, which the scores of “1”, if the company disclose the items and “0”, if it is not. The process adds all the scores and equally weighted. The scores will be calculated as follows:

$$(SCMSi)_j = \frac{\sum_{t=1}^{n_j} X_{ij}}{n_j}$$

Where:
 SCMSi j= Supply Chain Management Sustainability Index
 nj= Number of items expected for the company
 nj≤60 items
 Xij = of “1”, if the company disclose the items and “0”, if it is not

5. Conclusion

Sustainability supply chain management is an all-inclusive view of supply chain processes, logistics and technologies that considers the environmental, social, economic and legal aspects of a supply chain's components. Nowadays, companies are striving to operate in a more sustainable manner. In order to meet the principles of sustainability principles, companies are now making their products or delivering their goods or services in a way that doesn't give a negative impact to the environment, that doesn't deplete natural resources and doesn't contribute to climate change and not contribute to social inequalities.

SSCM is required to make sure principle of sustainability can be implemented well by integrating all the key players in the industry. SSCM can be used to address issues of socio-environmental and improve the performance of community, helps in making important decisions in supply chain as well as improving the organizational change. It has advanced that a comprehensive SSCM disclosure checklist is imperative for public listed companies to act as a benchmark for reporting of SSCM items or indicators. Measuring, improving and

communicating the sustainability related performance of SSCM an organization has become crucial for setting objectives and determining future courses of actions.

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