The Developing Key Performance Indicators for Sustainable Supply Chain in Indonesian Fashion Industry

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Abstract

The Indonesian fashion industry has continuously been growing since the last decade. However, the fashion industry practices produce negative environmental and social consequences. To overcome these issues, the Indonesian government encourages Indonesian fashion industries to adhere to sustainable practices to maintain and improve competitiveness in the global market since it is believed to be the future of the business. Therefore, it is necessary to determine the main indicators of sustainable practices in the fashion industry to measure the performance of a sustainable supply chain system. This study aims to develop a set of relevant key performance indicators (KPIs) in implementing a sustainable supply chain for the Indonesian fashion industry. Initially, this study reviewed the existing sustainability indicators to develop an initial short-list of indicators. Then, indicators were assessed and validated by a group of eight experts consisting of five industry representatives, a government official, a non-government organization leader, and an academic through a questionnaire. This study utilized content validity index (CVI) methods to get consensus indicators from all experts. From this study, 21 indicators were validated and could be further used by the fashion industries to improve their sustainability performance.

Keywords

Key Performance Indicators, Sustainable Supply Chain, Fashion Industry

1. Introduction

The fashion industry is the second most polluting industry in the world, second only to the oil and gas industry (Boström and Micheletti 2016; United Nation 2019). Such a high rate of pollution is caused by the use of synthetic dyes (Agustina et al. 2011; Martuti et al. 2020; Sutrisna et al. 2020), which may harm the ecosystem (Martuti et al. 2020). In addition, the fiber materials used contain microfibers (Sutrisna et al. 2020). Some materials contain heavy metals, such as chromium (Cr), cadmium (Cd), copper (Cu), nickel (Ni), lead (Pb), mercury (Hg) (Natalina and Firdaus 2017; Martuti et al. 2020; Sutrisna et al. 2020). The fashion industry contributes about 10% of global carbon emissions (Conca 2015). Nowadays, there is a fashion revolution where fashion trends change from slow fashion to fast fashion, so the fashion style changes rapidly with lower prices. One of the reasons is that most fashion products are made in developing countries, especially in South and Southeast Asia, such as Bangladesh, Cambodia, India, Sri Lanka, and Indonesia, where the labor costs are low (Aurelia 2020). Furthermore, unfair labor costs and child labor issues emerge from the fast fashion production culture (Aurelia 2020). In relation to these issues, the fashion industry needs to be more sustainable by addressing the triple bottom line (TBL) dimensions (Elkington 1997) – economic, environmental, and social. In recent decades, research on sustainability has increased rapidly (Bottani et al. 2020), yet the research that focuses on sustainable fashion is still very limited (Hassini et al. 2012; Boström and Micheletti 2016), especially in the context of developing countries such as Indonesia (Hassini et al. 2012).

Similar environmental and socio-economic issues can also be found in the Indonesian fashion industry. The main sustainability problems in Indonesian fashion industries are related to the environmental aspect, especially in water pollution caused by waste from the fashion industries (Belinawati et al. 2018; Harmesa et al. 2020). Water pollution mainly occurs in several rivers in Java Island – the primary location of the fashion industry in Indonesia (Badan Ekonomi Kreatif Republik Indonesia 2017). For instance, the Citarum River in Bandung is included as 1 of the 10 most polluted rivers in the world (Black Smith Institute and Green Cross Switzerland 2013). Cimanuk Estuary also

contains heavy metals above the natural value (Harmesa et al. 2020). Meanwhile, Dasun Estuary has been contaminated with cadmium (Cd) content, with a value that almost reached the minimum threshold value (Harmesa and Cordova 2021). Waters in Pekalongan and Surakarta contain heavy metals above the allowed environmental standard (Martuti et al. 2020). In addition, socio-economic issues such as low and unfair labor costs also happen in the Indonesian fashion industry practices (Aurelia 2020).

Besides the aforementioned facts related to sustainability problems, the Indonesian fashion industry has grown significantly from 2010 to 2019, according to the Indonesian Central Bureau for Statistics data. The GDP of the fashion industry has constantly increased from 2010 until 2019, and particularly in 2019, the fashion industry contributed 18% of the total Indonesian GDP (BPS 2019). Moreover, the export value of fashion products increased from 2012 to 2019 (BPS 2019). Unfortunately, some export destination countries have decreased their import of fashion products from Indonesia due to their concern related to sustainability issues (Martuti et al. 2020). Hence, to maintain the existence of and develop the Indonesian fashion industry in the global community, the government has begun to pay more attention to sustainability aspects. The Ministry of Industry of Indonesia also conveyed that implementing sustainable practices in the Indonesian fashion industry is essential to increase the competitiveness of Indonesian fashion products in the global market.

Seuring and Müller (2008) mentioned that implementing a sustainable supply chain ensures that all processes in the supply chain – from raw materials supply processes until the distribution of finished goods to end customers – comply with the applicable standards and are environment and society friendly. Implementing sustainability practices is believed to increase competitive advantage for companies (Hassini et al. 2012; Chardine-Baumann and Botta-Genoulaz 2014; Narimissa et al. 2020). Research by Srisawat and Srisawat (2020) revealed that implementing a sustainable supply chain that considers the economic, environmental, and social dimensions in the Indonesian textile industry – which is part of the fashion industry – might increase a company's profit, image, and reputation in the market.

A sustainable supply chain's performance measurement and management system are required to increase a company's competitiveness with sustainability practices (Hassini et al. 2012). However, the main problem of performance measurement in supply chain management is the lack of integration with sustainability aspects (Piotrowicz and Cuthbertson 2015). Thus, supply chain performance measurement and management need to be improved by considering sustainability dimensions and developing sustainable supply chain performance management (Uysal 2012).

In measuring performance, the use of appropriate indicators is necessary. One of the significant challenges for a company is determining the appropriate indicators for the assessment (Saeed and Kersten 2017). To overcome this challenge, Piotrowicz and Cuthbertson (2015), Saeed and Kersten (2017), Narimissa et al. (2020), and Saeed and Kersten (2020) identified main indicators in sustainable supply chain performance evaluation with a qualitative approach. Most of the studies were conducted in developed countries. Moreover, to the best of our knowledge, previous works pay little attention to sustainable performance management of the fashion supply chain in developing countries, especially Indonesia.

The business requires an appropriate and relevant performance evaluation model to examine the implementation of the sustainable fashion supply chain in Indonesia. Therefore, this study aims to develop performance evaluation indicators of the sustainable supply chain in the Indonesian fashion industry. This study will discuss the KPIs in implementing a sustainable fashion supply chain in the Indonesian fashion industry.

The remainder of this paper is structured as: Section 2 provides the literature review related to the sustainable supply chain in the fashion industry, sustainable indicators, and content validity index (CVI) as the methods used in this study, while Section 3 presents the research methodology. Section 4 provides the result and analysis of the findings. Conclusion as well as suggestions for future research are presented in Section 5.

2. Literature Review

In this section, the literature was reviewed according to the sustainable supply chain in the fashion industry, sustainability indicators, and the CVI method.

2.1 Sustainable Supply Chain in Fashion Industry

The supply chain is defined as all parties involved in fulfilling customer orders (Chopra and Meindl 2013). Particularly, there is an integration among supply chain parties (supplier, manufacturer, warehouse, distributor, transporter, and retailer) to minimize supply chain cost and maximize customer service. These two objectives of supply chain management (SCM) focus merely on the economic aspect, which is the focus of the traditional supply chain.

Many organizations have recently shifted their conventional SCM to a sustainable supply chain (SSC), where the triple bottom line (TBL) principle – economic, environmental, and social – works as the basis. Hassani et al. (2012) defined SSC as an integration among all supply chain actors that manage supply chain operation, resources, and information to maximize overall profit while minimizing environmental impacts and maximizing social well-being. In SSC, the focus point is not only on the economic aspect but also on the environmental and social aspects. Nowadays, businesses should consider implementing SSC due to increasing demands from government, non-government organizations (NGOs), and customers (Saaed and Kersteen 2017).

Sustainability in the fashion industry has recently garnered attention since it is believed to be one of the world's most polluting industries (Boström and Micheletti 2016; United Nation 2019). However, the fashion industry's long and complex supply chain makes it difficult to achieve sustainable practice (Shim et al. 2018). On the other hand, research by Karaosman et al. (2016) and Srisawat and Srisawat (2020) revealed that implementing sustainable practices in the fashion industry would positively impact the company's supply chain performance. However, research related to the sustainable fashion supply chain is still limited. As Bottani et al. (2020) mentioned, sustainable fashion research mainly focuses on sustainable materials.

2.2 Performance Indicators of Sustainable Supply Chain

Companies solely consider economic indicators for performance measurement and evaluation in a traditional supply chain. However, in a sustainable supply chain performance measurement, indicators related to the environmental and social dimensions are involved.

Ahi and Searcy (2014) reviewed 445 studies on sustainable supply chain and found 2555 indicators. Most of the indicators were only used once. It means that there are still many different perspectives on the performance measurement in the sustainable supply chain area (Ahi and Searcy 2014). Moreover, Saeed and Kersten (2017) stated that defining a set of relevant indicators for sustainable performance measures is a big problem for decision-makers. Therefore, many researchers develop sustainable indicators to measure sustainable supply chain performance (Rao 2021; Swarnakar et al. 2021; Narimissa et al. 2020; Saeed and Kersten 2020; Dwivedi et al. 2019; Li and Mathiyazhagan 2018; Kumar and Garg 2017; Saeed and Kersten 2017; Piotrowicz and Cuthbertson 2015). Nevertheless, most of them only focus on the manufacturing and automotive industry. We have not found any literature discussing sustainable performance indicators in the fashion industry: this is the gap that our study aims to fill.

The authors' literature study identified 31 relevant indicators for a sustainable supply chain in the fashion industry. Table 1, Table 2, and Table 3 present the identified sustainable indicators on the economic, environmental, and social dimensions, respectively.

2.3 Content Validity Index (CVI)

Content validity index (CVI) is a method to measure experts' degree of agreement regarding the instrument's content relevance (Polit and Beck 2006). CVI requires a panel of experts with a minimum of three, but unnecessary to be more than ten (Polit and Beck 2006). According to Polit and Beck (2006), experts need to rate the instrument's relevance according to a four-point scale (1 = not relevant, 2 = somewhat relevant, 3 = quite relevant, 4 = highly relevant).

There are two types of CVI: item-level CVI (I-CVI) and scale-level CVI (S-CVI). I-CVI represents the proportion of expert agreement and is calculated based on the number of experts who give a 3 or 4 rating, divided by the total number of experts (Polit et al. 2007; Polit and Beck 2006), as in Equation 1. Zamanzadeh et al. (2015) suggested the minimum value of I-CVI of 0.79 for an item to be considered valid. S-CVI is the average of I-CVI for all items, as

shown in Equation 2. Polit and Beck (2006) stated that an S-CVI with a value of 0.8 or higher is considered acceptable for overall experts' consensus.

$$I - CVI = \frac{Expert\ Agreed}{Number\ of\ Expert} \qquad (1)$$

$$S - CVI = \frac{\sum I - CVI}{Number\ of\ Item} \qquad (2)$$

Table 1. List of economic indicators

No	Code	Indicator	Definition	Sources
1	E1	Operating costs	Costs incurred throughout the supply chain include material procurement, production, distribution, transportation, inventory, labor, maintenance, and repair costs.	Bottani et al. (2020), Narimissa et al. (2020), Saeed and Kersten (2020), Kumar and Garg (2017), Saeed and Kersten (2017), Piotrowicz and Cuthbertson (2015), Chardine-Baumann and Botta-Genoulaz (2014)
2	E2	Labor training costs	Costs incurred to provide education and training to workers.	Piotrowicz and Cuthbertson (2015)
3	E3	Product quality	Product conformity with the quality specifications that have been set. It relates to the quality of goods throughout the supply chain, from raw materials to finished products.	Narimissa et al. (2020), Chardine-Baumann and Botta-Genoulaz (2014)
4	E4	Lead time	Amount of time needed for goods to arrive at the customer.	Narimissa et al. (2020), Piotrowicz and Cuthbertson (2015)
5	E5	Inventory level	Amount of inventory available throughout the supply chain, from the raw materials, work in process, and finished products.	Swarnakar et al. (2021)
6	E6	Customer satisfaction	Customer's satisfaction with product (product meets customer expectations), fulfillment of customer needs, and service.	Rao (2021), Narimissa et al. (2020), Piotrowicz and Cuthbertson (2015)

Table 2. List of environmental indicators

No	Code	Indicator	Definition	Sources
1	L1	Energy consumption	Total energy consumption throughout the supply chain.	Swarnakar et al. (2021), Narimissa et al. (2020), Saeed and Kersten (2020), Dwivedi et al. (2019), Kumar and Garg (2017), Saeed and Kersten (2017), Kozlowski et al. (2015), Piotrowicz and Cuthbertson (2015)
2	L2	Water consumption	Total water consumption throughout the supply chain.	Swarnakar et al. (2021), Narimissa et al. (2020), Saeed and Kersten (2020), Dwivedi et al. (2019), Saeed and Kersten (2017), Kozlowski et al. (2015)
3	L3	Material consumption	Material consumption throughout the supply chain.	Swarnakar et al. (2021), Narimissa et al. (2020), Saeed and Kersten (2020), Kumar and Garg (2017), Saeed and Kersten (2017)

No	Code	Indicator	Definition	Sources
4	L4	Carbon dioxide (CO_2) gas emissions	Emissions of carbon dioxide (CO_2) gas into the air that are generated throughout the supply chain.	Swarnakar et al. (2021), Bottani et al. (2020), Narimissa et al. (2020), Saeed and Kersten (2020), Li and Mathiyazhagan (2018), Kumar and Garg (2017), Saeed and Kersten (2017), Kozlowski et al. (2015), Piotrowicz and Cuthbertson (2015)
5	L5	Noise	The level of noise generated from processing raw materials to manufacturing finished products, distribution, and transportation processes.	Piotrowicz and Cuthbertson (2015)
6	L6	Water quality	Related to water quality and pollution levels in the surrounding environment.	Swarnakar et al. (2021), Saeed and Kersten (2020), Li and Mathiyazhagan (2018), Papilo et al. (2018), Saeed and Kersten (2017), Chardine-Baumann and Botta-Genoulaz (2014)
7	L7	Soil quality	Related to soil quality and pollution levels in the surrounding environment.	Li and Mathiyazhagan (2018), Papilo et al. (2018), Chardine-Baumann and Botta-Genoulaz (2014)
8	L8	Air quality	Related to the air quality and pollution levels in the surrounding environment.	Li and Mathiyazhagan (2018), Papilo et al. (2018), Chardine-Baumann and Botta-Genoulaz (2014)
9	L9	Waste management	Implementing a waste management process before it is released into the environment.	Narimissa et al. (2020), Saeed and Kersten (2020), Dwivedi et al. (2019), Saeed and Kersten (2017), Kozlowski et al. (2015)
10	L10	Use of hazardous material	Hazardous material used in the production process.	Saeed and Kersten (2020), Saeed and Kersten (2017), Chardine-Baumann and Botta-Genoulaz (2014)
11	L11	Use of organic material	Using organic materials that are more environmentally friendly in the production process.	Swarnakar et al. (2021), Narimissa et al. (2020), Dwivedi et al. (2019), Kozlowski et al. (2015)
12	L12	Implementation of reverse logistics system	Implementing reverse logistics systems and 3R (reduce, reuse, and recycle) in the supply chain.	Narimissa et al. (2020), Kumar and Garg (2017), Piotrowicz and Cuthbertson (2015)
13	L13	Environmental compliance	Following the environmental regulations and standards.	Dwivedi et al. (2019), Chardine-Baumann and Botta-Genoulaz (2014)
14	L14	Usage of environmentally friendly technology	Using environmentally friendly technology in the supply chain.	Narimissa et al. (2020), Kumar and Garg (2017)

Table 3. List of social indicators

No	Code	Indicator	Definition	Sources
1	S1	Number of work injuries	Total accidents occurring to workers in the work environment throughout the supply chain.	Rao (2021), Swarnakar et al. (2021), Narimissa et al. (2020), Saeed and Kersten (2020), Saeed and Kersten (2017), Piotrowicz and Cuthbertson (2015)
2	S2	No child labor	Not employing children under the working age following the regulations.	Saeed and Kersten (2020), Li and Mathiyazhagan (2018), Popovic et al. (2018), Saeed and Kersten (2017)

No	Code	Indicator	Definition	Sources
3	S3	Education and training	Providing education and training to the worker in order to improve their abilities and skills.	Swarnakar et al. (2021), Narimissa et al. (2020), Saeed and Kersten (2020), Dwivedi et al. (2019), Kumar and Garg (2017), Saeed and Kersten (2017)
4	S4	Fair wage	Providing wages following standards and regulations based on the time and energy spent by workers.	Kumar and Garg (2017)
5	S5	Labor welfare	Related to the worker's health, safety, living standards, and satisfaction.	Popovic et al. (2018), Chardine-Baumann and Botta-Genoulaz (2014)
6	S6	No forced labor	No intimidation to workers to work more than regular working hours without compensation.	Saeed and Kersten (2020), Popovic et al. (2018), Saeed and Kersten (2017)
7	S7	Non-Discrimination	No discrimination in gender, race, ethnicity, religion, recruitment process, and income.	Narimissa et al. (2020), Popovic et al. (2018), Chardine-Baumann and Botta-Genoulaz (2014)
8	S8	Diversity and Equal Opportunity	Creating diversity in the work environment (gender, age, ethnicity, race, culture) and providing equal opportunities for workers.	Popovic et al. (2018), Kumar and Garg (2017)
9	S9	Regulations that give workers protection from sexual violence	Enforcing rules to protect workers from sexual harassment and violence in the work environment.	Popovic et al. (2018), Kumar and Garg (2017)
10	S10	Employment of local people as labor	Opening employment opportunities for local communities around the company's operational locations and empowering local communities as workers.	Chardine-Baumann and Botta-Genoulaz (2014)
11	S11	Local society development	Developing local societies around the company's operational location based on their needs as a social responsibility.	Li and Mathiyazhagan (2018), Kumar and Garg (2017)

3. Methodology

This study attempts to review the existing literature concerning KPIs in the implementation of a sustainable supply chain. The main focus of this study is to determine a set of relevant, sustainable indicators for the Indonesian fashion supply chain. In order to achieve this objective, this study reviewed some literature to collect sustainable indicators and validated the identified indicators in the context of the Indonesian fashion supply chain.

The methodology employed in this study follows a five stages procedure. The first stage is the preliminary stage, which includes a study related to the problems discussed in this study, stating the problem background, problem formulation, research objectives, and doing the preliminary literature review to determine the research gap.

Next, the second stage would perform a literature review to identify a set of indicators related to implementing the sustainable supply chain in the fashion industry. From the literature study, 31 indicators were identified – consisting of 6 indicators from the economic dimension, 14 indicators from the environmental dimension, and 11 indicators from the social dimension – presented in Table 1, Table 2, and Table 3.

Afterward, this study validated the indicators identified in the previous stage and defined the relevant indicators in the Indonesian fashion supply chain context. The validation process was conducted through a questionnaire to experts in sustainability and fashion supply chain. This study involved eight experts from the fashion industry, government, non-government organization, and academic sectors with a minimum experience of five years. Table 4 shows the details of experts. Experts decided each indicator's relevance in the Indonesian fashion supply chain

context based on their knowledge and experience using a four-point scale (1 = not relevant, 2 = somewhat relevant, 3 = quite relevant, 4 = highly relevant).

After collecting the data from the experts, this study calculated the I-CVI and S-CVI to discover the consensus from all experts and concluded the final list of indicators. The calculation in this study resulted in 21 relevant indicators consisting of 6 indicators from the economic dimension, 8 indicators from the environmental dimension, and 7 indicators from the social dimension. Lastly, this study performed an analysis and concluded the results.

Table 4. List of experts

Expert	Background	Experience
A	Industry	15-20 years
B	Industry	5-10 years
C	Industry	> 20 years
D	Industry	5-10 years
E	Industry	10-15 years
F	Academic	5-10 years
G	Government	5-10 years
H	Non-Government Organization	> 20 years

4. Result and Discussion

This study examined sustainability performance indicators in the Indonesian fashion industry. The data were collected by distributing a questionnaire to eight experts (Table 4). Each expert rated the relevance of indicators using a four-level scale. Zamanzadeh et al. (2015) recommended the I-CVI value of at least 0.79. Due to employing eight experts (for the study), an indicator was considered valid once at least seven experts rated as “quite relevant” or “highly relevant”.

Table 5 demonstrates the validation result. From the data, the I-CVI values ranged between 0.5 to 1.00, and the S-CVI was 0.847. Since the S-CVI was more than 0.8, it can be concluded as an acceptable consensus from all the experts (Polit and Beck 2006). It means that all indicators with I-CVI more than or equal to 0.875 – or indicators agreed by seven experts – were valid. Therefore, this study resulted in only 21 indicators considered valid for the Indonesian fashion industry according to the I-CVI and S-CVI values from 31 earlier identified indicators. All the relevant indicators are summarized in Figure 1.

This study focused on the valid indicators. As previously mentioned, in this study, the valid indicator had an I-CVI value of 0.875 or more. When the I-CVI value was 1.00, all experts confirmed that the indicator was relevant. This study revealed only 7 indicators – 2 from the economic dimension, 3 from the environmental dimension, and 2 from the social dimension – agreed by all experts (the I-CVI equal to 1.00). The next few paragraphs discuss these indicators in the economic, environmental, and social dimensions, respectively.

All the economic indicators were valid because the economic dimension is one of the most crucial dimensions in Indonesia as a developing country, and Indonesian people still have a high orientation to economic aspects. In the economic dimension, “Product Quality” and “Customer Satisfaction” indicators got an I-CVI value of 1.00, which means all experts agreed that these two indicators were relevant. It is due to fashion being a primary need of human beings, so it is really close to the customer. Therefore, “Product Quality” and “Customer Satisfaction” were both necessary.

In the environmental dimension, from 14 identified indicators, only eight indicators were valid. “Water Quality”, “Reverse Logistics System”, and “Environmental Compliance” indicators were agreed by all the experts. “Water Quality” is essential because many rivers and waters around the fashion industry in Indonesia are polluted (Harmesa and Cordova 2021; Harmesa et al. 2020; Martuti et al. 2020; Belinawati et al. 2018), so this indicator is relevant in the context of Indonesia. For the “Reverse Logistics System” indicators, experts confirmed that this is important for the fashion industry to implement 3R by reducing, reusing, and recycling material or waste. They also conveyed that in reverse logistics, the fashion industries should extend their responsibility to manage post-consumption waste. The reverse logistics system could help reduce waste disposal to the environment. For “Environmental Compliance” indicators, all experts agreed that all fashion industries should follow the regulation from the Indonesian government

under the Ministry of Environment and Forestry. However, some experts argued that the Indonesian regulations are insufficient to achieve a sustainable fashion supply chain. The industries should also adjust to global standards and regulations. Moreover, they suggested that the Indonesian government revise the regulations according to international regulations.

Table 5. Result of expert validation

Dimension	Code	Indicator	Number of Agree	I-CVI	Validity
Economic	E1	Operating costs	7	0.875	Valid
	E2	Labor training costs	7	0.875	Valid
	E3	Product quality	8	1.00	Valid
	E4	Lead time	7	0.875	Valid
	E5	Inventory level	7	0.875	Valid
	E6	Customer satisfaction	8	1.00	Valid
Environmental	L1	Energy consumption	7	0.875	Valid
	L2	Water consumption	6	0.75	Invalid
	L3	Material consumption	7	0.875	Valid
	L4	Carbon dioxide (CO_2) gas emissions	4	0.5	Invalid
	L5	Noise	5	0.625	Invalid
	L6	Water quality	8	1.00	Valid
	L7	Soil quality	6	0.75	Invalid
	L8	Air quality	6	0.75	Invalid
	L9	Waste management	7	0.875	Valid
	L10	Use of hazardous material	6	0.75	Invalid
	L11	Use of organic material	7	0.875	Valid
	L12	Implementation of reverse logistics system	8	1.00	Valid
	L13	Environmental compliance	8	1.00	Valid
	L14	Usage of environmentally friendly technology	7	0.875	Valid
Social	S1	Number of work injuries	5	0.625	Invalid
	S2	No child labor	7	0.875	Valid
	S3	Education and training	8	1.00	Valid
	S4	Fair wage	7	0.875	Valid
	S5	Labor welfare	7	0.875	Valid
	S6	No forced labor	8	1.00	Valid
	S7	Non-Discrimination	6	0.75	Invalid
	S8	Diversity and Equal Opportunity	6	0.75	Invalid
	S9	Regulations that give workers protection from sexual violence	7	0.875	Valid
	S10	Employment of local people as labor	6	0.75	Invalid
	S11	Local society development	7	0.875	Valid

In the social dimension, only seven out of 11 initial identified indicators were valid. All experts agreed that indicators "Education and Training" and "No Forced Labor" were highly relevant indicators from those valid indicators. These two indicators were related to employees. Experts stated that employees should be treated well since employees are the company's main asset. The industry should give employees education and training not only on hard skills related to their job but also on regulation, safety, and sustainability. “No Forced Labor” indicator means that all employees work according to regular working hours and fair compensation (with no unpaid overtime). This indicator is essential since many forced labor practices in the fashion industry (Aurelia 2020). By addressing these indicators, employees’ satisfaction will increase, and it consequently will increase productivity.

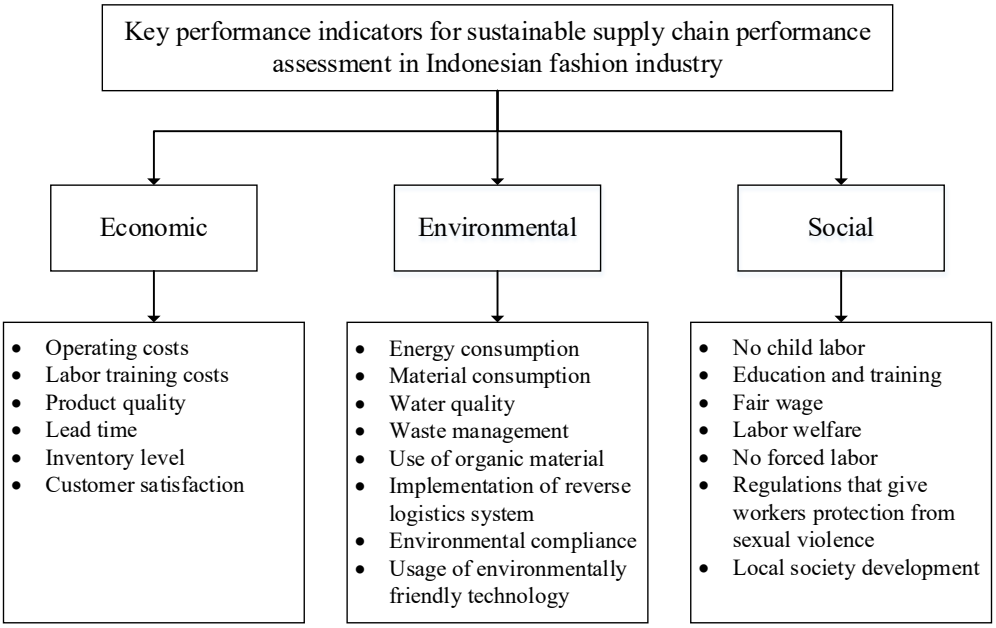

Figure 1. KPIs for performance assessment of a sustainable fashion supply chain

The 21 relevant indicators resulting from this study can be used in the performance management system. For a fashion company, these indicators may help create a sustainable system, monitor and evaluate the company's sustainability performance and improve the company's performance. For the government, these indicators can be used as a standard performance monitoring system to monitor and evaluate the sustainable performance of Indonesian fashion industries. Therefore, by using these indicators, the fashion companies, together with the government, might improve Indonesian fashion industries' sustainability performance and competitiveness.

5. Conclusion

It is crucial to identify the relevant KPIs for economic, environmental, and social dimensions to evaluate a sustainable supply chain performance. This study explored the appropriate KPIs for a sustainable supply chain in the context of the Indonesian fashion industry. We reviewed some literature and identified 31 indicators. These indicators include 6 economic indicators, 14 environmental indicators, and 11 social indicators. Then, validation by eight experts was carried out and calculated the CVI. Finally, 21 KPIs from the three sustainability dimensions (6 economic indicators, 8 environmental indicators, and 7 social indicators) were selected with a minimum I-CVI of 0.875 and S-CVI of 0.847. The fashion industries can use those KPIs to increase their sustainability performance and competitiveness.

This study focused on identifying and validating a set of KPIs for evaluating the performance of a sustainable supply chain in the fashion industry. In future research, it is recommended to prioritize and analyze the interrelationship between indicators by using the multi-criteria decision-making (MCDM) approach. It is also recommended to develop a performance evaluation model that the fashion industries can utilize to measure each indicator and overall sustainable performance, so they can regularly evaluate and increase their performance.

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