

ASSESSMENT OF INDUSTRIAL SUSTAINABILITY IN THE HERBAL AND MEDICINE SECTOR

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ABSTRACT

The Ministry of Industry of the Republic of Indonesia is committed to increasing the competitive position of industry globally from 41st to 39th in the world out of 138 countries recorded by the 2016-2017 Global Competitiveness Report. Sustainability requires careful planning, namely assessment. The herbal medicine and medicine industry is an industry with significant development, absorbing a workforce of 15 million people and continues to grow along with developments in the direction of food, beverages, cosmetics, spas and aromatherapy. This research aims to develop industrial sustainability assessment indicators implemented in the herbal medicine and medicine sector in the city of Surakarta. The method used is the Delphi method to validate indicators, then MCDM to support the decision making process. The MCDM method used is AHP, which assesses and determines the level of industrial sustainability. Respondents in this study are companies with the criteria for a workforce of more than 100 people and are registered with the Ministry of Industry.

KEYWORDS

Assessment; Indicator; Continuity; Competitiveness



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INTRODUCTION

Industrial sustainability is an active concern for many aspects such as human rights, the environment, anti-corruption, work requirements, gender equality, diversity, and business ethics (Purwaningsih, 2020). Triplebottom is the designation of three data fields that exist in industrial sustainability (Chen, 2014). The data fields are economic, social and environmental. Economics is a field of data that emphasizes industrial productivity and well-being. While the field of social data is the impact on the surrounding community as well as increasing the income of the surrounding community. The environment is an industry concern in paying attention to the environment for the impact of continuing business. The ability to survive in complex competition and economic, societal and

environmental challenges is called industrial sustainability (Jayasundara, 2020).

In the world economy, industry has an important role in helping the country's economic development (Wisudawati et al., 2020). This is because industry is an important component of the economic system of every country in the Association of Southeast Asian Nations (ASEAN) (Schaper). The ASEAN Federation of Accountants targets that the industry will become the backbone of the regional and national economies in 2019 (Pratama, 2019). These statements align with theories advanced by policy makers, industry lawyers and other commentators. Industry is an important force from year to year in improving the economy in ASEAN. This statement is directly proportional to the number and role of the economy, the vulnerability to sustainability and industry competition is getting higher (Chen et al., 2013). Industry is a field that is difficult to understand, handle, and measure because it is always changing (Schaper, 2020)). So that the government needs to make effective policies so that it can more easily measure current industrial phenomena, so that it can encourage economic and industrial growth to be more effective in helping to improve the regional and national economy (Tukker, 2015).

The industry has many sectors, one of which is the herbal and medicinal industry. The herbal and medicinal industry is financial and strategic because the demand for medicinal and medicinal herbs in society is very high and the herbal and medicinal industry also has a significant role in building the economy in Indonesia. The drug and herbal industry can also open new jobs and can absorb as many as 15 million people and continue to grow in the direction of food, beverages, cosmetics, spas and aromatherapy. Entering industry 4.0, competition in the industrial world is getting higher in the herbal medicine and medicine sector. Thus, sustainability assessments in general can be divided based on dimension-based approaches, indicators, and assessments related to products and integrated assessments (Chen, 2013). Indicators become suitable assessment tools for industry sustainability. So that the formulation of the problem from this research is how are the industrial sustainability indicators implemented in the herbal and medicinal sector in Surakarta City?

RESEARCH METHOD

Based on the problems described above, namely regarding the sustainability of the industry in the herbal and medicinal sector. In general, sustainability assessments can be divided based on dimension-based approaches, indicators, as well as product-related assessments and integrated assessments (Chen, 2013). Indicators are assessment tools that are considered appropriate for industrial sustainability. So, it is necessary to select indicators that are in accordance with the conditions of the company that the research will carry out (Chen, 2013). So that problem solving can be started by selecting indicators from previous research as shown in Table 1.

Based on the methods used from previous research on industrial sustainability, the appropriate method for assessing industrial sustainability in the herbal medicine sector is the Multi-Criteria Decision Making (MCDM) method. MCDM is a method that is often used in the decision-making process when solving complex and complicated problems (Kubler et al., 2016). The dimensions to be examined are economic, social and environmental.

Table 1. Industrial Sustainability Methods and Indicators

No	Metode	Indikator	Penulis
1.	Multi- criteria Decision Making	Ekonomik: Revenues, capital invesment, value adedd, infrastructure investment, financialrisk, inflation Environment: materials used by the system, water used by the system, energyused by the system, air Social: impact on local community, hire local skills, impact on labour	Ziout A, Azab A, Altarazi SA, Elmaraghy WH
2.	Product Service System (PSS)	Economic: Pengusaha mandiri, proses diverifikasi, inovasi produk Environment: Sumber daya lokal sosial,kemitraan, kolaborasi antar pemangku kepentingan	Bhamra T, Hernandez R, Rapitsenyane Y, Trimmingham R.
3.	Barometer of Sustainability	Environment: soil, water, air,biodiversity Sosial: Wealth, knowledge and culture,of resources community, equity, use of resources	Batalhao ACD, Teixeira D, DeGodoi EL
4.	Product Service System (PSS)	Economic: posisi pasar dan daya saing, profitabilitas, nilai tambah pelanggan, pengembangan bisnis, kemitraan, efek ekonomi makro Environment: optimalisasi umur sistem, pengurangan transportasi, penggunaan sumber daya, minimalisasi limbah, konservasi, toksisitas Sosial: tanggung jawab sosial, K3, kondisi lingkungan, ketenagakerjaan, hubungan industrial, keragaman budaya	Purwaningsih R, Yudha, C, SusantoN.
5.	Composite Index	Economic: economic dependence,formcreation, fiscal potentiol, taxedhousehold, productivity in industry Environment: off-site greenhouse gass,share of non artificialized area, wastesorting center Sosial: women in job, equipment and service, poverty	Bonnet J, MartinezEC, Maissant PR
6.	Sustainability Report	Pelestarian Lingkungan, Bisnis yanginklusif, kesejahteraan karyawan, integritas produk, posokan berkelanjutan	PT Industri Jamudan farmasi Sido Muncul Tbk

Based on the research method, it can be seen that the stages in this study amounted to four stages. This stage consists of identifying variables, modifying assessment tools or assessment tools, collecting data and processing data. is a research flow diagram from the initial stage to the final stage.

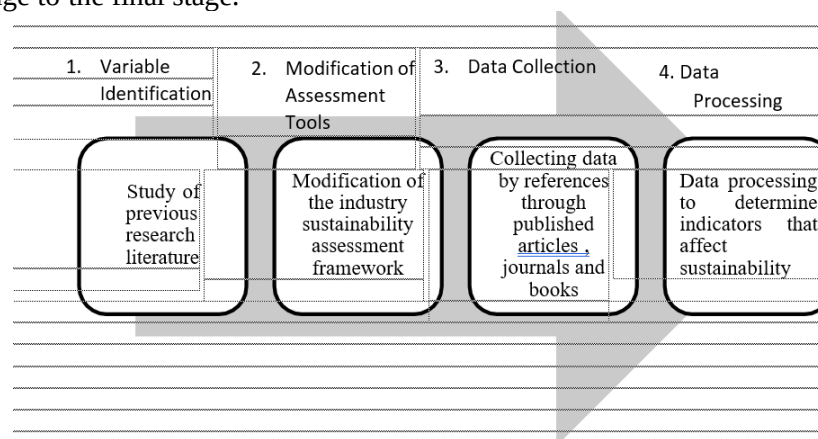


Figure 1. Reseach Road map

The first stage is identifying indicators, where there are six previous studies adopted in this study. There are 3 main dimensions plus the dimensions of the herbal medicine and drug companies. The second stage is the modification of the assessment tool, which determines the rating scale used to see the level of sustainability of the herbal and medicinal industry. The third stage is data collection. Collection is carried out by studying the literature by reviewing references that are appropriate to the research.

The third stage is data processing, this stage is to determine indicators that affect the sustainability of the industry in the herbal medicine and medicine sector in Surakarta.

Table.2 Industrial Sustainability Assessment Indicators

No	Indikator	Penulis
1	Economic: Revenues, capital investment, value added, infrastructure investment, financial risk, inflation, self-employment, diversification process, product innovation, market position and competitiveness, profitability, business development, partnerships, economic effects makro, productivity in industry	(Ziout , Bhamra , Batalho , Purwaningsih)
2	Environment: Materials used by the system, water used by the system, energy used by the system, air emissions, solid AND liquid waste, hazardous waste, optimizing system life, reducing transportation, using resources, minimizing waste, conservation, toxicity, off-site greenhouse gas, share of non-artificialized area, waste sorting center	(Ziout , Bhamra , Batalho , Purwaningsih)
3	Social: Impact on local community, hire local skills, impact on labour, partnerships, collaboration between stakeholders, wealth, knowledge and culture, of resources community, equity, use of resources, women in job, equipment and service, poverty	(Ziout , Bhamra , Batalho , Purwaningsih)
4	Environmental preservation, inclusive business, employee welfare, product integrity, sustainable supply	PT. Industri Jamudan Farmasi Sido Muncul

RESULT AND DISCUSSION

The sustainability of the industry in the herbal medicine and medicine sector in the city of Surakarta is an action that needs to be taken to enter the industrial era 4.0 with increasingly high competition. With these problems it is necessary to first understand what aspects need to be updated or developed in the herbal medicine sector. There are four dimensions that need to be analyzed to find out the indicators that affect industrial sustainability. These dimensions are environmental, social, economic, and product integrity (Ratna, 2020).

The environmental dimension means concern for the impact of the industry on the environment or nature. Many indicators influence the environmental dimension in industrial sustainability. These indicators are environmental management, greenhouse gases, energy efficiency (Ministry, 2016), management systems, waste treatment systems, environmental awareness and sustainability and diversity of herbal plants.

Economic dimension with indicators including partnerships with farmers, women's empowerment, community development (Ziout A et al., 2013). The Socio-Cultural Dimension includes the development of importers and farmers, supplier audits, freedom of expression, forced labor practices, fair compensation, diversity and equal opportunities, OHS policies and management systems, Occupational Safety and Health (K3) regulations. – product invitations, research and development, marketing (Purwaningsih et al, 2016).

There are 22 indicators that affect the sustainability of the industry in the herbal medicine sector in Surakarta City. With this in mind, it is necessary to validate the

indicators to find out the weighting of the indicators that affect industrial sustainability. The Delphi method was first developed by Norman Dalkey and Olaf Helmer and their associates in the Rand Corporation in the early 1950s. The Delphi method is a group process used to conduct surveys and collect opinions from experts in certain fields (Wiwin et al., 2015). The Delphi method has been applied in terms of making policies, plans, or ideas based on thought or judgment. The Delphi method is very useful for collecting opinions and judgments of experts and practitioners when time and distance and other factors do not allow them to meet in the same location. Thus the authors will get the results of indicators that are in accordance with the herbal and medicinal industrial sector in Surakarta.

The Multi-Criteria Decision Making (MCDM) method to support the decision-making process (Agusti et al., 2023). The results obtained from the calculations become an assessment of industrial sustainability that can be used to determine strategies for dealing with competition in the herbal and medicinal industry sector. These results can also indirectly support the industry in innovating and maintaining its sustainability so that it can continue to exist in adding to the country's economic income. The advantage of this method is that it can solve complex, complicated and immeasurable problems (Kubler, 2016).

CONCLUSION

Industrial sustainability is necessary to meet the needs of society, companies or research. In order to evaluate the weighting of the indicators in the herbal medicine industry sector in Surakarta City using the Delphi method, there are 22 indicators. The method that can support decision making is Multi-Criteria Decision Making (MSDM). With this discovery it is hoped that it can provide a reference regarding the sustainability of the industry in the herbal and medicinal sector in Surakarta City.

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