The Future of Indonesia for Sustainable Engineering and Innovation for Sustainability and Its Impact?

Jilly Ayuningtias[1], Fahri Hendrawan[1], Ahmad Auliya Rahman[2], and Ani Nuraisyah[1(✉)]

[1] School of Business, IPB University, Bogor, Indonesia
anynuraisyah@apps.ipb.ac.id
[2] Agribusiness Management of Vocational Schools, IPB University, Bogor, Indonesia

Abstract. On a list of the world's most populated nations, Indonesia comes in at number four. One of the nations with the largest populations is Indonesia. The population of Indonesia is 273 million. With so many human resources already in place, it goes without saying that there is a need for sustainable engineering development and innovation that have an influence on the economy of our nation. Due to its large population, Indonesia frequently experiences socioeconomic disparities such as hunger, poverty, and injustice. As a result, this essay makes future predictions for Indonesia.

Keywords: Innovation · SDGs · SEI

1 Introduction

Sustainable development is a way of improving the quality of life for people while also preserving the natural environment for future generations. It involves meeting the needs and goals of humanity in a way that does not harm the planet or deplete its resources. This requires a balance between economic, social, and environmental considerations, as the well-being of people and the health of the planet are interconnected. Ultimately, the goal of sustainable development is to create a society that is both prosperous and sustainable, where people can thrive while also protecting the natural world. Sustainable development term was described in the 1987 Brundland statement as "development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs" [1]. The concept of sustainable development has evolved over time to place greater emphasis on the interrelated pillars of economic, social, and environmental sustainability. This means that in addition to promoting economic growth and social progress, sustainable development also involves protecting and preserving the natural environment for future generations. This approach recognizes that economic, social, and environmental factors are all interconnected, and that a balance must be struck between these three pillars to create a sustainable future. Therefore, sustainable development aims to promote economic development, social inclusion, and

S. Jahroh et al. (Eds.): BIEC 2022, AEBMR 236, pp. 291–302, 2023.
https://doi.org/10.2991/978-94-6463-144-9_28

environmental protection in a way that is mutually reinforcing and ensures that the needs of present and future generations are met. The concept of sustainable development was formally introduced at the United Nations Conference on Environment and Development (UNCED) in 1992, also known as the Earth Summit, which took place in Rio de Janeiro, Brazil. At this conference, world leaders adopted Agenda 21, a comprehensive plan of action to build a global partnership for sustainable development. In 2015, the United Nations General Assembly adopted the Sustainable Development Goals (SDGs), a set of 17 goals and 169 targets aimed at promoting economic, social, and environmental sustainability around the world. The SDGs, which will be in place from 2015 to 2030, address a range of global challenges, including poverty, inequality, climate change, environmental degradation, and the promotion of peace and justice. The SDGs are designed to be integrated and indivisible, meaning that progress on one goal can support and enhance progress on the others. The ultimate goal of the SDGs is to create a more sustainable and equitable world for present and future generations [2].

UNESCO formulated a distinction between the two concepts as follows: "*Sustainability* is often thought of as a long-term goal (i.e. a more sustainable world), while *sustainable development* refers to the many processes and pathways to achieve it." [2] The concept of sustainable development has faced criticism from various perspectives. Some argue that the idea of "sustainable development" is paradoxical or contradictory, as they view development as inherently unsustainable due to the way it often relies on the depletion of natural resources and the generation of pollution and waste. Others have expressed disappointment with the lack of progress that has been made in implementing sustainable development practices and achieving the goals set out by international agreements such as the Sustainable Development Goals (SDGs) [3]. Part of the challenge in addressing these criticisms is that the term "development" itself is not always clearly defined and can be interpreted in different ways by different people and organizations. As a result, it can be difficult to determine what specific actions and policies are necessary to promote sustainable development in practice.

Sustainable development is a holistic approach to development that considers economic, social, environmental, and cultural factors in order to meet the needs of the present without compromising the ability of future generations to meet their own needs. It involves balancing short-term and long-term issues and working towards a future in which people can live fulfilling lives without damaging the planet or depleting its resources. This requires a multifaceted approach that considers the interconnectedness of economic, social, and environmental issues, and seeks to create a sustainable and equitable society for all. The discussion of "Sustainable Development" or "sustainable development" is actually not something new both globally and nationally. The concept of sustainable development has actually long been a concern of experts. However, the term sustainability itself only appeared a few decades ago, although attention to sustainability began since Malthus in 1798 who was worried about the availability of land in England due to the rapid population explosion. Issue of socio economic development is a complex situation and it is essential to deal with the natural environment, ecology, energy and impact of natural conditions for development.

As a beginning the emergence of the concept of sustainable development was due to attention to the environment. Especially non-renewable natural resources are being

exploited against them continuously. An important problem faced in economic development is how to deal with the trade-off between meeting development needs on the one hand and efforts to maintain environmental sustainability on the other.

Economic development based on natural resources that do not pay attention to aspects of environmental sustainability will eventually have a negative impact on the environment itself, because basically natural resources and the environment have limited carrying capacity. In other words, economic development that does not pay attention to the capacity of natural resources and the environment will cause development problems in the future.

Sustainable development is a concept that aims to create a balance between dimensions of development such as economic, social and environmental. Sustainable development has two key concepts: 1) the need is the awareness of the needs of poor people in developing countries. 2) limitations are limitations from technology and social organization relating to the capacity of the environment to current and future needs.

According to the World Summit, the United Nation document in 2005, sustainable development covers three scope of policy where the policy interconnected with each other. These policies include economic development policy, social development and environmental development. In the economic aspect, sustainable development is related to economic growth and figuring out how to advance the economy in long term without having to spend natural resources. In the social aspect, sustainable development is related with environmental protection, where the development carried out must always involve environmental aspects so that the rapid development does not destroy environmental sustainability. Principle of sustainable development are: 1) protecting life support system, 2) protect and improve biotic diversity, 3) maintain and improve the integrity of damaged ecosystem, 4) develop and apply adapt strategy and to prevent threat of environmental changes, 5) maintaining the physical scale of human activities under the carrying of the biosphere, 6) increase community participation in development, 7) create relation between political activity and environmental, 8) implement an open and easy to achieve political process, 9) increase community participation in development, 10) implement an open and achievable political process.

This study analyzed various aspects of environmental sustainability in manufacturing and logistics, including environmental routines, policies and targets, the implementation of environmental management systems, environmental reporting, environmental requirements within the supply chain, trends in greenhouse gas emissions, and trends in energy consumption. The aim of the study was to identify the current state of sustainability in these sectors and to examine how it aligns with the Sustainable Development Goals (SDGs) in the context of Industry 4.0 technologies and innovations. The study found that previous research has primarily focused on corporate social responsibility and the benefits of sustainability in the form of social enterprises, rather than on the broader scope of the SDGs and their interaction with business, technology, and logistics processes. This article aims to fill this gap by providing a comprehensive overview of sustainability in manufacturing and logistics in light of the SDGs and Industry 4.0 technologies. The article begins with an introduction and then discusses the theoretical background of the SDGs in the context of technological change [4].

2 Literature Review

2.1 SDGs

The Sustainable Development Goals (SDGs) are a set of global goals adopted by world leaders, including Indonesia, with the aim of ending poverty, reducing inequality, and protecting the environment. The SDGs consist of 17 Goals and 169 Targets that are intended to be achieved by 2030. These goals and targets cover a wide range of issues related to economic, social, and environmental sustainability, and are designed to be integrated and indivisible, meaning that progress on one goal can support and enhance progress on the others. The SDGs represent a global action plan for creating a more sustainable and equitable world for present and future generations. [5]. Therefore, rely on the Sustainable Development Goals (Sustainable Development Goals, SDGs), the lives of Indonesians can be improved. For the Republic of Indonesia, implementing the National Development Agenda means implementing the Sustainable Development Goals. The SDGs are institutionalized from the highest national level to sub-national entities and incorporated into national and sub-national development plans. This is a large-scale collaborative effort between state and non-state actors to serve 264 million people, one third of whom are children, from 1,300 ethnic groups on 17,000 islands. Considering that Indonesia is the fourth most populous country, the success of Indonesia's development will contribute to global prosperity. With 16.9% of Indonesia's population aged 15–24 (2016), Indonesia has the opportunity to benefit from a "demographic dividend" during 2020–2040. Therefore, youth is a huge potential and investment in sustainable development and its participation in the SDGs [6].

Some Millenium Development Goals (MDGs) agenda that have not been achieved will be continued in the implementation of SDGs achievements until 2030. The SDGs are an improvement of the MDGs because: 1) the SDGs are more comprehensive, structured by involving more countries with universal golas for developed and developing countries, 2) expanding funding resources, in addition to assistance from developed countries, also sources from the private sector, 3) emphasizing on human rights so that discrimination does not occur in poverty reduction in all its dimensions. 4) Inclusive, specifically targeting vulnerable groups. 5) involvement of all stakeholders: government and parliament, philanthropy and business actors, experts and academics, as wellas civic and media organizations. 6) the MDGs only target "half" reductions while the SDGs target to complete all goals (Zero Goals), 7) the SDGs not only contain golas but also means of implementation.

The Sustainable Development Goals (SDGs) are a set of global commitments to promote the continuous improvement of economic welfare, social well-being, environmental quality, and governance in order to create a more sustainable and equitable world for current and future generations. The SDGs consist of 17 goals, including: (1) No Poverty; (2) No Hunger; (3) Healthy and Prosperous Life; (4) Quality Education; (5) Gender Equality; (6) Clean Water and Proper Sanitation; (7) Clean and Affordable Energy; (8) Decent Work and Economic Growth; (9) Industry, Innovation and Infrastructure; (10) Reduced Inequality; (11) Sustainable Cities and Settlements; (12) Responsible Consumption and Production; (13) Addressing Climate Change; (14) Ocean Ecosystems;

(15) Mainland Ecosystems; (16) Peace, Justice and Resilient Institutions; (17) Partnerships to Achieve Goals. Achieving the targets of the SDGs is a national development priority in Indonesia, which requires coordination and cooperation between national, provincial, and district/city level policies and planning.

The targets of the Sustainable Development Goals (SDGs) at the national level in Indonesia are aligned with the country's 2015–2019 National Medium-Term Development Plan (RPJMN), and include specific programs, activities, and indicators as well as financing support. The SDGs are an expansion of the Millennium Development Goals (MDGs), which were achieved by many countries around the world, including Indonesia. The SDGs are more comprehensive than the MDGs, as they involve a wider range of countries, both developed and developing, and draw on a wider range of funding sources. They also place a greater emphasis on human rights and include the involvement of community organizations, the media, philanthropy and business actors, academics, and experts. Indonesia has successfully achieved most of its MDGs targets, but there are still some indicators that need to be addressed in the implementation of the SDGs. These include reducing the poverty rate based on the national poverty line, increasing minimum consumption below 1,400 kcal/capita/day, decreasing maternal mortality (MMR), managing HIV/AIDS, providing clean water and sanitation in rural areas, and reducing disparities in the achievement of targets between different provinces.

2.2 Sustainable Engineering and Innovation

Engineering sustainability is a design process or system implementation that aims to use energy and resources in a sustainable manner, without harming the natural environment or compromising the ability of future generations to meet their own needs. There are many predecessors of sustainable engineering, including Environmental Engineering, which has been in existence since the beginning of civilization and has taken on a more modern approach since the 1970s. Environmental Engineering is a branch of engineering that addresses the negative environmental impacts of natural and human activities, such as water and air pollution, waste management, energy conservation, climate change, and agricultural systems. It aims to protect freshwater supplies, improve sanitation, and mitigate the harmful effects of pollution on human health and the environment [7].

Sustainable engineering plays a crucial role in ensuring that the processes and systems used by individuals and corporations do not deplete resources or harm the environment, in order to preserve them for future generations. Sustainable engineering is defined as "the process of using resources in a way that does not compromise the environment or deplete the materials for future generations." It involves designing and implementing systems and technologies that are resource-efficient and environmentally friendly, and that minimize waste and pollution. By adopting sustainable engineering practices, we can help to ensure that our actions today do not compromise the well-being of future generations.

Sustainable engineering is the practice of designing and operating systems in a way that conserves energy and resources and minimizes harm to the environment, so that they can be used by future generations. It encompasses a wide range of areas, including water management, waste management, and energy conservation, and aims to address environmental challenges such as climate change, pollution, and population growth.

Sustainable engineers, also known as environmental engineers, use their expertise in science, geography, and engineering to design technologies and processes that prevent and control environmental risks, and restore and rehabilitate damaged environments. They may work on issues such as improving flood and drainage risk in high-risk areas, finding more sustainable solutions for disposing of waste products like water, plastics, and industrial waste, and addressing the impact of human activities on the environment. Sustainable engineering is essential for ensuring that our daily systems and processes are sustainable and do not compromise the natural environment or the ability of future generations to meet their own needs.

To be successful in sustainable engineering, it is important to have certain skills, including: (1) Data research: The ability to collect, analyze, and manipulate data from a variety of sources. (2) Report writing: The ability to compile findings into a clear and concise report that can be shared with others. (3) Presenting and communicating ideas: The ability to explain findings to other professionals and to persuade stakeholders to take action to improve their processes. (4) Time management: The ability to manage projects efficiently and meet strict deadlines. (5) Creative problem-solving: The ability to use scientific and engineering knowledge to find innovative solutions to complex challenges. (6) Organization: The ability to manage different phases of projects and track large volumes of data. (7) Passion: A desire to challenge the status quo and work towards improving the world for future generations.

According to Benoit Cushan-Roisin, sustainable engineering is based on the principles of "engineering in context, engineering with a conscience, engineering for a finite planet and the indefinite future." These principles involve taking into account the broader context of sustainable development, being mindful of the ethical implications of engineering decisions, and designing solutions that consider the long-term impacts on the planet and its resources. Sustainable engineering principles should be applied early in the design and development process to ensure that technologies are developed and implemented in an environmentally responsible manner. These principles should be considered in research, industrial projects, policy making, and funding decisions to ensure that solutions are balanced and consider the environmental, social, and economic impacts. Lopsided solutions that prioritize one aspect over the others can create tension, instability, and new problems in the long term.

Here are some of the aspects that differentiate the traditional and sustainable approaches in engineering, which can be seen in Table 1.

The diagram presents a consolidated framework for sustainable engineering principles, which are in part adopted from the work of Gagnon and co-authors "Sustainable development in engineering: a review of principles and definition of a conceptual framework" (2008) and from the green engineering principles established by Sundestin Conference (2003), which can be seen in Fig. 1 [8, 9].

According to Ganon et al. (2008), sustainable engineering principles can be placed on the perimeter of a triangle, with the Society pole on the left and the Economy pole on the right. From left to right, the four principles listed are:

- Offer individuals and communities the opportunity to increase their capabilities.
- Know your "needs" and "wants." Put primary focus on meeting the needs of the larger number of individuals.

Table 1. Differentiate the traditional and sustainable approaches in engineering

Traditional Engineering	Sustainable Engineering
Considers the object or process	Considers the whole system in which the object or process will be used
Focuses on technical issues	Considers both technical and non-technical issues synergistically
Solves the immediate problem	Strives to solve the problem for infinite future (forever?)
Considers the local context	Considers the global context
Assumes others will deal with polical, ethical, and societal issues	Acknowledges the need to interact the experts in other disciplines related to the problem

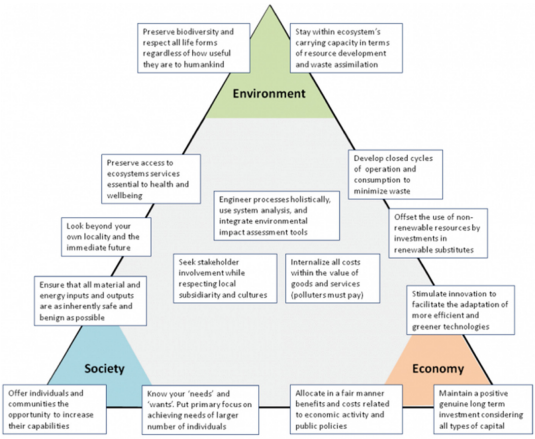

Fig. 1. Principles of sustainable engineering

- Allocate benefits and costs related to economic activity and public policies fairly.
- Maintain a positive, long-term investment considering all types of capital.

These principles aim to balance social, environmental, and economic considerations in engineering decisions and to ensure that the benefits and costs of economic activities and public policies are distributed fairly. The goal is to create sustainable solutions that meet the needs of individuals and communities in a manner that is equitable and that considers the long-term impacts on all types of capital.

On the left side of the triangle, with the Society pole at the bottom and the Environment pole at the top, are four principles of sustainable engineering:

- Ensure that all material and energy inputs and outputs are as safe and environmentally friendly as possible.
- Consider the impacts beyond the local area and the immediate future.

- Protect access to ecosystem services essential for health and well-being.
- Preserve biodiversity and respect all life forms, regardless of their usefulness to humans.

These principles aim to balance social and environmental considerations in engineering decisions and to design solutions that are safe and environmentally friendly, and that consider the long-term impacts on the environment and society. They also involve protecting access to ecosystem services and preserving biodiversity, recognizing the value of all life forms.

On the right side of the triangle, with the Environment pole at the top and the Economy pole at the bottom, are four principles of sustainable engineering:

- Stay within the carrying capacity of ecosystems in terms of resource development and waste assimilation.
- Develop closed-loop systems to minimize waste and resource use.
- Offset the use of non-renewable resources through investments in renewable alternatives.
- Encourage innovation to adopt more efficient and environmentally friendly technologies.

These principles aim to balance environmental and economic considerations in engineering decisions and to design solutions that are sustainable and efficient.

At the center of the triangle are three principles of sustainable engineering:

- Analyze engineering processes holistically, using system analysis and environmental impact assessment tools.
- Involve stakeholders and respect local subsidiarity and cultures.
- Internalize all costs within the value of goods and services, requiring polluters to pay for their negative impacts.

These principles involve taking a holistic approach to engineering, considering the impacts on all aspects of the system and using tools to assess the environmental impacts. They also involve involving stakeholders and respecting local cultures, and ensuring that the costs of negative environmental impacts are accounted for in the pricing of goods and services.

3 Method

This paper aims to explore the future of sustainable engineering and innovation in Indonesia. To do this, the we conducted a literature review of previous research on sustainable development goals and sustainable engineering and innovation. This method of analysis involves reviewing and synthesizing existing research on a specific topic in order to identify trends, gaps, and areas for further investigation. By reviewing the existing literature on sustainable development goals and sustainable engineering and innovation, the authors were able to gain insights into the current state of these areas in Indonesia and identify opportunities for future research and development.

4 Results

4.1 Descriptive Analysis in Quantitative Research

Based on data from quantitative research, in which there are bivariate descriptive statistics, univariate descriptive statistics, and multivariate descriptive statistics, descriptive analysis is used to interpret the data from these studies. We focus on presenting information consisting of scientific problems as identification of knowledge relevant to the topic. From what was mentioned above, the implementation of the SDGs will be analyzed in several industrial sectors. Furthermore, sustainability in production processes and logistics in manufacturing companies is identified.

The SDGs' implementation in businesses within the chosen industry sectors is depicted in Fig. 2. The mechanical engineering sector has the highest SDGs implementation, according to the results summarized in the bar chart (38.90 percent). The percentage in the automotive industry is likewise significant (26.40 percent). Enterprises in the electrical engineering sector must adhere to the SDGs to the tune of 22.20 percent. Enterprises in the mining industry (16.70 percent) and enterprises in the metallurgical industry have the lowest implementation rates of sustainable development targets (13.80 percent). At the same time, based on the data's graphical representation, we draw the conclusion that the SDGs are prevalent across all sectors represented in the research sample [10].

Research Question 1 (RQ1): What Are the Sustainability in Supply Chain Management?

Most research indicated that the degree of relationship materiality was $p > 0.005$. (almost 90 percent of all values). This suggests that there aren't any meaningful statistical relationships between the analyzed firms' sizes, how long they've been in business, and the defined components of sustainable management. Due to a low r-indicator Pearson's (below 0.05; values are shown in brackets in the table), the remaining 10% of the relationships may be disregarded as having no bearing on the formation of the phenomena under study. There are reasons to reject the H2 and H3 hypotheses since the findings of the 2 test are statistically irrelevant. It is feasible to presume that there isn't any relationship between the variables investigated. The level of the appraisal of relevance of the specific SSCM (Sustainable Supply Chain Management) elements is unaffected by the number of employees or the length of time that an organization has been operating on the market.

The non-parametric Chi-square independence test is utilized at the chosen significance level of p 0.005 in order to confirm the significant relationships between the sample data sheets and the specific SSCM sections. A Pearson's r correlation coefficient is also calculated to see whether there is a linear relationship between these pairs. Its value might be between 1 and 1, with a value closer to unity indicating a larger degree of reliance between the variables under study (Table 2).

Research Question 2 (RQ2): What is the Relationship Between Sustainable Logistics Activities in Context of Corporate Social Responsibility in the Industrial Sector? [11]

Resources (materials, people, energy, machinery, and facilities), procedures, and outputs are crucial inputs for the construction of sustainable logistics in business (products,

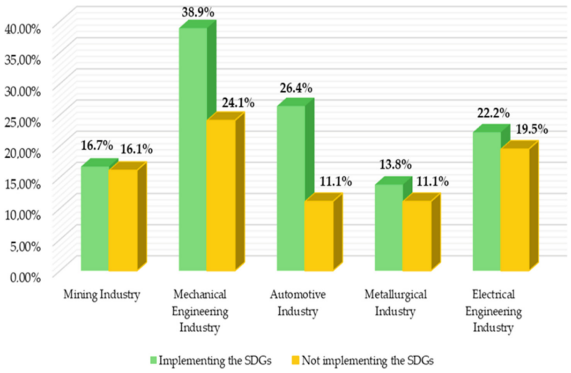

Fig. 2. The data visualization of SDGs implementation in selected industry sectors

Table 2. Relationships between the Sample Features and Particular SSCM Areas.

Dependent Variables	Independent Variables	The Value of the Two-Tailed Significance Level *p*	The *r*-Pearson Correlation
Business Elements in Sustainable Supply Chain Management			
Common clear vision of supply chain management	Operating period	0.045	−0.102
Exchange of production information on a regular basis, e.g., through sales and operations planning meetings	Employment size	0.014	0.126
Environmental Sustainability Elements in Sustainable Supply Chain Management			
Environmentally-friendly production processes	Operating period Employment size	0.022 0.007	0.117 0.137
Acting towards reducing the amount of waste	Operating period	0.008	0.135
Engaging in production processes free from harmful substances emissions	Operating period	0.007	0.139
Social Aspects of Sustainability in Sustainable Supply Chain Management			
Applying the code of ethical conduct to employees and contractors	Position	0.017	0.122
Clearance of taxable income	Position	0.045	0.103

pollution, emission). An input-output analysis of environmental, social, and cultural factors needs to be completed since this will allow industrial enterprises to identify potential areas for process and product development.

Resources (materials, semi-products, human resources, etc.), energy, equipment, and accessories are inputs for sustainable logistics.

Products requested by clients (in best perspective, products with Slovakia's EVV ecolabel), detrimental environmental effects, and other outcomes of sustainable logistics (pollution, emissions, waste).

Sustainable logistics, in the context of corporate social responsibility, can have a number of benefits for a business or industrial sector. These benefits include cost savings, risk reduction, enhanced competitiveness, meeting customer requirements, and responding to public opinion. Additionally, incorporating sustainable logistics practices into a company's culture can also have a positive impact on competitiveness. Overall, sustainable logistics can provide a range of benefits that can help improve a company's competitiveness in various ways. (see Table 3).

Table 3. Contribution of Sustainable Logistics in Context of Corporate Social Responsibility in Industrial Enterprise.

Sustainable logistics in context of corporate social responsibility can improve competitiveness of an industrial enterprise in many ways	
Cost saving	▲ costs of energy and of raw materials ▲ costs of transport and manipulation ▲ costs of waste material treatment
Avoiding risk and damages	▲ eliminating of ecological accidents ▲ avoiding possible damages on the environments and people
Enhancement of competitiveness	▲ respecting requirements of customers and public (possible future customer's) on products with ecolabel and processes respecting sustainable development ▲ innovation of products and processes ▲ better flexibility in processes ▲ detection of new markets and possibilities
Improvement of firm culture	▲ improvement of firm image ▲ reliability and confidence of firm ▲ better personal qualification for employees ▲ better relationship to public and society neighbourhood ▲ better relation to products of enterprise

Sustainable supply logistics (green procurement) guarantees that the raw materials, components, and semiproducts needed for a production process are procured from suppliers in accordance with environmental and quality standards, and that there are opportunities to reduce energy usage. The best mode of transportation for the environment must be identified, and suppliers whose goods bear an eco-label and promote environmentally friendly shopping should be preferred.

Logistics for sustainable production. The goal of an industrial firm is to deliver its goods to clients in the appropriate time and quantity while maintaining suitable environmental, qualitative, and social standards. In order to account for the impact of processes and products on people and the environment, the entire transformation process in sustainable production should be analyzed in terms of logistics.

It is crucial to use the least amount of energy and materials possible during production, as well as best available techniques (BAT), which can reduce environmental risk. Other important considerations include avoiding unnecessary storage and transport, providing regular training for employees on how to handle hazardous materials, adhering to safety and health regulations, and managing a company's environmental and social policies.

References

1. Our Common Future [Access on 2022 July 25] http://www.un-documents.net/ocf-02.htm
2. J Education for sustainable development [Access on 2022,July 25] https://www.unesco.org/en/education/sustainable-development
3. Brown, H. James, The oxymoron of sustainable development, BioScience, 2015, pp. 1027–1029. DOI:https://doi.org/10.1093/biosci/biv117.
4. Patrick, Helena Fidlerova, Impact and potential of sustainable development goals in dimension of the technological revolution industry 4.0, 2020, DOI:https://doi.org/10.3390/en15103697

5. Apa itu SDGs [Access on 2022 July 24] https://www.sdg2030indonesia.org/page/8-apa-itu
6. VNR 2021 [Access on 2022 July 24] https://sustainabledevelopment.un.org/memberstates/indonesia
7. M.L Davis, D.A. Cornwell, Introduction to Environmental Engineering, 4th ed, McGraw-Hill, New York, NY, USA, 2006.
8. Sustainable development in engineering: a review of principles and definition of a conceptual framework http://gredi.recherche.usherbrooke.ca/wpapers/GREDI-0818.pdf [Access on 2022, July 25]
9. R. Venables, Civil Engineering - Jubilee River, (link is external)in Engineering for Sustainable Development: Guiding Principles, Royal Academy of Engineering, Dodds, R., and Venables, R., Eds., 2005, pp. 11–14.
10. S. Kot, Sustainable Supply Chain Managament in Small and Medium Enterprises, MDPI: Basel, Switzerland, 2018.
11. G. Hrdinova, P. Sakal, Fidlerova, Sustainable Logistics and it Role in Value Chain of Industrial Business with Context of CSR and CSV, Slovak University of Technology: Jeseník, Czech Republic, EU, 2012.