Interconnecting Science-Based Target with company supply chain to contribute climate action – lesson learned from Indonesia

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Abstract. Science-Based Target (SBT) has become popular since 2020 as a promising platform for reducing greenhouse gas emissions. Recent studies found that SBT diffusion in low- and medium-income countries remains unresponsive even in emission-intensive sectors. Setting realistic targets for aligning actions across each chain, planning and implementing targeting methods, and developing SBT governance to respond to stakeholder interests can influence the climate change response. This paper describes how the international supply chains influence Indonesian companies to apply SBT through the demand side. This paper will depict early initiatives and evidence with descriptives data that announce the Indonesian company's plan to achieve established SBT. The result shows that Indonesian company still rare to implement SBT and the initiatives begin when triggered by international demand on supply chain.

1 Introduction
Since green and growth have become a widespread initiation to adding value in sustainable development, the linkage between a company's innovation and green business triggers the supply chain management process [1]. Aligned with that initiation, the Paris Agreement greenhouse gas (GHG) emission reduction commitments strengthen the company strategy to transform the Supply Chain Management (SCM) process greener in order to maintain their business. In that context, the Science-Based Target (SBT) platform proposes methodologies to reduce the company's GHG emissions to face the company's climate action[2]. The hope is that SBT and other corporate climate initiatives will become empirical evidence to enforce climate policy [3].

SBT initiative (SBTi) was created to respond to the Paris Agreement commitment and provide tools, guidelines, and methodologies for the company to reduce the GHG emission targets set at the company level [4]. Recently, SBTi become a more expansive platform implemented in global companies, appealing to the academia's worldwide attention [5]. Nevertheless, the empirical evidence shows that low and medium-income countries face many obstacles, such as regulatory pressure, linking the chain in SCM, lack of government

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programs that support this initiative, and lack of assessment tools and methods for combating climate change. These limitations are also relevant in Indonesia and depict the low number of company voluntary movements to join SBTi. The purpose of this review is to observe why, and how many Indonesian companies participating in SBT initiatives for reducing GHG systematically.

According to the SBTi dashboard [https://sciencebasedtargets.org/target-dashboard], the number of Indonesia's companies that joined voluntarily in the initiative is 28, active status and committed the near term is 25 companies, 18 companies in net zero commitment, and only one company dealing with long-term commitment, two companies with approved targets, and only one company removed their commitment. Furthermore, based on the data, most are manufacturing companies (22 from 27); others are services companies (banking, hospitality, services, and real estate). Hence, interconnecting SBT and company supply chain management becomes essential to accelerate cleaner production practices and effectively contribute to climate action.

In order to adopt sustainability practices, manufacturing companies have some motivations, such as (1) stakeholder pressure [6], (2) concern for environmental and social impacts [7,8], and (3) gaining a competitive advantage [9]. They also manage their performance and take appropriate metrics to measure their sustainability action. The metrics also serve as a tool to monitor and evaluate sustainability performance. Measuring the quality and effectiveness of corporate climate disclosure and target setting has become more prominent as these strategies have become more widely adopted [10]. SBT become an appropriate metric Indonesian companies use to meet the Paris Agreement's goals to reduce the GHG emission targets set at the company level. One of the benefits of establishing ambitious environmental objectives is the facilitation of collaboration between prominent companies and governmental bodies. This collaboration aims to foster the advancement of low-carbon technologies through innovation while concurrently assessing and formulating new regulations that promote effective implementation [11].

2 Literature review

2.1 Science-based target

Implementing a science-based target (SBT) setting assists enterprises in establishing greenhouse gas (GHG) reduction objectives that align with a predetermined temperature threshold. According to the SBTi, targets implemented by corporations to mitigate greenhouse gas (GHG) emissions qualify as "science-based" when they align with the necessary level of decarbonization essential to limit the rise in global temperatures to below 1.5°C compared to pre-industrial levels [12]. The SBTi is a joint initiative from the World Wide Fund for Nature (WWF), the World Resources Institute (WRI), the UN Global Compact, and the CDP, first launched in 2014 [13].

The SBTi aims to engage the commercial sector in addressing climate change with an awareness of concern. Adopting SBT approaches can facilitate the implementation of the Paris Agreement's socio-political objectives and ensure its practicality for stakeholders not directly involved in the agreement. This action may be achieved by incorporating the most relevant and up-to-date scientific knowledge into decision-making. Implementing Science-Based Targets (SBTs) should be considered a fundamental aspect of everyday business practice when creating strategies to reduce greenhouse gas (GHG) emissions [4]. SBTi also supports that the private sector is leading in achieving net-zero emissions by implementing the Corporate Net-Zero Standard and the upcoming Net-Zero Standard for Financial Institutions [12]. The incorporation of SBTi into firm supply chain management has the potential to facilitate a just transition towards a low-carbon society.
The SBTi establishes global-level, sector-specific decarbonization pathways compatible with the International Energy Agency (IEA) 2°C scenario[14]. However, these pathways are only set for 13 aggregated global sectors without consideration of regional differences concerning technical capability, historical responsibility, resource endowment, and political environment. Hence, it is imperative to enhance the applicability of the SBTi framework by incorporating two distinct scientific domains: biophysical planetary boundaries[15], which encompasses a comprehensive understanding of the interrelated dynamics and comprehensive coverage of production and consumption patterns and intermediates demand-driven consumption-based accounting, which focuses on the products utilized by industries in the production of final consumer goods [9]. In the Indonesian context, the appropriate approach between the company supply-chain mechanism and the low-carbon measurement will be a priority to fulfill the global demand for final or intermediate products.

2.2 Company supply chain and greenhouse gas protocol

According to the Greenhouse Gas Protocol, the world's most widely used greenhouse gas accounting standard [16], we find the terms Scope 1, 2, and 3 emissions (Fig.1). That term enables companies to understand their entire value chain emissions and focus their efforts on the most significant reduction opportunities. Scope 1 addresses emissions resulting from sources that an organization possesses or exercises direct control over, such as the combustion of gasoline in its fleet of vehicles. Scope 2 covers the corporation's indirect emissions from producing purchased and utilized energy, such as electricity generation for buildings. Scope 3 concerns emissions that the company itself does not directly cause, nor are they a consequence of actions conducted by assets owned or controlled by the firm. Instead, these emissions are attributable to entities the company bears indirect responsibility along its value chain [17]. The current standard provides obvious definitions for Scope 1 and 2 emissions but lacks detailed quantification and benchmarking methods for indirect emissions /Scope 3 [18]. When assessing specific measures or technologies to mitigate greenhouse gas (GHG) emissions, it is crucial to prioritize actions with the most significant potential to address both direct and indirect emissions [19].

Scope 3 emissions were, for the first time, taken into account in analyzing drivers and trends on a national level in the Intergovernmental Panel on Climate Change (IPCC) [20]. The focus on Scope 3 has only emerged in recent years, despite earlier studies indicating that the most significant emissions increase occurred inside Scope 3 [18]. Why? Because the footprint of a product across its supply chain will form the footprint of global consumption. Moreover, the most emissions increase occurred in developing countries. Therefore, indirect supply chain targets must align with carbon mitigation scenarios to gradually reduce the global upstream Scope 3 emission intensities. Nevertheless, implementation of this agenda has been limited due to the difficulty in obtaining emissions data from vendors and customers [9].

Scope 3 emissions encompass the emissions linked to using manufactured capital to produce energy and products. This scope includes coal mines, vehicles, roads, and buildings emissions. In the green SCM context, emission which does not directly cause by itself must be reduced with the green procurements. Moreover, the company has an opportunity to minimize GHG emissions by electing green manufacturing processes. Within the context of the entire supply chain, a formal request to the logistics supplier, pressing them to utilize vehicles powered by renewable energy sources, will also be a way to minimize GHG emissions.
Fig.1. Scope 1,2,3 definition [17].

3 Method
This exploratory was derived from an elaborate analysis of prior studies on SBT, specifically focusing on data about Indonesian enterprises participating in the SBT initiative. Additionally, the study considered the efforts taken by these companies to reduce greenhouse gas emissions, with a particular emphasis on the perspective of supply chain management. The data of members’ SBT can be accessible at the following URL: https://sciencebasedtargets.org/target-dashboard.

4 Result and discussion
The manufacturing industry is responsible for substantial carbon emissions released into the environment. As a result, manufacturers face considerable pressure from various stakeholders to address sustainability concerns and actively contribute to achieving the United Nations Sustainable Development Goals. In manufacturing industries, it is crucial to prioritize activities that generate the highest value, and doing a materiality analysis can aid in this process. Backcasting and materiality analysis are valuable methodologies for establishing quantifiable objectives, and these goals must receive scientific validation through the SBTi. Using the backcasting method with the SBT methodology will enhance the company's supply chain by prioritizing commitment to the sustainability platform.

The footprint of a product is the sum of the footprints of the processes along the product's supply chain. These processes may take place in different geographical areas. The operational footprint of a company is the sum of the footprints of its operations. There are always several entities playing a role in causing a footprint: the investors, the suppliers, the recipients, and the regulators. Hence, the responsibility for moving toward a sustainable footprint will be shared among them. Exploring how we can better institutionalize full supply chain responsibility is one of humanity's significant research challenges toward achieving a sustainable future [19].

Upstream activities include operations relating to the initial stages of producing an intermediate good or service, such as material sourcing, material processing, or supplier activities. For example, for a textile manufacturing company, "upstream emission footprint" refers to the emissions of all material extractions, conversions, processing, and delivery of inputs required to produce textiles, including emissions related to services. This footprint measurement does not include the end-use of goods and services the company sells. For the illustration of upstream and downstream activities in different geographical areas, the
interconnecting between SCM Indonesian company and the global company depicted in Fig.2 will be an example.

**Fig. 2.** Interconnecting between SCM Global Company and Indonesia Company.

This paper concerns a case study within the textile industry relevant to the Indonesian context. The analysis of the SBT target dashboard for 2023 reveals that the sectors demonstrating the most proactive initiatives are textiles, clothes, footwear, and luxury goods. The information mentioned above is supported by the observation that 8 of the 27 enterprises examined are actively involved in sustainability initiatives, as illustrated in Fig.3, which are in the textile, clothes, footwear, and luxury goods sectors. All processes involved in the extraction, conversion, processing, and transportation of raw materials necessary for textile production, as well as the emissions associated with these activities, were carried out by Indonesian companies. Integrating cleaner production practices and adopting sustainable fuel sources, including sustainable biomass, were mandatory components within the supply chain management framework (SCM). The commencement of the procurement process for green supply chain management (SCM) is motivated by the demand triggered by global firms adopting green SCM methods.

**Fig. 3.** Indonesian companies taking action in SBTi 2023.

5 Conclusion

Based on early evidence of applying SBTi in SCM at Indonesian companies, we can conclude that we have to raise technical and policy interventions on the supply and demand sides. Energy efficiency, cleaner production, green procurement, using renewable energy in the
entire supply chain, and aligning actions across each chain will be essential actions to support the climate change response.

References