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National and voluntary sustainability standards: Convergence or divergence? Insights from Indonesian agri-food export sectors

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ABSTRACT

Voluntary sustainability standards (VSS) are market-based mechanisms promoting sustainability in agri-food value chains. VSS can create challenges related to compliance, market access and acceptance for producers in emerging countries. To address this challenge, some emerging countries have established national sustainability standards (NSS). This paper compares VSS (Roundtable on Sustainable Palm Oil and Rainforest Alliance) and NSS (Indonesian Sustainable Palm Oil and Lestari Tea Certification) in Indonesia's palm oil and tea sectors on three dimensions: substantive requirements, enforcement procedures, and drivers for adoption. The analysis shows that substantively, while VSS have stricter requirements than NSS, the latter increasingly converge toward VSS. Procedurally, both systems mainly rely on audits for compliance. In term of adoption, VSS are mainly adopted to access export markets, while NSS adoption is driven primarily by regulatory compliance. The implications of the findings are discussed with a specific focus on the potential complementarity between VSS and NSS.

1. Introduction

International trade in agricultural and food products has more than doubled during the past three decades (FAO, 2024). For many emerging countries, agri-food exports constitute crucial sources of income and foreign exchange, with the potential to alleviate poverty and reduce inequality (Imai et al., 2015; van Berkum, 2021). However, the global agri-food system contributes substantially to environmental and socio-economic challenges such as greenhouse gas emissions, resource depletion, deforestation, biodiversity loss, child labour, human rights violations, and unfair wages (Foley et al., 2011; Pendrill et al., 2022). Voluntary sustainability standards (VSS) emerged a response to these challenges, and are increasingly used as private market-based governance mechanisms to improve sustainability in global agri-food systems (Beghin et al., 2015; Marx et al., 2024). VSS set sustainability requirements that cover social, economic, and environmental aspects of production, which economic actors along value chains can voluntarily commit to (UNFSS, 2013). VSS have expanded rapidly over the past three decades, with a coverage reaching at least 9 % of global cropland in 2022, with the highest shares of certified production areas in cocoa (31.4 %), coffee (15.2 %), tea (13 %), and palm oil (12.4 %) (Kemper et al., 2024).

VSS are predominantly established by stakeholders from high-income countries (HIC), including corporate entities, civil society actors, or multistakeholder platforms, yet primarily target producers in emerging countries, mainly in tropical agricultural production (Kemper et al., 2024; Lambin and Thorlakson, 2018; Schouten and Bitzer, 2015; Tayleur et al., 2017). This generates several shortcomings. First, the inclusion of local or national stakeholders from emerging countries in decision-making and standard-setting is limited. This can generate a lack of fit between VSS requirements and local or national contexts, as well as socio-political resistance towards VSS (Bennett, 2017; Fiorini et al., 2019; Nadvi, 2008; Nava and Tampe, 2023; Peña, 2014; Schleifer et al., 2019). Moreover, producers in these countries traditionally face significant challenges in adopting and implementing VSS due to limited financial resources and technical expertise, and poor institutional frameworks and regulatory capacities (Bush et al., 2013; Renckens and Auld, 2019; Schleifer et al., 2019; Starobin, 2021; Tampe, 2021).

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As a response to the shortcomings of VSS, emerging countries are increasingly developing their own national standards (Hidayat et al., 2018; Schouten and Bitzer, 2015). These National Sustainability Standards (NSS) may be better suited to local economic, social, and environmental contexts, which would facilitate their adoption comparatively to VSS. They might be more inclusive in their governance approach, as they are developed by national stakeholders. NSS can enable emerging countries to pursue sustainable development on their own terms and facilitate norm internalization. They can complement VSS by providing a stepping stone for producers to transition towards more sustainable production systems and build their capacity to subsequently engage with more stringent VSS (Macdonald, 2020; Sippl, 2020; Sun and van der Ven, 2020; Bloomfield, 2020; Brandi, 2021; Choiruzzad et al., 2021; Wijaya and Glasbergen, 2016). Hence, complementarity between NSS and VSS might generate two interrelated outcomes. First, by offering a lower entry threshold (in terms of stringency of standards and compliance requirements), NSS might offer producers which would otherwise be excluded from sustainability standards dynamics an opportunity to get certified and close the gap with more stringent international standards, to which they can transition later. Second and related, this might in turn lead to increased overall adoption of (international and national) standards, which is necessary to scale up potential effects of sustainability standards (Marx et al., 2024).

While a large body of literature has investigated VSS, focusing on institutional design, adoption dynamics, and sustainability impacts (Bennett, 2017; Depoorter and Marx, 2023; Dietz et al., 2018; Fiorini et al., 2019; Marx, 2014; Marx et al., 2022; Meemken, 2020), research on NSS has been limited. In particular, studies are lacking on the design of NSS, how they compare to VSS, and whether both instruments converge or diverge over time; as well as on whether NSS are able to overcome the adoption challenges that VSS pose. Such an analysis is however necessary to provide insights on the potential for complementarity between VSS and NSS to address key sustainability challenges. Complementarity refers to the extent to which NSS and VSS fulfill different but mutually reinforcing functions within sustainability governance, for instance by targeting different groups of producers or by enabling sequential pathways into sustainability certification. Convergence, concerns the degree to which NSS and VSS become aligned over time in their substantive requirements. While convergence is not a prerequisite for complementarity, it may strengthen it. If NSS and VSS gradually align in their substantive standards while reaching different adopter groups, NSS may function as an entry point that facilitates subsequent transition toward more stringent international standards. Such dynamics could increase the overall adoption of sustainability standards, which is becoming increasingly important in a context in which national and international standards are integrated in other policy instruments such as regulatory measures regulating sustainability dimensions of imports (Schleifer, 2023; Renckens, 2020), sustainable public procurement (Marx, 2019), trade agreements (Brandi and Morin, 2023) and other ‘smart mix’ policies (Brandi, 2021; Lambin et al., 2014; Lambin and Thorlakson, 2018; Schleifer and Fransen, 2024). Recent trade agreements exemplify this importance. The Comprehensive Economic Partnership Agreement between the EFTA States and the Republic of Indonesia (2018) allows for tariff differentiation between palm oil products based on certification which currently is implemented by Switzerland (as an EFTA state) through reference to *inter alia the* Roundtable on Sustainable Palm Oil (RSPO) (Swiss, 2021). Similarly, the recently concluded European Union-Indonesia Comprehensive Economic) (CEPA) includes a Protocol on Palm Oil and sustainability which explicitly recognizes the role of the Indonesia Sustainable Palm Oil standard (ISPO) in sustainable palm oil production and includes commitments to strengthen ISPO as a sustainability governance tool.

This paper aims to fill this gap and analyzes the complementarity between NSS and VSS by comparing them along three dimensions. First, we analyze the extent to which VSS and NSS differ in their sustainability requirements (substantive dimension). To systematize this comparison, we develop a Sustainability Standards Index (SSI) on which we score both VSS and NSS based on their inclusion of a set of social, economic, environmental, and governance standards. We also examine changes in these requirements over time to reveal convergence or divergence between VSS and NSS. Second, we compare how VSS and NSS operate and which actors are involved in developing and implementing their standards (procedural dimension). Finally, we explore the differences in motivations for and barriers to adoption between VSS and NSS, both for large firms and for smallholders (adoption dimension).

We conduct a case study of VSS and NSS in Indonesia. In particular, we focus on the palm oil and tea sectors as Indonesia is the largest exporter of palm oil in the world and the tenth largest exporter of tea (FAO, 2024). Both sectors are covered by VSS, mainly the RSPO for palm oil and the Rainforest Alliance (RA) for tea, as well as NSS, including ISPO for palm oil and Lestari for tea. This allows us to compare VSS and NSS in the same context and across two sectors. By examining these cases, the study contributes to a deeper understanding of how VSS and NSS interact and their potential to complement each other in addressing sustainability challenges.

The paper proceeds as follows: section 2 provides background information on VSS and the emergence of NSS in the agri-food sector. Section 3 introduces an analytic framework and literature review to compare VSS and NSS while section 4 describes the case study, data and methods. We present the results in section 5. We reflect on these results and their implications for sustainability governance in section 6. Section 7 offers a conclusion and policy recommendations to enhance sustainability governance, especially in Indonesia's agri-food sector.

2. Voluntary and national sustainability standards

2.1. VSS in the agri-food sector

VSS outline social, economic, and environmental requirements that private actors can voluntarily adopt to enhance their sourcing strategies or improve production and processing practices (UNCTAD, 2022). VSS address critical sustainability concerns, such as deforestation, biodiversity loss, labour rights, and community welfare, by creating incentives for producers, including facilitating market access, generating price premiums, and guaranteeing minimum prices for sustainably produced goods or services (Auld et al., 2008a,b; Estrella et al., 2022). VSS play a crucial role in integrating sustainability into international trade by setting benchmarks for responsible production and reducing transaction costs (Chaturvedi et al., 2021).

The number of VSS has increased sharply since the end of the 1990s, as illustrated in Fig. 1. The proliferation of VSS in the early 1990s has been driven by various socio-economic and political factors including consumer demand (O'Rourke, 2012), shareholders' and stakeholders' expectations (Gereffi et al., 2001; van der Ven, 2019), political support (Rickenbach and Overdevest, 2006), and demand by multinational enterprises (Loconto and Fouilleux, 2014).

While VSS are present in a wide range of sectors, including jewelry, electronics, tourism, textiles, and mining, they are most prevalent in the agri-food sector, as illustrated in Fig. 1. The agri-food sector has witnessed a significant expansion in the adoption of VSS, driven by the need to address sustainability challenges and enhance market competitiveness. Most prominent examples of globally active VSS in the agricultural sector include Organic, Rainforest Alliance, RSPO, GlobalG.A.*P. and* Fairtrade International.

Fig. 2 depicts the global certified production area (in million ha) as well as the share of certified area in total production area for seven key tropical agricultural commodities in 2018 and 2022. For both measures, we provide minimum and maximum estimates for each commodity. The minimum estimates offer conservative figures, accounting for the possibility of multiple certifications for a single area and assuming full overlap across VSS. Maximum estimates assume no overlap between VSS. Certification trends vary across crops. Certified banana area and

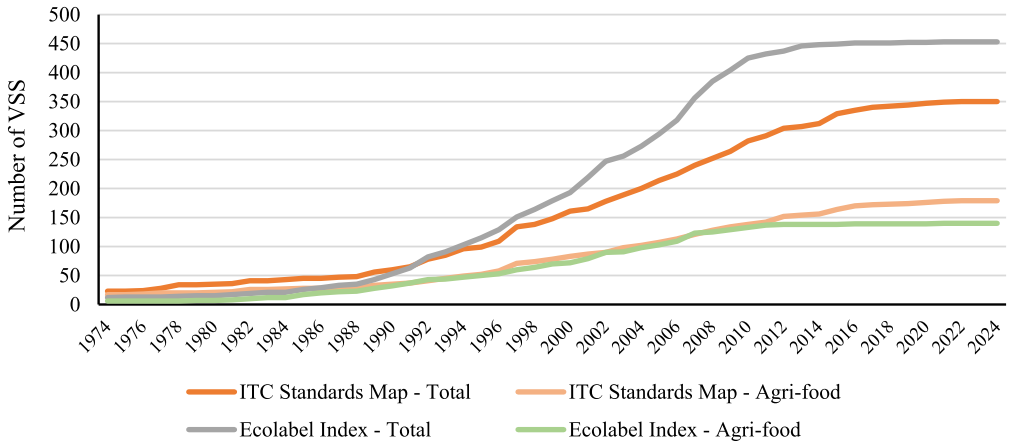

Fig. 1. Evolution of the number of VSS, 1974–2024, in general and in the agri-food sector. Data obtained from the ITC Standards Map (https://standardsmap.org/en/identify) and the Ecolabel Index (https://www.ecolabelindex.com/).

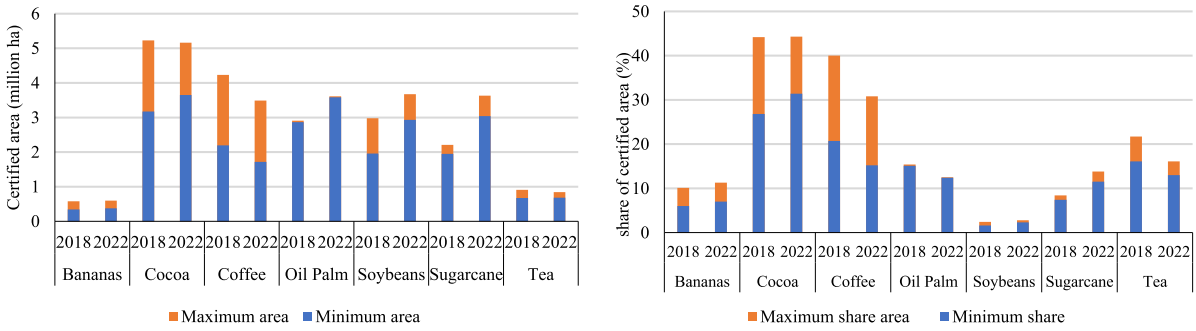

Fig. 2. Global certified area (million ha, left panel) and share of certified area in total production area (%, right panel) in 2018 and 2022 for the most certified commodities. Maxima and minima assume no overlap in certified area between different standards and full overlap, respectively. Based on data from Kemper et al. (2024).

share increased, driven by strong demand in European and North American markets. Cocoa also experienced growth, supported by corporate initiatives, consumer awareness, and regulatory frameworks in consuming countries, though the maximum certified area declined slightly. In contrast, coffee saw a decline in both certified area and share, primarily due to a drop in 4C certification. Palm oil's certified area expanded, yet its share declined because total global cultivation increased at a faster pace. Soybean certification grew by over 60 %, with RTRS certification reaching over 2 million ha, although it still only represents a small share of total global area. Sugarcane certification more than doubled under Bonsucro between 2018 and 2022, driven by growing demand from the food and beverage sector and regulatory developments such as the European Union Renewable Energy Directive, adopted in 2023 recognizing Bonsucro certification as a means to verify that sugarcane exports comply with the directive's requirements (Cezar et al., 2025). Finally, tea certification showed only increases in minimum area, while the maximum area and share declined, as certified tea remains largely export-oriented and is rarely consumed in producing countries (Kemper et al., 2024). This highlights the significant role of VSS in tropical commodity sectors, particularly in facilitating trade between emerging countries as producers and HIC as importers.

Most VSS are developed by stakeholders in HIC but are predominantly implemented by producers in emerging economies, particularly within tropical commodity sectors (Kemper et al., 2024; Tayleur et al., 2017), which has generated several challenges. In terms of the substance of their requirements, this has often resulted in a lack of alignment with local contexts (Nava and Tampe, 2023). Moreover, governance processes within VSS are criticized for being dominated by HIC stakeholders, thereby limiting the participation and influence of local producers and local stakeholders in decision-making (Bennett, 2017; Schleifer et al., 2019). Additionally, barriers to adoption, such as the high costs of compliance and certification, disproportionately impact smallholder producers and other vulnerable actors, exacerbating existing power imbalances in global value chains (Bush et al., 2013; Tampe, 2021). To address these challenges, some governments have explored opportunities to create National Sustainability Standards (NSS).

2.2. *The emergence of NSS*

NSS are emerging as new tools for promoting sustainable development in emerging countries. NSS remain largely absent from VSS databases such as the ITC Standards Map and the Ecolabel Index Database, and no comprehensive databases on NSS currently exist. Marques and Eberlein (2021) argue that governments in emerging countries are increasingly integrating sustainability standards by formulating NSS that align with their specific contexts and strategic interests. This move reflects a desire to assert greater national control over sustainability practices, often in response to the dominance of VSS set by HIC that may not adequately reflect the specific regulatory, economic, and social context of producer countries (Strambach and Surmeier, 2018; Thorstensen et al., 2024; van der Ven et al., 2021). Similarly, Schouten and Bitzer (2015) observe that NSS in agricultural value chains are driven by the desire of emerging economies to enhance inclusiveness and ownership over sustainability initiatives. The development of NSS allows emerging economies to address context-specific environmental and social challenges while maintaining competitiveness in global markets (Sun and van der Ven, 2020).

Examples of NSS from emerging economies include the ISPO and the

Malaysian Sustainable Palm Oil (MSPO) standards, developed in response to the dominance of RSPO, the leading global palm oil VSS, to provide locally tailored sustainability frameworks for palm oil production (Brandi, 2021; Hospes, 2014). Similarly, Brazil's Soja Plus program emerged as a response to the standards set by the Roundtable on Responsible Soy (RTRS), aiming to improve sustainability practices in soybean farming through capacity-building and compliance with national regulations (Schouten and Bitzer, 2015). The Sustainability Initiative of South Africa (SIZA) represents a bottom-up approach to ethical trade in South African fruit production. It was established to address specific social and environmental issues within the South African context, promoting fair labor practices and sustainable farming methods (Schouten and Bitzer, 2015). Trustea, a NSS in the tea sector in India, exemplifies how NSS can address local or national social and environmental issues that global standards may overlook, thereby improving inclusiveness and sustainability within the value chain (Bitzer and Marazzi, 2021). Another example are national GAP standards from emerging countries like Kenya, Malaysia, Mexico and Chile, benchmarked against GlobalG.A.P. to enhance market access for local producers while adapting to national contexts and supporting global value chain integration (van der Valk and van der Roest, 2009). Moreover, collaborations between NSS and VSS, such as the mutual recognition between Certified Minas Coffee (CMC) – a NSS in Brazil – and the global UTZ standard, have been explored to expand sustainable production and supply chains (D'Hollander and Tregurtha, 2016).

Several studies have started to explore the relationship between VSS and NSS, raising questions on whether they act as complements or as competitors (Brandi, 2021; Choiruzzad et al., 2021). However, empirical studies are lacking on whether VSS and NSS have potential for complementarity by assessing the extent to which they differ or align.

3. Analytic framework and literature review

We compare NSS and VSS on three dimensions, including a substantive dimension, a procedural dimension, and an adoption dimension. First, to compare VSS and NSS substantive standards, we develop a Sustainability Standards Index (SSI), as detailed in Section 4.2. The SSI allows us to assess and compare the stringency and scope of VSS and NSS. We developed the SSI framework by drawing from the literature, including Dietz et al. (2018), Holvoet and Muys (2004), Fiorini et al. (2019), Depoorter and Marx (2023) and ITC-Standards Map (2024). Following this, we identified a comprehensive set of regulatory topics and indicators commonly addressed by both NSS and VSS. These topics were grouped into four categories: environmental, social, economic, and governance. As further detailed in Appendix 1, environmental indicators include topics such as prohibitions against destroying primary forests, prohibitions against burning to prepare land, obligations to protect High Conservation Value (HCV) areas, and environmental impact assessments, among others. Social indicators encompass topics like ensuring minimum wage, freedom of association, non-discrimination, housing for workers, occupational health and safety, and community relations. Economic indicators cover management plans, Good Agricultural Practices (GAP) implementation, minimum price guarantees, price premium, and quality criteria, focusing on the economic viability of smallholders participating in certification schemes. Governance indicators include requirements related to compliance with local/national regulations such as land legality, business and environmental permits, social security for workers, as well as compliance mechanisms including sanctions, continuous improvement and third-party auditing.

Second, to compare VSS and NSS on the procedural dimension, we start from a stylized presentation of how VSS operate based on previous literature. The starting point is that a typical VSS scheme consists of structured relationships and responsibilities between various actors involved in developing standards and ensuring conformity of their adopters (Marx et al., 2024). Fig. 3 illustrates the process of VSS governance and implementation, beginning with the VSS organization responsible for defining and specifying sustainability standards that must be implemented by VSS adopters. The governance of VSS determines how standards are set and who is responsible for their oversight (Fiorini et al., 2019). VSS organizations vary in structure and leadership. Government-led VSS are usually set by the government with input from NGOs and producers, such as USDA Organic. NGO-led VSS can either be set by NGOs alone or through multi-stakeholder processes involving NGOs, companies, and producers, like Rainforest Alliance and RSPO. Company-led VSS are typically set by individual companies, such as the Unilever Sustainable Agriculture Code (Lambin and Thorlakson, 2018). The VSS organization typically sets requirements for accreditation and certification processes to ensure adherence to its standards. The accreditation body plays a crucial role in this top-down (ex-ante) conformity assessment by verifying the competence of certification bodies

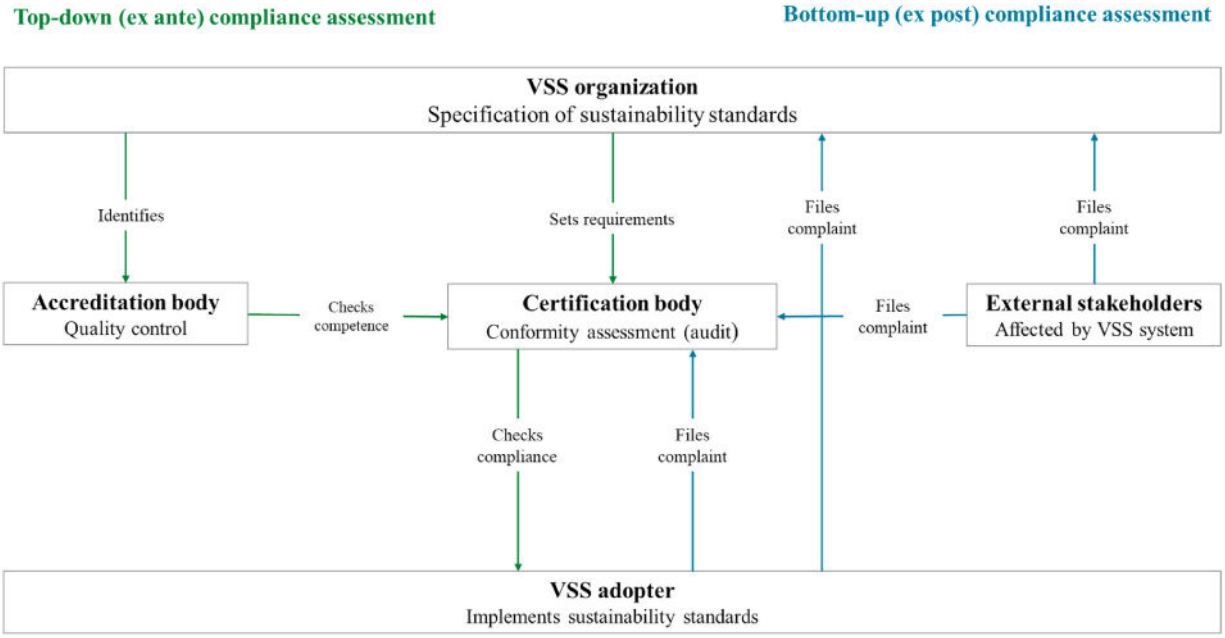

Fig. 3. Schematic representation of the procedural framework of the VSS certification system. Based on Marx et al. (2024) and UNCTAD (2022).

through quality control, ensuring they are capable of assessing compliance with VSS standards. The certification body conducts audits of VSS adopters to assess their compliance with the sustainability standards. VSS adopters, such as smallholder farmers or companies, implement these standards and undergo regular audits by the certification body to confirm adherence. Additionally, external stakeholders, including communities, workers, and environmental groups, represent those affected by the VSS system. They contribute to a bottom-up (ex-post) assessment by filing complaints if they observe any non-compliance or negative impacts related to VSS standards, which adds a layer of accountability and allows for feedback after certification. This ideal-type dual approach, combining proactive top-down and reactive bottom-up assessments, ensures a comprehensive framework for sustainability compliance within the VSS system. To understand the differences between VSS and NSS on this procedural dimension, NSS will be compared to this model of certification based on an analysis of documents and interviews (see Section 5.2.).

Third, to compare VSS and NSS on the adoption dimension, we start from a literature review on incentives for and barriers to VSS uptake and analyze the uptake of NSS in relation to these. Among the primary drivers of VSS adoption is enhanced market access, where compliance with VSS enables producers to enter international markets that demand sustainable practices, thereby improving market positioning and meeting consumer demand for ethical products (Galati et al., 2017; Henson and Humphrey, 2010; Lee et al., 2012). Certification can facilitate integration into global value chains and foster long-term buyer relationships, especially benefiting smallholders in developing countries (Ibnu et al., 2018; Pyk and Hatab, 2018). Another significant driver is economic incentives, such as the prospect of receiving premium prices for certified products, which can offset certification costs and lead to increased sales volumes (Faggi et al., 2014; Grabs, 2020; Lemeilleur et al., 2020; Oya et al., 2018; Piñeiro et al., 2020). Additionally, capacity building plays a crucial role, as VSS adoption often involves training and knowledge transfer that enhance technical skills and operational efficiency. This empowers producers to improve productivity and sustainability practices (Ibnu et al., 2018; Loconto and Fouilleux, 2014; Marx and Cuypers, 2010; Piñeiro et al., 2020). Environmental awareness is also a factor of adoption, prompting organizations to align with conservation goals by adopting eco-friendly practices promoted by certifications (Blackman and Rivera, 2011; Faggi et al., 2014; Galati et al., 2017; Marx and Cuypers, 2010). Regulatory compliance serves as another incentive, with certifications helping organizations meet legal requirements and reduce regulatory risks by providing structured frameworks for compliance (Auld et al., 2008a; Carter and Siddiki, 2021; Schleifer, 2013). Lastly, ethical considerations and human rights concerns drive businesses to adopt VSS to address labor issues, respond to societal pressures for ethical practices, and enhance corporate image (Bright et al., 2020; Marx, 2008).

Despite these motivations, some actors in emerging economies face significant challenges in adopting VSS. High implementation costs associated with certification exclude those with financial constraints (Brandi et al., 2015; Henson and Humphrey, 2010; Loconto and Dankers, 2014; Starobin, 2021). Limited stakeholder involvement from emerging economies in VSS governance leads to standards misaligned with local or national contexts (Levy et al., 2016; Renckens and Auld, 2019; Schleifer et al., 2019). A lack of incentives specific to emerging countries results in low participation rates, as benefits like price premiums are uncertain (Schleifer, 2013; Starobin, 2021). Moreover, insufficient training and technical assistance hinder compliance, as many smallholders lack the technical expertise required by sustainability standards due to inadequate capacity-building programs (Lee et al., 2012; Loconto and Dankers, 2014; Nava and Tampe, 2023).

4. Case study, data and methods

4.1. VSS and NSS in the Indonesian context

Indonesia is one of the major producers of tropical agricultural commodities, with several VSS active in these sectors. In 2021, Indonesia is the largest producer of palm oil globally, producing an estimated 45.1 million metric tons, of which 19.51 % was certified under RSPO. In the same year, Indonesia ranked as the fifth-largest tea producer, producing 137 thousand metric tons, with 11.95 % certified predominantly under Rainforest Alliance (RA), while Organic certification covered only 0.2 % of tea production. Furthermore, Indonesia was the third-largest cocoa producer globally, producing about 0.68 million metric tons, of which 9.80 % was certified primarily under RA certification and UTZ, with a smaller share certified as Organic. Lastly, Indonesia ranked as the third-largest coffee producer worldwide in 2021, producing approximately 786 thousand metric tons, with 13.70 % covered under 4C, Fairtrade, Organic, and RA (ITC- Standards Map, 2024; BPS-Statistics Indonesia, 2025; FAO, 2024).

Indonesia has developed several NSS including in the agrifood export sectors in response to these VSS. In the palm oil industry, ISPO certification serves as a mandatory standard to promote sustainable palm oil production and enhance the industry's global competitiveness (Choiruzzad et al., 2021; Hutabarat, 2017). In the tea sector, the Lestari certification has been introduced as a voluntary standard to improve environmental practices and social welfare among tea producers (Dallinger and Claasen, 2013). The proposed Indonesian Standard for Cocoa Sustainability (IS-Cocoa) and Indonesian Standard for Coffee Sustainability (IS-Coffee) aim to establish sustainability standards in the cocoa and coffee sectors (Schouten and Bitzer, 2015). For our analysis, we focus on the ISPO in the palm oil sector and Lestari in the tea sector because the proposed IS-Cocoa and IS-Coffee standards have yet to be effectively implemented and, as such, do not provide sufficient data for analysis.

ISPO certification is a mandatory NSS established by the Indonesian government established in 2009 and implemented in 2011 through Minister of Agriculture Regulation No. 19/2011 to promote sustainable palm oil production and enhance the competitiveness of Indonesian palm oil in the global market (Hutabarat, 2017). ISPO represented the government's reassertion of its authority in overseeing sustainability within the palm oil sector, challenging RSPO's dominance (Brandi, 2021; Giessen et al., 2016; Hospes, 2014). Furthermore, the creation of ISPO was driven by increasing global concerns over environmental degradation, deforestation, and social issues associated with palm oil cultivation. By aligning with Indonesia's legal framework, ISPO aims to ensure that palm oil production adheres to sustainable practices specific to the country's context (Wijaya and Glasbergen, 2016). Initially, ISPO certification was voluntary. However, the regulation was revised under Minister of Agriculture Regulation No. 11/2015, making it mandatory for firms while remaining voluntary for smallholder farmers. In the latest revision, ISPO certification became mandatory for all producers, including both firms and smallholders, as stipulated in Minister of Agriculture Regulation No. 38/2020 and Presidential Regulation No. 44/2020. It currently covers about 5.68 million hectares of palm oil production area, or about 36.7 % of the country's total production area (BPS-Statistics Indonesia, 2025; Indonesia Palm Oil Facts, 2024).

The Lestari Tea Certification was introduced as a voluntary NSS to promote sustainable tea production in Indonesia (Dallinger and Claasen, 2013). It was originally developed in 2008 and formally launched in 2011 by Business Watch Indonesia, Solidaridad, and the Sustainable Trade Initiative (IDH), in partnership with the Indonesian Tea Board (*Dewan Teh Indonesia*, DTI) (Kneepkens et al., 2016). Lestari certification

aims to enhance environmental sustainability, improve social welfare, and boost economic viability for tea farmers[1] and seeks to facilitate smallholder inclusion in international certification systems while expanding the market for sustainable tea (Kneepkens et al., 2016). Lestari Tea Certification was explicitly designed to reflect Indonesia's national context with a strong focus on promoting sustainable practices and empowering smallholder tea farmers who manage the majority of the country's tea plantations and who were struggling with complying with international VSS. In order to achieve this the program relies on training and capacity-building rather than only checking compliance.

The existence of both VSS and NSS in Indonesia has generated questions about whether they can be complementary, or whether they are competitors (Giessen et al., 2016; Wibowo et al., 2019). VSS and NSS can complement one another by covering different aspects of sustainability, reinforcing compliance through multiple certifications, or targeting different producer groups. For instance, producers may adopt NSS as a stepping stone towards VSS, or adopt both NSS and VSS certifications to meet national regulations and access international markets that demand higher sustainability standards. NSS may however compete with VSS for legitimacy and market acceptance. Producers may face challenges in meeting multiple standards, leading to increased costs and administrative burdens. Hence, to understand their potential for complementarity, we need to assess the degree to which they differ or not.

4.2. Methods and data

First, we compare the substantive stringency of RSPO, RA, ISPO, and Lestari and their evolution over time. To do so, we developed a Sustainability Standards Index (SSI). The SSI is a composite index comprising four primary sustainability indicators, themselves operationalized into a set of specific topics, covering 49 topics in total (all detailed in Appendix 1). The four indicators include: environmental (14 topics), social (19 topics), economic (8 topics), and governance (8 topics). Topics were selected mostly based on Dietz et al. (2018) and complemented by additional topics from Holvoet and Muys (2004), from the ITC Standards Map, and based on the Indonesian context.

To evaluate VSS and NSS stringency against each topic, we employed a scoring system based on Dietz et al. (2018) assigning scores ranging from 0 to 3 according to the rigor of each VSS or NSS requirement related to a regulatory topic. A score of 0 was assigned if the VSS or NSS did not contain any specific requirement addressing the regulatory topic; a score of 1 if the VSS or NSS included only weak requirements, signifying minimal regulation; a score of 2 for moderate requirements, reflecting a more substantial but not comprehensive regulatory focus; and a score of 3 if the VSS or NSS contained strong requirements, demonstrating rigorous and detailed regulatory standards for that topic. We assigned scores based on a systematic content analysis of standard documents, applying equal weighting across all topics. Detailed definitions of every topic and the criteria used to assign each score are provided in Appendix 1.

As per Equation (1), we then generate scores for each of the four indicators by aggregating the topic scores within that indicator and dividing it by the maximum possible value (3 x n topic) in each indicator, which corresponds to the case of a VSS or NSS that would score 3 on all topics within that indicator (highest stringency) and then multiplying by 100. This produces an indicator score that ranges from 0 to 100, facilitating comparability across indicators and over time.

$$I\_Indicators_i = \frac{\sum_i^n a_i\_Topics}{\sum_i^n a_i\_\ Max\ Value}\ x\ 100 \quad (1)$$

[1] More information about Lestari certification: https://sustainabletea.org/en/tentang-lestari/latar-belakang/.

Finally, we calculate the overall SSI for a single VSS or NSS by averaging the scores of these four indicators into a single composite index ranging from 0 to 100, as shown in Equation (2).

$$SSI = average\ (I\_Indicators_i) \quad (2)$$

We used different data sources to score the selected VSS and NSS on the SSI, as well as to assess the evolution in their substantive stringency over time in order to determine the extent of convergence or divergence between NSS and VSS. For RSPO, we use standards documents from RSPO (2007), RSPO (2013), RSPO (2018), and RSPO (2024). For ISPO, we refer to legal documents issued by the Indonesian Ministry of Agriculture, specifically from Indonesian Ministry of Agriculture (2011), Indonesian Ministry of Agriculture (2015), and Indonesian Ministry of Agriculture (2020). For tea, we refer to Rainforest Alliance (2020) and Lestari (2016) standards documents, as well as information gathered from interviews which also informed the analysis on the adoption dimension (as detailed below). The evolution analysis is feasible for RSPO and ISPO as they have undergone standards revisions; however, we refrain from conducting a similar longitudinal analysis for RA and Lestari due to the fact that we only have data for one point in time for Lestari. There is only one officially available version of the Lestari standard, and no publicly documented revisions or updates have been released since its introduction in 2016. As such, there is no historical evolution of the Lestari standard that can be assessed using the SSI framework, indicating that there is no (up- or downward) development in the Lestari standard, and hence no alignment of Lestari towards the RA standard.

Additionally, to analyze and compare VSS and NSS on the procedural dimension as well as on the adoption dimension, we conducted 31 semi-structured interviews (Table 1). These interviews involved a diverse group of stakeholders, including representatives from certification bodies, standard-setting organizations, commodity boards and associations, producing companies (both government-owned and private), smallholder farmer groups, academic researchers, and non-governmental organizations (NGOs). The interviews were conducted between September 2022 and February 2023 and sought to gain insights into how VSS and NSS schemes function within Indonesia, focusing on standard development and implementation processes on the one hand, as well as on the motivations for and barriers to adoption on the other hand.

5. Results

5.1. Substantive comparison of VSS and NSS

We compare VSS and NSS on the stringency of the substantive standards they develop. Fig. 4 presents the comparison between VSS and NSS, based on their respective scores in the SSI. Higher SSI scores indicate stricter requirements across sustainability dimensions. In the palm oil sector, RSPO scores significantly higher than ISPO. This gap underscores the broader scope of RSPO compared to ISPO in addressing sustainability. In the tea sector, a similar pattern emerges when comparing RA with Lestari certification.

Fig. 5 provides a detailed comparison of the SSI scores across the four

Table 1
Overview of 31 interviewed stakeholders.

Stakeholders	General	Palm oil	Tea
Central Government official	2		
Certification Body	4		
Standard-setting organization		2	2
Commodity board/association		3	1
Company (government-owned and private)		4	3
Smallholders Farmers Group		3	1
Academic		1	1
NGO		3	1

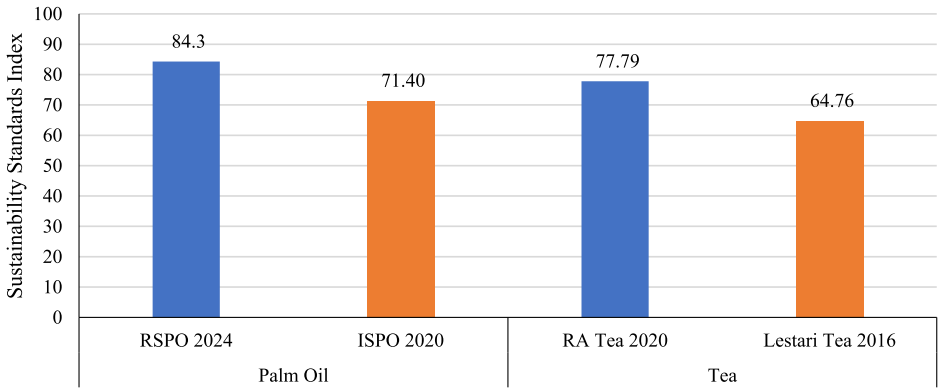

Fig. 4. Comparison of NSS and VSS in substantive dimension based on the Sustainability Standards Index.

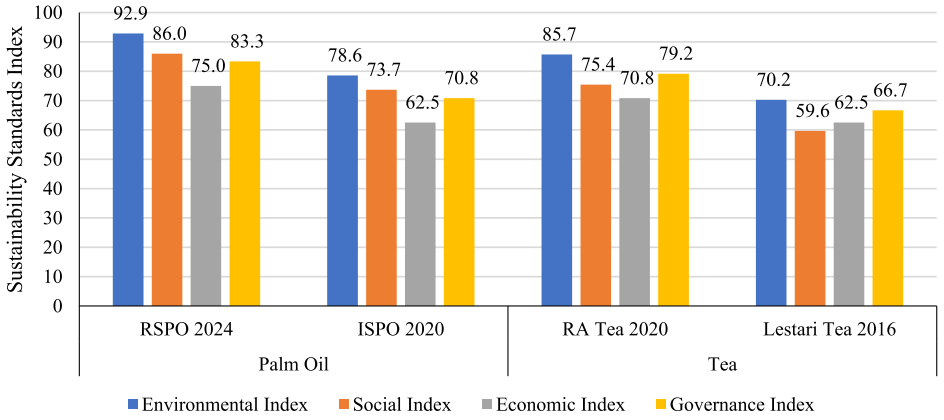

Fig. 5. Comparison of NSS and VSS in environmental, social, economic and governance substantive dimensions based on the Sustainability Standards Index.

indicators for both VSS and NSS. By breaking down the overall sustainability performance into these specific indicators, the figure offers a more nuanced view of how each standard addresses different dimensions of sustainability. In the palm oil sector, the RSPO 2024 scores highest on the environmental index, reflecting a strong commitment to environmental protection through stringent requirements on biodiversity, emissions, and deforestation. Score on the social indicator is also high, showing RSPO's emphasis on labour rights and community engagement. While score on the economic indicator is slightly lower, it still indicates a focus on promoting fair trade practices and market incentives. The score on the governance indicator reflects RSPO's robust enforcement and compliance mechanisms, which support consistent adherence to the standard's criteria. In contrast, ISPO 2020 shows lower scores across all indicators compared to RSPO. Its environmental indicator is moderate, and its social and economic indicators are also lower due to the absence of price premium criteria. The score on the governance indicator is comparatively lower as well.

In the tea sector, the RA Tea 2020 standard demonstrates high scores across indicators, with a particularly strong environmental stringency but lower than RSPO. Score on the social indicator reflects RA's commitment to ethical labour practices, and the economic and governance indices show balanced support for economic viability and compliance mechanisms, creating a holistic approach to sustainability. Lestari, 2016 scores lower across all indicators compared to RA Tea 2020. This trend reflects how VSS tend to incorporate more stringent and comprehensive requirements, often developed to meet global sustainability expectations. These standards typically emphasize environmental protection, social responsibility, economic incentives, and robust regulatory mechanisms, making them more suitable for companies seeking to meet international market demands for sustainable products. NSS, while providing a regulatory framework within Indonesia, appear to focus more on local compliance and may lack the same level of depth in addressing environmental, social, and economic sustainability comprehensively.

The comparison between the two VSS shows that RSPO consistently attains higher SSI scores than RA across all indicators. On the environmental dimension, RSPO's higher score reflects more clearly specified and binding requirements related to deforestation control, biodiversity protection, and peatland management, whereas RA adopts a more principle-based and adaptive approach. Differences on the social indicator arise from RSPO's more explicit formulation of labour, land-use, and community-related requirements compared to RA. Although economic scores are comparatively lower for both standards, RSPO attains higher economic indicator scores due to its verified production and supply-chain practices. Finally, RSPO's higher governance score is associated with its stronger emphasis on alignment with national legal and regulatory frameworks, while such regulatory anchoring is less prominent in the RA standard.

Fig. 6 illustrates the evolution of the SSI scores for the RSPO and ISPO over time, from 2007 to 2024. RSPO began with a moderate level of sustainability criteria, and its score shows a steady increase over the years, reflecting RSPO's ongoing efforts to strengthen its sustainability requirements. This trend is likely influenced by growing global expectations for rigorous environmental and social standards in palm oil production. ISPO, which entered later, initially had a lower level of stringency. However, its scores have gradually risen, showing substantial improvement around 2020 and then stabilizing at a higher level. These advancements suggest that ISPO has made significant updates to its criteria, likely responding to promote sustainable practices in Indonesia's palm oil industry. The overall trend in the figure shows that while RSPO has maintained a higher level of stringency, the gap between ISPO and RSPO has decreased over time, suggesting a degree of alignment in

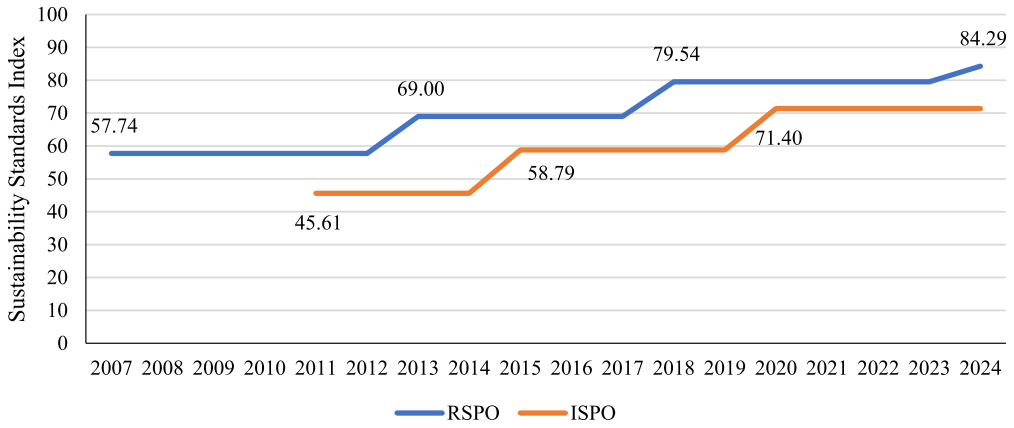

Fig. 6. Evolution of Sustainable Standard Index scores for RSPO and ISPO over time.

their sustainability criteria. This convergence may indicate that both standards are increasingly working towards meeting similar international sustainability expectations. The progressive increase in SSI scores for both standards highlights a growing commitment to stronger sustainability in the palm oil sector.

The evolution of the SSI for RSPO and ISPO is broken down for each indicator in Fig. 7. RSPO consistently outperforms ISPO, demonstrating higher stringency and steady improvements, reflecting its commitment to global sustainability standards. ISPO, though starting from a lower baseline, shows significant progress, especially in its 2020 version, aligning more closely with international expectations. While RSPO maintains a lead across all indicators, ISPO's gradual improvements highlight efforts to enhance its standards, narrowing the gap between NSS and VSS in response to growing demands for sustainable palm oil production.

5.2. *Procedural comparison of VSS and NSS*

VSS and NSS are compared on how they develop standards and assess conformity (procedural dimension). Fig. 2 showed a stylized version of how VSS, including RSPO and RA, operate. VSS certification schemes rely on a combination of top-down independent assessments and bottom-up stakeholder feedback, and are characterized by minimal government involvement in standard-setting and decision-making processes (Marx et al., 2024). Fig. 8 explains how ISPO certification schemes work. ISPO was set up by the Indonesian Ministry of Agriculture to establish all requirements and operated by the ISPO Commission. The Indonesian Accreditation Committee (KAN) first accredits certification bodies (CBs), ensuring they are competent to evaluate compliance with ISPO standards. The accredited certification body then assesses palm oil producers or certificate holders, for compliance through audits and, if compliant, issues an ISPO certificate. The final certification decision, however, must be approved by the ISPO Commission under the Ministry of Agriculture. Government involvement in ISPO is designed to enforce national laws and regulations within the palm oil sector, ensuring that producers meet both legal and sustainability requirements (Hospes, 2014).

ISPO and VSS share common objectives of promoting sustainable practices through structured compliance processes. They include accreditation mechanisms to ensure the competence of certifying bodies and the establishment of specific sustainability criteria or requirements that actors must meet. The most significant improvement in ISPO is its adoption of third-party certification in 2020, replacing the previous audit process conducted by the ISPO Commission. The ISPO certification scheme now involves third-party accreditation to ensure impartiality, credibility, and transparency in the certification process. This approach mitigates potential conflicts of interest that might arise if the government or other stakeholders directly assessed compliance. The ISPO framework also differs from general VSS certification schemes in several ways. First, while VSS schemes are often overseen by independent organizations that define standards and rely on external stakeholders for accountability, the ISPO process includes direct government oversight through the Indonesian Ministry of Agriculture and the ISPO Commission, adding regulatory approval as a critical step. Second, the ISPO is mandatory whereas RSPO is voluntary. Third, based on semi-structured interviews, both ISPO and RSPO certifications require legal compliance for adopters, though they differ in their documentation requirements. Specifically, ISPO mandates that companies submit a valid *Surat Tanda Daftar Usaha Perkebunan* (STDB)/Plantation business registration for cultivation and proof of clear legal land rights, whereas RSPO does not require these specific documents but instead expects evidence of both legal and customary rights for land utilization.

The Lestari certification scheme illustrated in Fig. 9, involves a structured certification process with roles assigned to multiple organizations. KAN is responsible for accrediting certification bodies (CBs), ensuring their competence to assess tea producers for compliance with Lestari certification. Accredited CBs conduct audits of tea producers, or certificate holders, who seek to achieve Lestari certification by adhering to sustainable practices. Upon compliance, the CB awards the certification, signaling the producer's commitment to environmentally and socially responsible practices. Oversight of CBs in the Lestari scheme is provided by the Lestari Foundation/*Yayasan Komoditas Lestari* (YKL), which receives reports and evaluates the certification processes conducted by CBs, thereby ensuring that the standards are maintained and certification integrity upheld. Certified producers also become members of the Lestari Association, which is managed by the Lestari Foundation and provides training to the association. The Lestari certification scheme shares structural similarities with VSS schemes, such as the use of independent third-party CBs and a layered approach involving accreditation, certification, and oversight bodies. However, unlike many VSS schemes that are managed by multistakeholder organizations and cover market globally, Lestari is specifically tailored to Indonesia's tea sector and operates under the Lestari Foundation with niche market in Indonesia tea market (Dallinger and Claasen, 2013).

After identifying the procedural framework of ISPO and Lestari tea standards, we compare VSS and NSS to understand their governance and procedural system in Table 2. VSS, such as RSPO and RA, are private market-driven initiatives, with leadership primarily from NGOs. These voluntary standards operate through multi-stakeholder governance frameworks, allowing broader participation from companies and producers. In contrast, the ISPO standard is a mandatory initiative led by the Indonesian government, reflecting a regulatory approach aimed at integrating sustainability within national regulations. Similarly, the Lestari tea standard, while voluntary, incorporates input from both NGOs and government entities. Despite differences in governance, both NSS and VSS rely on third-party audits for compliance verification,

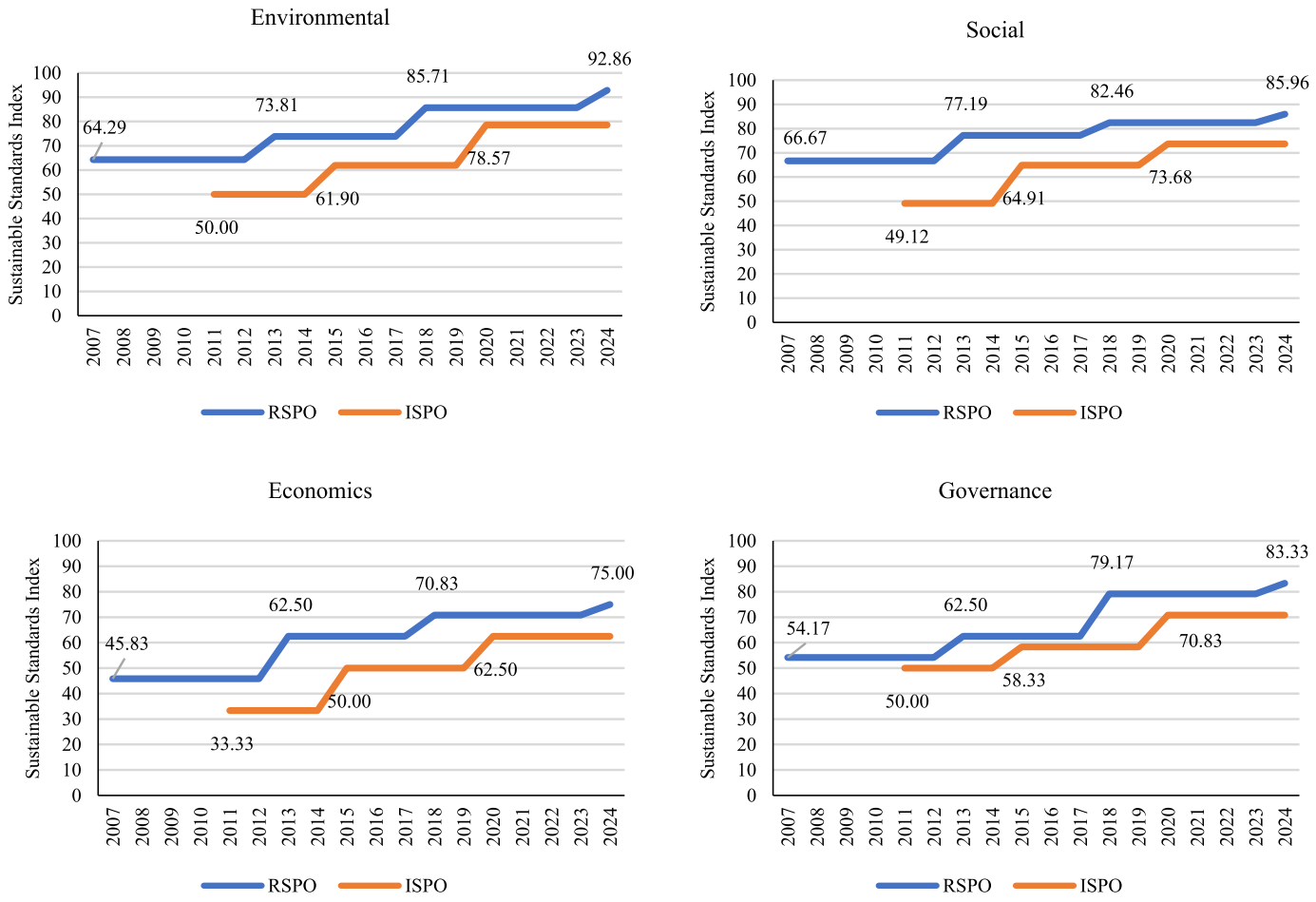

Fig. 7. Evolution of Sustainable Standard Index scores for environmental, social, economic and governance dimensions for RSPO and ISPO over time.

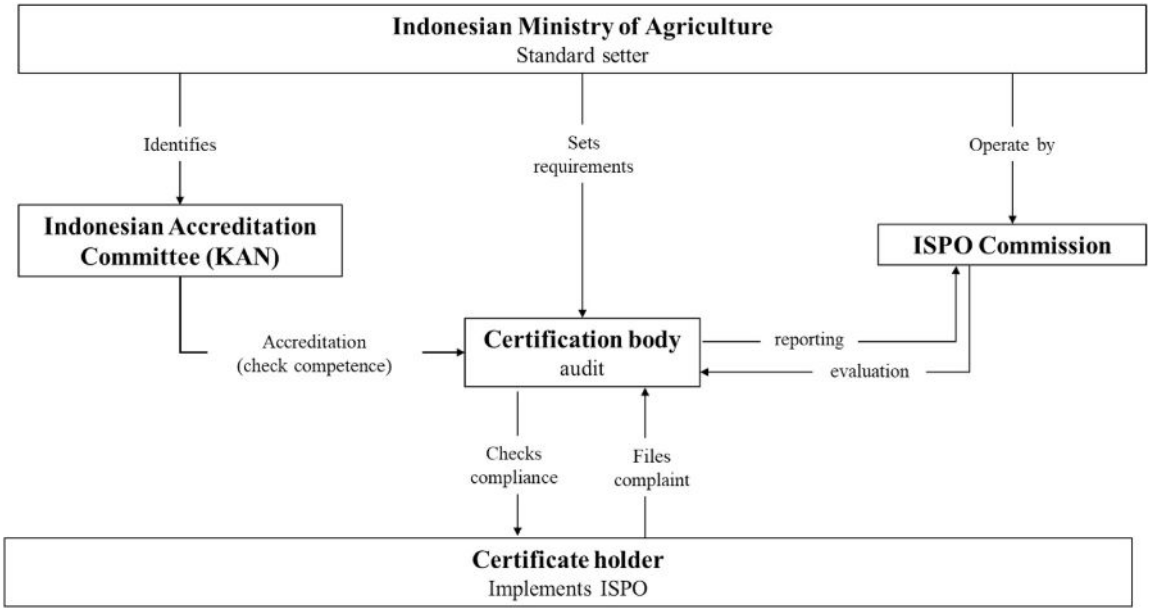

Fig. 8. Procedural framework of ISPO. Developed based on information from stakeholder interviews.

emphasizing the role of independent monitoring in ensuring adherence to sustainability criteria.

5.3. Adoption of VSS and NSS

Based on findings from semi-structured interviews, Fig. 10 provides insights into the motivations and barriers driving companies and

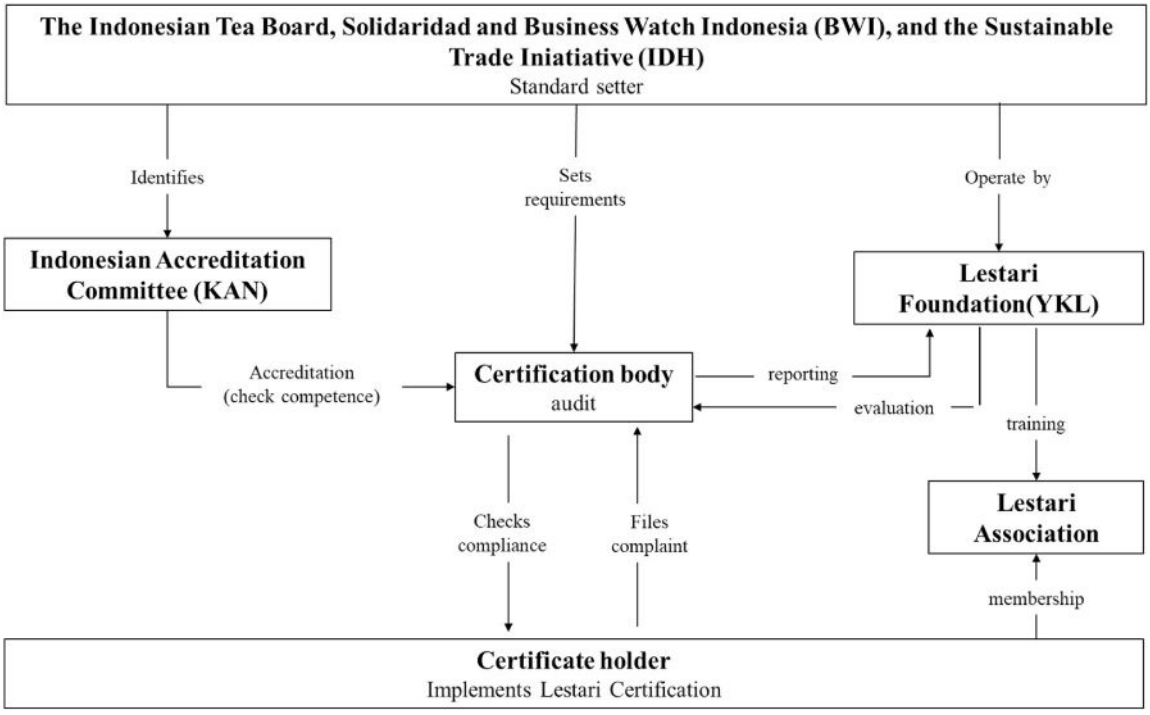

Fig. 9. Procedural framework of Lestari. Developed based on information from stakeholder interviews.

Table 2
Comparison of governance and procedural systems between VSS and NSS.

Type	Standard	Commodity	Initiation	Standard-setting	Governance	Audit process
VSS	RSPO	Palm oil	NGO	NGOs, companies & producers	Voluntary	Third party
	RA	Tea & others	NGO	NGOs	Voluntary	Third party
NSS	ISPO	Palm oil	Government	Government	Mandatory	Third party
	Lestari	Tea	NGO	NGOs with input from government & producers	Voluntary	Third party

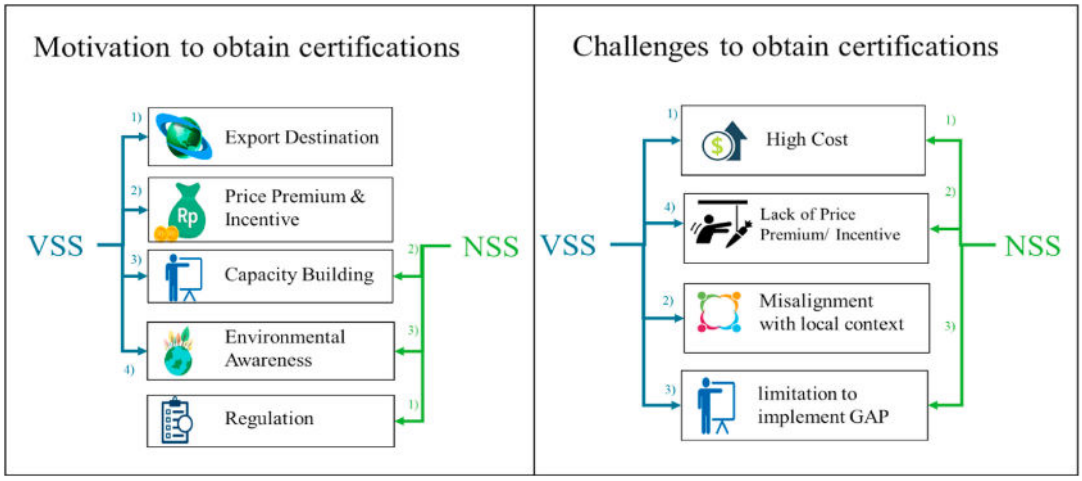

Fig. 10. Schematic representation of the motivations and challenges to obtain certification. Synthesis based on in-depth stakeholder interviews.

smallholder farmers in Indonesia to adopt VSS and NSS. This section delves into these motivations and challenges, highlighting the nuanced factors influencing adoption decisions for both VSS and NSS for companies and smallholder farmers.

The adoption of VSS among companies and smallholders' farmers is primarily driven by market access and price premium. For companies, certification acts as a gateway to higher-value markets, particularly those in HIC where VSS such as RSPO and RA often perquisites for entry. This access not only expands their market reach but also strengthens their competitive edge. This finding supports Galati et al. (2017) and Henson and Humphrey (2010), who emphasize certification as a gateway to global value chains. Smallholder farmers also see market access as a significant advantage of VSS as a means to secure stable market channels, often facilitated by partnering companies, which help

mitigate the uncertainties of agriculture income (Grabs, 2020; Ibnu et al., 2018). Price premiums also strongly motivate both companies and smallholders' farmers to adopt VSS, compensating for the significant investment require during the compliance process. Premium price for smallholders' farmers is not merely compensatory but the main driver for joining certification programs. The added income from premium prices directly improves their financial well-being, making certification a highly appealing option for increasing household income. This observation aligns with Faggi et al. (2014) and Oya et al. (2018), who indicate that receiving a premium price is a main driver for smallholder participation in certification programs. Companies also rely on these price premia to offset audit expenses and supply-chain adjustments required under VSS criteria (Brandi et al., 2015; Tampe, 2021).

Beyond direct economic incentives, capacity-building opportunities in certification schemes can attract adopters as it can enhance farmers' knowledge and skills in implementing sustainable practices, further increasing productivity and crop quality. This is in line with Loconto and Fouilleux (2014) and Marx and Cuypers (2010), who emphasize the importance of technical assistance in driving smallholder adoption. Finally, while economic rationales dominate, environmental awareness emerges as an additional motive for producers to adopt VSS. By following environmental standards prescribed by VSS, producers often notice tangible environmental benefits, reinforcing their commitment to adopt VSS (Galati et al., 2017; Faggi et al., 2014).

The motivations to adopt NSS are driven more by regulatory compliance and desire for knowledge transfer than by market incentives. With standards like ISPO being mandatory for companies, adoption is driven by the need to avoid penalties and ensure business continuity. This aligns with Carter and Siddiki's (2021) finding that regulatory compliance is the main driver for NSS adoption. For smallholders, ISPO compliance reflects not only regulatory necessity but also a sense of patriotism, as participation aligns with national efforts to promote sustainable practices. Lestari in the tea sector appeals to companies and smallholders through capacity-building programs that emphasize knowledge transfer and skill development (Rickenbach and Overdevest, 2006). These initiatives improve agricultural practices and productivity, creating long-term benefits despite the absence of financial incentives like price premiums. Furthermore, similar to VSS, environmental awareness is also a reason to adopt NSS.

While VSS can offer significant economic and market benefits, their adoption is not without challenges. High certification costs, encompassing audit fees, facility upgrades, and staff training, impose financial strain on companies. This echoes Brandi et al. (2015), who document how certification costs deter smallholder participation. These costs are compounded by the limited involvement of local stakeholders in the development of VSS, leading to misalignment with local regulatory and economic contexts. For instance, Indonesia's decentralized wage policies create disparities that complicate compliance with VSS labor requirements, increasing operational costs for companies. The lack of alignment of VSS in national contexts may further hinder adoption, as noted by Schleifer et al. (2019) and Renckens and Auld (2019). Smallholder farmers face additional barriers, such as limited access to information and technical support, particularly in remote areas. This lack of resources inhibits their ability to meet VSS standards. Compounding this is the lack of guaranteed price incentives, with many farmers perceiving an imbalance between the efforts required and the incentives provided, particularly under certifications like RA in the tea sector.

The adoption of NSS presents distinct challenges, primarily due to their positioning as regulatory obligations rather than market-driven certifications. Unlike VSS, NSS such as ISPO and Lestari do not offer access to international markets and price premiums. Some companies view ISPO as a baseline regulatory requirement rather than a value-adding certification, and in the case of Lestari, the absence of tangible benefits has led to reduced long-term engagement. Smallholder farmers face similar issues, as the lack of premium pricing limits the perceived value of compliance. This shows that a lack of financial benefits also leads to low motivation among companies and farmers, which is in line with Rodriguez et al. (2009) and Starobin (2021). Moreover, resource constraints and inadequate technical support hinder the implementation of GAP under NSS frameworks, creating inconsistencies in compliance. For companies sourcing from smallholders, additional investments in training and support are often necessary, further increasing costs and challenges associated with NSS adoption. This combination of limited incentives and resource gaps reinforces the perception that NSS are primarily regulatory tools rather than mechanisms for value creation.

6. Discussion

The comparative analysis of VSS and NSS in Indonesia's palm oil and tea sectors highlights significant differences. On the substantive dimension, VSS have higher SSI scores than NSS, primarily because they originated from and are shaped by transnational multi-stakeholder coalitions involving global NGOs, international retailers, and multinational traders who prioritize stringent environmental and social criteria to meet international market expectations (van der Ven and Barmes, 2023; Schleifer, 2023). In contrast, NSS emerged largely from national governments seeking to reassert sovereignty and regulatory authority over sustainability governance as well as introducing sustainability certification to smallholder farmers. This response was particularly shaped by perceptions that VSS represented high-income country standards that overlooked local development priorities, national interests and excluded smallholders (Wijaya and Glasbergen, 2016; Hospes, 2014). As a result, NSS tend to focus primarily on domestic legal compliance rather than comprehensive global sustainability requirements, which reduces their acceptance in international markets (Giessen et al., 2016). In the case of Indonesia, ISPO was developed as a national certification scheme intended to strengthen governance in the palm oil supply chain. However, it continues to face significant implementation challenges, including weak enforcement of standards, limited regulatory authority, and inadequate institutional capacity (Hidayat et al., 2018; Schleifer, 2023). Additionally, the Ministry of Agriculture incorporated many elements from RSPO during the development of ISPO, reflecting a broader pattern of domestic standards relying on pre-existing international frameworks, as described by Mayer and Gereffi (2010).

Despite their initially weaker substantive standards, NSS have shown gradual improvement, with increasing convergence toward VSS over time. This trend is evident in the evolving relationship between ISPO and RSPO. When ISPO was introduced in 2011, it triggered significant political tension, as the Indonesian government aimed to assert national sovereignty over sustainability governance and distance itself from what were perceived as HIC-driven standards (van der Ven and Barmes, 2023; Hospes, 2014). This shift led to immediate friction, exemplified by the withdrawal of the Association of Indonesian Palm Oil Plantation Companies (GAPKI) from the RSPO. GAPKI expressed dissatisfaction with RSPO's governance structure and policies, which it viewed as disproportionately burdensome for producers who bore most of the compliance costs (Hospes, 2014). However, the government's effort to replace the RSPO with ISPO did not succeed, largely due to the challenge of gaining international recognition for ISPO and implementing it effectively at the national level (Pramudya et al., 2018). As a result, ISPO began seeking opportunities for cooperation with the RSPO. This shift was marked by a joint study in 2013 that explored areas of complementarity between the two standards (Suharto et al., 2016). From 2016 onward, collaboration deepened through increased dialogue and the establishment of joint working groups involving Indonesian ministries, civil society organizations, and the RSPO Smallholder Working Group (van der Ven and Barmes, 2023; Brandi, 2021). These interactions laid the groundwork for further institutional reforms. In 2020, a significant revision of the ISPO standard included the adoption of third-party audit mechanisms, similar to those used by the RSPO to enhancing transparency, credibility, and alignment with VSS. Over time, the initially

adversarial relationship transformed into selective cooperation, facilitating convergence in substantive standards, especially in environmental aspects. Through these developments, RSPO and ISPO complement each other allowing more producers in standard-setting systems (increasing adoption) and aligning approaches which might enable transition from NSS to VSS.

The distinct political contexts and actor coalitions underlying VSS and NSS significantly influence how each standard is governed and adopted. VSS, driven by global market actors and multi-stakeholder involvement, encourage adoption primarily through market incentives such as premium pricing, improved market access, and corporate reputation enhancement (Schleifer, 2023; Hidayat et al., 2018). NSS, on the other hand, rely largely on mandatory regulatory compliance, anchored in government enforcement mechanisms and national policy alignment, motivating adoption through legal obligations and national interest narratives (Wijaya and Glasbergen, 2016; Hospes, 2014). Despite these differing adoption pathways, both VSS and NSS share a significant common barrier: the high cost of certification. This financial burden disproportionately impacts smallholders and producers with limited resources, often undermining broad-scale adoption and effectiveness of either system (Brandi, 2021). At the same time, these political-economic factors are discussed here primarily to contextualize observed differences in standard design, governance, and adoption, rather than to provide a depth political economy analysis, which remains beyond the scope of this study.

The comparison between NSS and VSS in Indonesian agrifood export sectors shows signs of potential for complementarity (Giessen et al., 2016; Wibowo et al., 2019). NSS, with their integration into national policy frameworks and inclusion of local stakeholders, address local challenges such as regulatory compliance and capacity building, fostering alignment with domestic priorities and potentially enabling South-South trade (Bloomfield, 2020). VSS, on the other hand, offer higher sustainability stringency, international market access, and global recognition, driving competitiveness on a global scale. These frameworks can complement each other if NSS focus on local adaptation and inclusivity while VSS enhance international credibility and market integration. However, NSS risk replicating VSS shortcomings such as exclusionary effects and the double cost of dual certifications for producers navigating both standards. This dynamic emphasizes the need to harmonize national and international standards in order to leverage the respective strengths of VSS and NSS, reduce certification burdens, and expand trade opportunities across diverse markets. This harmonization can possibly lead in the future to mutual recognition between different standards, which would be a development addressing costs linked to certification – a possibility which can materialize if NSS further revise their standards and approaches in line with more stringent international standards.

These findings have broader implications for sustainability governance and especially policy instruments which engage with or integrate VSS and NSS in their design (Brandi, 2021; Lambin et al., 2014; Lambin and Thorlakson, 2018; Schleifer and Fransen, 2024). The recently concluded European Union-Indonesia Comprehensive Economic Partnership Agreement (2025) (CEPA) includes a Protocol on Palm Oil which is designed to enhance the preferential trade opportunities under CEPA (tariff reductions, investment, trade in sustainable products) in order to facilitate trade in palm products. The current agreement foresees significant tariff-free quota's[2] for palm oil from Indonesia to the European market, which for the moment are not conditioned on sustainability performance. However, it does not exclude that sustainability conditions for tariff reductions can be put in place in the future (for additional quota's) and refers in this context explicitly to ISPO and other sustainability assurance schemes. In these future debates the design and strength of ISPO and other assurance schemes such as RSPO will play an important role. Our study shows the convergence of the two schemes and their potential complementarity. These insights can feed into discussions on possible recognition of assurance schemes in trade agreements (and other policy instruments) as well as in discussion on how to strengthen sustainability assurance schemes.

While providing valuable insights, the comparison between VSS and NSS in Indonesian agrifood export sectors has some shortcomings. A first limitation is the narrow geographical and sectoral focus, which may limit the generalizability of the findings to other countries or sectors with different regulatory environments and market and certification dynamics. Second, while the SSI framework enables systematic comparison across standards, the selection and equal weighting of topics (rather than for example expert-derived weights) may entail some limitations. Third, the analysis partially relies on qualitative methods, particularly based on expert interviews, and combines this with a quantitative document analysis. This approach offers a rich contextual understanding of the difference between VSS and NSS, but may carry some inherent subjectivity and lacks empirical validation through doing impact evaluations and thus providing more quantitative support for the decision of companies and farmers to comply with one or the other certification. Finally, this study does not provide an in-depth political-economy analysis, as this lies beyond the scope of the study.

The findings of this paper generate several directions for future research. Comparative studies could expand to include multiple countries, sectors, and standard systems to test the applicability and robustness of findings in different institutional settings and for different commodities. Further, the SSI framework could be refined and validated through broader consultation and testing to ensure that the selection of indicators reflects a comprehensive and inclusive sustainability approach. Future research could include quantitative impact evaluations to assess and compare the actual outcomes of VSS and NSS adoption on sustainability practices, and smallholders' livelihoods. Finally, while this was not the main focus of this paper, we encourage deeper political economy analyses (such as Bartley, 2018; Schleifer, 2023) of VSS–NSS cooperation, especially through empirical research focused on actor interactions, institutional power relations, and governance dynamics, which would enrich our understanding of convergence processes and policy effectiveness.

7. Conclusion and policy recommendations

The analysis in this paper highlights that VSS and NSS have potential for complementarity but that there are also risks that NSS replicate the same shortcomings as VSS. VSS are more stringent than NSS in their substantive requirements. While NSS can be used as a stepping stone towards VSS adoption, over time, NSS (here ISPO) and VSS (here RSPO) have shown increasing convergence, particularly in environmental standards. In addition, VSS prioritize global market expectations and economic incentives, attracting smallholders with financial benefits, productivity gains, and environmental awareness, though certification costs and limited technical support remain challenges. NSS focus on regulatory compliance, and their adoption is driven by legal alignment and a sense of national duty. Capacity building supporting sustainable practices is provided in both VSS and NSS, but NSS often lack financial incentives, reducing their appeal.

To optimize the complementarity of VSS and NSS, policymakers should focus on harmonizing the two systems. Aligning NSS with VSS requirements can enhance international recognition without compromising local relevance, reducing the dual certification burden for producers. Emerging countries' governments can play a central role in strengthening alignment with international standards to support

[2] Upon entry into force, 1.9 million tonnes of crude and refined palm oil will enter the EU tariff-free, rising to 2.479 million tonnes from the ninth year. For palm-kernel oil, the tariff-free volume stands at 140,000 tonnes, expanding to 182,668 tonnes from year nine. https://euobserver.com/stakeholders/ar658b12ac - see also https://palmoilmonitor.org/2025/10/17/analaysis-breaking-down-the-ieucepa/.

South–South trade. In this way, NSS can contribute to sustainability in international trade. At the same time, the private sector, especially buyers or companies, certification bodies, and NGOs, can support adoption by providing financial and technical assistance. NGOs and companies can contribute through capacity-building initiatives that facilitate compliance, particularly for smallholders. Certification bodies can help reduce the high cost of dual certification by implementing joint audit processes for producers who adopt both VSS and NSS. Since NSS are primarily led by governments and VSS are governed by multi-stakeholder coalitions, cooperation between these actors is essential. Collaborative efforts to simplify compliance procedures can enhance inclusivity and reduce the exclusionary effects of certification systems. These measures might help agri-food export sectors in emerging countries to maximize the potential for complementary between NSS and VSS while advancing their sustainability and development goals.

CRediT authorship contribution statement

Muhamad Amin Rifai: Writing – review & editing, Writing – original draft, Visualization, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Charline Depoorter:** Writing – review & editing, Writing – original draft, Validation. **Nunung Nuryartono:** Writing – review & editing, Supervision, Funding acquisition, Conceptualization. **Miet Maertens:** Writing – review & editing, Validation, Supervision, Funding acquisition, Conceptualization. **Axel Marx:** Writing – review & editing, Validation, Funding acquisition, Conceptualization.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Miet Maertens and Nunung Nuryartono reports financial support was provided by VLIR-UOS. Miet Maertens and Axel Marx reports financial support was provided by KU Leuven. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix

Table A1
List of indicators, topics, definition and indications for scoring included in the Sustainability Standards Index

Indicators	Code	Topic	Definition	Indications for scoring	Adopted from/Source
Environmental sustainability	E1	Prohibitions against destroying primary forest	Clearing of primary forest is prohibited, including retroactive bans.	0 no prohibition; 1 ban applies only from application date; 2 ban applies 1–8 years prior; 3 ban applies >8 years prior and mandates restoration	Dietz et al. (2018)
	E2	Prohibitions against burning to prepare land	Use of fire to prepare land is forbidden.	0 no rule; 1 SOP related to land preparation by burning; 2 SOP and documented evidence; 3 fire prevention, mitigation, and control measures	Dietz et al. (2018)
	E3	Obligations to protect HCV	High Conservation Value (HCV) areas must be identified and protected.	0 no HCV concept; 1 HCV ban only; 2 HCV + either ecosystem or retroactive ban; 3 HCV + ecosystem + retroactive ban	Dietz et al. (2018)
	E4	Protection and restoration of biodiversity	Rare species and habitat biodiversity must be restored or left intact.	0 none; 1 general statement; 2 specific buffer or rehabilitation actions; 3 comprehensive biodiversity management plan	Dietz et al. (2018); Holvoet and Muys (2004); ITC-Standards Map
	E5	Environmentally sustainable pest and weed management	Pest and weed control follows Integrated Pest Management (IPM).	0 no IPM; 1 references IPM; 2 IPM with monitoring; 3 IPM with training, records and banned pesticide list	Dietz et al. (2018); Holvoet and Muys (2004); ITC-Standards Map
	E6	Environmentally sustainable soil management	Soil is managed to avoid erosion and maintain fertility.	0 no measures; 1 single practice; 2 soil testing and erosion plan; 3 full soil fertility programme with targets	Dietz et al. (2018); Holvoet and Muys (2004); ITC-Standards Map
	E7	Sustainable water management	Water use is sustainable and does not deprive other users.	0 none; 1 good-practice mention; 2 water-use mapping and efficiency targets; 3 water management plan and monitoring	Dietz et al. (2018); ITC-Standards Map
	E8	Sustainable waste management	Waste is minimised, segregated and disposed without contamination.	0 none; 1 recycle organics; 2 plan for hazardous and non-hazardous waste; 3 full waste management system and no open burning	Dietz et al. (2018); Holvoet and Muys (2004); ITC-Standards Map
	E9	Sustainable use of energy	Energy efficiency is pursued and renewables used where feasible.	0 no rule; 1 mentions efficiency or renewables; 2 energy efficiency measures adopted or planned; 3 efficiency measures + renewable energy use if feasible	Dietz et al. (2018); Standardsmap ITC
	E10	Use of organic products	Organic inputs are preferred over synthetics.	0 none; 1 encourage organic inputs; 2 partial organic input requirement; 3 organic inputs mandatory or certified organic	ITC-Standards Map; Holvoet and Muys (2004)
	E11	GHG/Carbon emissions and carbon stocks	GHG emissions are monitored and reduced; carbon stocks protected.	0 none; 1 basic estimates; 2 GHG inventory; 3 inventory with public reduction plan	ITC-Standards Map

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Table A1 (*continued*)

Indicators	Code	Topic	Definition	Indications for scoring	Adopted from/Source
	E12	Monitoring and prevention of environmental damage	Environmental impacts are monitored and corrective action taken.	0 ad hoc only; 1 checklists; 2 documented monitoring; 3 full environmental management and monitoring plan	Holvoet and Muys (2004)
	E13	Environmental impact assessment	Environmental Impact Assessment (EIA) is compulsory before development.	0 no EIA; 1 EIA only when legally required; 2 EIA plus stakeholder input; 3 EIA plus public disclosure and mitigation plan	ITC-Standards Map
	E14	Protection of peatland	Development on peatland is prevented or strictly controlled.	0 allowed; 1 basic no new planting; 2 no expansion plus rehabilitation guidance; 3 total ban plus rewetting or restoration plan	Author related to Indonesian context
Social sustainability	S1	Ethical conduct	Zero tolerance for corruption, bribery and fraud.	0 absent; 1 code of ethics; 2 code plus training; 3 code plus training and whistle blower system	Author related to ISPO and RSPO
	S2	Minimum wage	At least the statutory minimum or living wage is paid.	0 below minimum; 1 meets legal minimum; 2 exceeds minimum wages; 3 exceeds minimum wages with transparent payslips	Dietz et al. (2018); ITC-Standards Map
	S3	Freedom of association and collective bargaining	Freedom of association and collective bargaining are respected.	0 restricted; 1 policy only; 2 policy plus union evidence; 3 full implementation without interference	Dietz et al. (2018); Holvoet and Muys (2004); ITC-Standards Map
	S4	Reliable and transparent payment system	Workers are paid regularly with clear payslips and no unfair deductions.	0 cash or irregular; 1 regular pay; 2 regular pay plus written payslip; 3 regular pay plus payslip and no punitive deductions	Dietz et al. (2018); ITC-Standards Map
	S5	Written contracts and communication of terms	Every worker receives a written contract outlining terms in a language they understand.	0 none; 1 permanent staff only; 2 all workers >3 months; 3 all workers including seasonal and short-term contract	Dietz et al. (2018); ITC-Standards Map
	S6	Working hours and leave	Working hours and leave comply with ILO limits.	0 no limits; 1 legal reference only; 2 partial compliance; 3 full ILO compliant system with records	Dietz et al. (2018); ITC-Standards Map
	S7	Child labour	Child labour under 15 years is prohibited and remediation provided.	0 no rule; 1 ban only; 2 ban plus age checks; 3 ban plus remediation and schooling	ITC-Standards Map
	S8	Housing for on-site workers	On site accommodations are safe, clean, and serviced.	0 none; 1 basic shelter; 2 meets national standard; 3 meets ILO 115 with sanitation and upgrades plan	Dietz et al. (2018)
	S9	Education facilities	Access to education for workers' children is facilitated.	0 no action; 1 encourage schooling; 2 transport or allowance; 3 school or daycare provided	Dietz et al. (2018)
	S10	Health facilities	Health services such as first aid and medical care are accessible to workers.	0 none; 1 first aid box; 2 clinic or doctor visits; 3 comprehensive OHS and medical cover	Dietz et al. (2018)
	S11	Non discrimination	Equal opportunity and pay are ensured.	0 not mentioned; 1 policy; 2 policy plus gender committee; 3 policy plus committee and wage parity evidence	Dietz et al. (2018); ITC-Standards Map
	S12	Prohibition of abuse and harassment	Zero tolerance for corporal punishment, abuse, or harassment.	0 no rule; 1 statement; 2 statement plus procedure; 3 zero tolerance policy plus training and sanctions	Dietz et al. (2018)
	S13	Training of workers	Workers receive regular training to build skills and safety awareness.	0 none; 1 adhoc; 2 annual training plan; 3 more than 50 percent of workforce trained with records	Dietz et al. (2018)
	S14	Freedom from forced labor	Forced or bonded labour is prohibited and remediated.	0 no rule; 1 policy; 2 policy plus risk assessment; 3 strong prohibition plus remediation and audits	Dietz et al. (2018)
	S15	Community relations and land use rights	Land tenure issues resolved through FPIC and community dialogue.	0 not addressed; 1 legal title only; 2 FPIC procedure initiated; 3 FPIC plus grievance and remediation	Dietz et al. (2018); Holvoet and Muys (2004)
	S16	Occupational health and safety	Comprehensive OHS management with PPE, training and medical checks.	0 none; 1 basic PPE; 2 PPE plus risk assessment; 3 complete OHS management system	Dietz et al. (2018; ITC-Standards Map
	S17	Transparency to producers	Certification policies, criteria and audits are openly shared with producers.	0 no information; 1 documents on request; 2 documents public; 3 online multilingual with guidance	ITC-Standards Map; Fiorini et al. (2019)
	S18	Transparency towards smallholders	Smallholders receive clear information and support to participate.	0 none; 1 basic outreach; 2 capacity building; 3 structured programme with premium or credit access	ITC-Standards Map
	S19	Improving local communities	Programs enhance livelihoods and infrastructure in local communities.	0 none; 1 CSR donations; 2 consulted community plan; 3 multiyear participatory development plan	Holvoet and Muys (2004)
Economic sustainability	E1	Management plan	The business has a multiyear plan with budgets and KPIs.	0 absent; 1 basic budgets; 2 multiyear plan; 3 plan with KPIs and regular review	Holvoet and Muys (2004)
	E2	GAP implementation	Good Agricultural Practices are fully applied and verified.	0 none; 1 advice only; 2 partial GAP adoption; 3 full GAP verified in field	Dietz et al. (2018)
	E3	Storage, transport and grading	Produce is stored transported and graded according to procedures.	0 none; 1 handling guidance; 2 SOPs and staff trained; 3 SOPs plus audits and traceability	Dietz et al. (2018)
	E4	Price premium	Producers receive a guaranteed premium for certified products.	0 none; 1 voluntary premium; 2 variable market premium; 3 contractual premium floor	Dietz et al. (2018)
	E5	Minimum price guarantee	A minimum floor price shields producers from market downturns.	0 not provided; 1 commodity floor price; 2 variable floor by agreement; 3 fixed minimum price clause	Dietz et al. (2018)
	E6	Inclusion of independent smallholders	Independent smallholders are supported to access certification.	0 no mention; 1 eligibility stated; 2 technical support; 3 support plus credit and group certification	Dietz et al. (2018)

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Table A1 (*continued*)

Indicators	Code	Topic	Definition	Indications for scoring	Adopted from/Source
	E7	Quality criteria	Product quality is tested and feedback provided to producers.	0 none; 1 visual grading; 2 laboratory tests; 3 multi parameter quality system	ITC-Standards Map
	E8	Supply chain criteria	Traceability systems track certified product through the supply chain.	0 none; 1 batch record keeping; 2 mass balance; 3 identity preserved chain of custody	ITC-Standards Map
Governance	R1	Land Legality	Proof of land legality (title, lease, or recognised customary right).	0 no evidence of land rights; 1 basic proof but not formally registered; 2 formal title registered and in line with spatial plan; 3 formal title plus participatory boundary mapping and public disclosure	Author related to national regulation
	R2	Business Permit	Valid business permit/licence is current and displayed.	0 no business permit; 1 IUP/STD-B issued but expired or area mismatch; 2 valid and current IUP (for companies) or STD-B (for smallholders) renewed on schedule; 3 valid permit plus annual legal-compliance report submitted and externally audited	Author related to national regulation
	R3	Environmental Permit	Valid environmental permit complies with national law.	0 no environmental license; 1 SPPL/UKL-UPL/AMDAL approved but no follow-up; 2 permit implemented with internal monitoring and reporting to authorities; 3 permit plus third-party verification and periodic public reports	Author related to national regulation
	R4	Waste Permit	Specific permit for hazardous waste & effluent management.	0 no waste-management license; 1 TPS-B3 storage permit obtained; 2 permit plus waste-manifest records and routine reporting; 3 permit plus public disclosure of waste flows and target for zero discharge	Author related to national regulation
	R5	Social security insurance	All employees are registered and contributions paid to social security.	0 no social-security coverage; 1 only some workers registered or payments in arrears; 2 all workers registered in the employment and health social-security schemes with up-to-date contributions; 3 full social-security coverage for all workers and eligible dependents, with proof of timely payments and annual compliance review	Author related to national regulation
	R6	Sanction mechanism	Certification imposes clear escalating sanctions for noncompliance.	0 not defined; 1 internal warnings; 2 graded sanctions; 3 sanctions plus public disclosure and appeal	Depoorter and Marx (2023).
	R7	Continuous improvement	The standard requires ongoing performance improvement and reviews.	0 absent; 1 encouraged; 2 mandatory annual review; 3 formal PDCA cycle with public targets	Depoorter and Marx (2023).
	R8	Third party audit	Audits are conducted by accredited independent auditors.	0 no audit; 1 self-assessment; 2 internal audit in VSS organization or related to NSS; 3 third party audit by external	Depoorter and Marx (2023).

Data availability

Data will be made available on request.

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