FEDERAL UNIVERSITY OF SÃO CARLOS
SCHOOL OF MANAGEMENT AND TECHNOLOGY
DEPARTMENT OF ECONOMICS

LAURA MERCEDES GRIMALDO HIDALGO

MULTIPLICITY OF SUSTAINABILITY STANDARDS IN THE GLOBAL PALM OIL INDUSTRY

Sorocaba

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Thesis presented to the Graduate Program in Economics to obtain the title of MSc. in Applied Economics.

Advisor: Prof. Dr. Rosane Nunes de Faria

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RESUMO

O crescente impacto sobre o meio ambiente da produção de commodities agrícolas tem criado novas regulamentações que visam uma produção mais sustentável. Assim, os padrões de sustentabilidade (SS) nascem como uma ferramenta para a regulação transnacional do comércio, pois aumentam a possibilidade de que os produtos comercializados provenham de fontes sustentáveis. No entanto, atualmente existe uma proliferação desses SS em quase todos os setores. Esse trabalho, examinou o mercado de óleo de palma, uma importante indústria e de rápido crescimento em todo o mundo. Assim, propôs descobrir a forma na qual a multiplicidade afeta os custos de comércio. O estudo considerou os padrões líderes neste mercado: Roundtable on Sustainable Palm Oil - RSPO; International Standard for Carbon Certification - ISCC; Roundtable on Sustainable Biomaterials – RSB; Indonesian Sustainable Palm Oil – ISPO and Malaysian Sustainable Palm Oil - MSPO. Foi proposto um modelo analítico que busca estabelecer os potenciais efeitos diretos e indiretos da multiplicidade dos SS nos custos de comércio para os produtores, levando em consideração as interações entre os padrões que ocorrem por meio da competição, da cooperação e da sobreposição de SS. Os resultados apontam alta sobreposição dos padrões de sustentabilidade e uma balanceada co-opetição (um fenômeno que combina competição e cooperação) nesse mercado. Os padrões privados apresentaram baixo potencial para causar custos de comércio a seus membros, especialmente o RSPO. No entanto, o ISPO apresentou o maior potencial de causar custos de comércio pelos seus baixos níveis de cooperação e de sobreposição. Além disso, os resultados mostraram que os padrões tem se beneficiado pela dinâmica de co-opetição, principalmente na parte da cooperação porque tem gerado processos de aprendizado e inovação no mercado sem sair da concorrência por novos membros. Por fim, esse tipo de interação ainda impulsaria um aumento de custos de certificação, implementação e de embalagem para os produtores.

Palavras-chave: Óleo de palma. Padrões de sustentabilidade. Multiplicidade de padrões. Custos de comércio.

ABSTRACT

The growing impact on the environment of the global production of agricultural commodities has created new regulations that aim at a more sustainable production. Thus, sustainability standards (SS) are seen as a tool for transnational trade governance because they increase the possibility that commercialized products come from sustainable sources. However, there is currently a proliferation of SS in almost every industry. This dissertation examined the palm oil market, an important and rapidly growing industry worldwide. Hence, it proposed to explore the ways in which SS multiplicity affects trade costs. The study took into account the major SS in global palm oil production such as Roundtable on Sustainable Palm Oil - RSPO; International Standard for Carbon Certification - ISCC; Roundtable on Sustainable Biomaterials – RSB; Indonesian Sustainable Palm Oil – ISPO and Malaysian Sustainable Palm Oil - MSPO. An analytical model was developed that seeks to establish the potential effects of the SS multiplicity on trade costs. By considering the interactions between patterns such as competition, cooperation, and overlap, the model assesses the possible direct and indirect effects on trade costs for producers. The results point out high overlap and balanced co-opetition (a phenomenon that combines competition and cooperation) in the standard market. Private standards had a low potential to create trade costs on its members, especially the RSPO. However, ISPO had the greatest potential to cause trade costs due to its low levels of cooperation and overlap. Furthermore, the results showed that the dynamics of co-opetition would be generating learning and innovation processes in the standard market without ceasing the competition for new members. Finally, this type of interaction still drives an increase in certification, implementation and packaging costs for producers.

Keywords: Palm oil. Sustainability standards. Standard multiplicity. Trade costs.

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS, ACRONYMS, INITIALS, AND SYMBOLS

FPP – Forest People Program

HIS – Heterogeneity Index of Standards

HIID – Heterogeneity Index of Institutional Design

ISCC – International Standard for Carbon Certification

ISEAL - International Social and Environmental Accreditation and Labelling

ISPO – Indonesian Sustainable Palm Oil

ITC – International Trade Center

MSPO – Malaysian Sustainable Palm Oil

POIG – Palm Oil Innovation Group

RSB – Roundtable on Sustainable Biomaterials

RSPO – Roundtable on Sustainable Palm Oil

RSPO P&C – Roundtable on Sustainable Palm Oil Principles and Criteria

SDGs – Sustainable Development Goals

SMD – Standard Map Database

SOI – Standard Overlap Index

SPOI – Sustainable Palm Oil Initiative

SS – Sustainability Standards

UNFSS – United Nations Forum on Sustainability Standards

SUMMARY

1 INTRODUCTION

Sustainability Standards - SS have emerged as a non-state market-driven governance approach that aims to improve economic, environmental, and social aspects of commodity production by establishing and enforcing specific behavior (CASHORE; AULD; NEWSOM, 2004). In the last two decades, there has been a proliferation of SS, which constitutes a challenge for transnational trade governance. According to Schleifer et al. (2019), the global increase of SS started in the 1990s, and it peaked by the mid-2000s when the growth in the number of SS has slowed down considerably.

In 2021, the Standard Map Database - SMD[1] of the International Trade Centre - ITC reported 307 active Voluntary Sustainability Standards - VSS, codes of conduct, audit protocols, and best practices applied to various countries and products. Another vital source of sustainability certification schemes is Ecolabel Index[2] , which contains, in 2021, 455 ecolabels in 25 industries. These numbers demonstrate the proliferation of SS systems that pursue numerous social, environmental, and economic problems.

According to Marx and Wouters (2014), three main drivers contributed to the outbreak of private SS. First, gaps and failures in public policies to protect the environment and social issues. Secondly, information asymmetries towards consumers. And finally, instead of adopter companies feel confronted by SS, they see them as an Non-Governmental Organization – NGO guided institution, which turns it into a cooperative strategy from their point of view. Bartley (2007) points out the economic globalization, the insufficient government-led regulation of global production, and the growing importance of environmental norms in the international agenda as the main factors explaining the increasing fragmentation of the standards. Likewise, the United Nations Forum on Sustainability Standards - UNFSS (2018) argues that the rapid proliferation of Voluntary Sustainability Standards responds to the fact that economic agents are giving more support to the realization of the Sustainable Development Goals - SDG and the 2030 agenda.

[1] See https://standardsmap.org/standards

[2] See http://www.ecolabelindex.com/ecolabels/

This proliferation has resulted in various SS types, classified by its degree of obligation as voluntary or mandatory, or according to the geographic coverage area: national, regional, and global schemes. Different actors can also establish them: government, private sector, NGOs, and International Organizations (FERNANDES; BIAN, 2016; LEE; GEREFFI; BEAUVAIS, 2012). This variety has caused a large number of sustainability standards that interact with each other in many industries, a phenomenon which is known as standard multiplicity or standard fragmentation (FIORINI; SCHLEIFER; TAIMASOVA, 2017; FRANSEN; KOLK; RIVERA-SANTOS, 2019; UNFSS, 2018). Standard multiplicity is a complex phenomenon because different standards, according to their degree of obligation, coverage area, or who establishes them, can interact in the same industry sector (FERNANDES; BIAN, 2016; FRANSEN; KOLK; RIVERA-SANTOS, 2019). Therefore, some authors attribute the characteristic of dynamic complexity or regime complexity to the transnational trade governance in standard markets (ABBOTT; SNIDAL, 2008; BRANDI, 2020a; DENTONI; BITZER; SCHOUTEN, 2018; OVERDEVEST; ZEITLIN, 2012).

Furthermore, within the multiplicity, there are also patterns of interactions between the standards as overlap, competition, and cooperation. The standard overlap shows similarities of requirements between two standards (UNCTAD, 2017). The standard competition refers to a market where many SS schemes intend to address the same product or production sector (FRANSEN; SCHALK; AULD, 2016). Hence, SS seeks features that differentiate one from another (FIORINI; SCHLEIFER; TAIMASOVA, 2017). In contrast, standard cooperation denotes strategies that SS could use to harmonize processes and requirements (MARX; WOUTERS, 2014).

The standard multiplicity characteristics in a specific market affect producers, who are the SS's primary adopters. In particular, there could be impacts on trade costs, which, if increased or decreased, can enhance or diminish international trade, respectively (FERNANDES; BIAN, 2016; MARX; WOUTERS, 2014; THORSTENSEN; WEISSINGER; SUN, 2015). Trade costs in the sustainability standard market refer to those costs involved in the certification process or adherence to a standard (BANTERLE; STRANIERI, 2013). Thus, they are classified into two types, implementation and certification costs (SCHLEIFER; FIORINI; FRANSEN, 2019; UNFSS, 2018), and they could increase or decrease according to the features within the standard multiplicity

phenomenon (FIORINI et al., 2019; SCHLEIFER; FIORINI; FRANSEN, 2019). These effects also vary depending on the specific sector/product or country to be analyzed (UNFSS, 2018).

In the palm oil industry, sustainability standards are essential tools to regulate environmental, social, and economic issues at the production level. Therefore, this industry has been facing a proliferation of sustainability standards in recent years. Currently, the Standard Map Database contains 76 standards for palm oil, but most are more generic and applied to other global value chains or other sectors, too (STANDARD MAP, 2020).

The production of palm oil has been growing in the last decades due to its efficiency per hectare. Other oilseeds would require 5 – 8 times larger land areas to produce the same oil amount (PIRKER et al., 2016). Hence, palm oil is the most important vegetable oil source, accounting for 35% of the world's oilseeds production (OECD/FAO, 2019). Oil palm cultivation predominates in tropical areas near the Equatorial Belt (BARTHEL et al., 2018). Consequently, countries with the highest production are located in Southeast Asia, West Africa, and Central and South America (USDA, 2019). The largest exporters are Indonesia and Malaysia, which produce approximately 90% of the world's total.

Despite its productivity, the rapid expansion of palm oil production has been considered a significant cause of biodiversity loss (TINHOUT; VAN DEN HOMBERGH, 2019). In Indonesia, the two main islands of Sumatra are covered by palm oil plantations, so the country has experienced one of the highest deforestation rates. Only in those two islands, 70% of their forest has been replaced (IWARSSON, 2018). In Latin America, 21% of the land occupied with palm oil production is woody vegetation (FURUMO; AIDE, 2017). This large-scale deforestation and peatland drainage increase the Indirect Land-Use Change (ILUC), one of the major reasons for Greenhouse Gas emissions (CRAW, 2019). Besides, palm oil expansion threatens some of the planet’s most essential and sensitive habitats of endangered species like orangutans, tigers, elephants, and rhinos (WWF, 2020).

Palm oil production is not only carried out by large plantation companies but also by smallholders. In Southeast Asia, 40% of palm oil comes from smallholders

(BARTHEL et al., 2018; ESPO, 2019). Besides, in Indonesia and Malaysia, official statistics estimate that smallholders account for over 30% of palm oil planted land. And it is projected to be 60% of the total palm oil planted area by 2030 (CRAW, 2019). Further, it reveals the importance of small farmers in the global palm oil industry.

The social conflicts arise mainly because palm oil grows in emerging countries where land rights and local politics can be unclear (LEVIN, 2012). The Environmental Justice Atlas reports land conflicts that affect native communities and violate human rights in Malaysia, Indonesia, Myanmar, Cameroon, Brazil, and Peru (TEMPER; BENE; MARTINEZ-ALIER, 2015). For instance, local communities in Malaysia have protested against the palm oil company IOI Pelita because its production expansion violates the Native Customary Rights - NCR recognized in the Malaysian Constitution (COLCHESTER; JALONG; CHUO, 2013).

Thus, it is crucial to recognize the need for SS to address environmental and social issues. Then, it is also relevant to understand the potential effects of SS multiplicity on trade costs. Therefore, this study takes into account the major sustainability standards that currently exist in the global palm oil value chain: Roundtable on Sustainable Palm Oil - RSPO; International Standard for Carbon Certification - ISCC; Roundtable on Sustainable Biomaterials – RSB; Indonesian Sustainable Palm Oil – ISPO, and Malaysian Sustainable Palm Oil - MSPO[3].

1.1 JUSTIFICATION OF THE STUDY

Although multiple standards may be desirable to cover different sustainability aspects, it could create additional trade costs, such as implementation and certification costs, and consequently acting as trade barriers for producers (FERNANDES; BIAN, 2016; THORSTENSEN; WEISSINGER; SUN, 2015; UNFSS, 2018).

Compliance with a standard means additional preparation of skills and resources. These costs are further intensified when it comes to smallholders. It is evidence that

[3] On the one hand, the RSPO, ISCC and RSB are voluntary multi-stakeholder standards created by private organizations as NGOs, firms and International Organizations. On the other hand, the ISPO and MSPO are public mandatory standards promoted by the Indonesia and Malaysia government, respectively.

certification costs are higher for them because they often lack access to SS information and markets (BRANDI et al., 2015; FIORINI; SCHLEIFER; TAIMASOVA, 2017). Furthermore, they need to implement additional labor, resources, and/or technologies to comply with SS's requirements (HIGGINS; RICHARDS, 2019). Therefore, it can effectively withdraw small producers from the market (BRANDI, 2020b; LOCONTO; DANKER, 2014).

Many studies indicate the high costs of incorporating standards (FERNANDES; BIAN, 2016; FIORINI; SCHLEIFER; TAIMASOVA, 2017; MUTERSBAUGH, 2005). Additionally, it is proved that large and commercial producers can better absorb compliance costs than small producers (MASKUS; WILSON; OTSUKI, 2000). Mutersbaugh (2005) argues that even large and organized production groups significantly impact their profits due to the high costs of compliance with standards, so they may work as a barrier to market entry. Another problem is the cost-sharing practices in SS systems, in which producers cover all the costs related to certification, but other members of the global value chain do not (FIORINI et al., 2019; SCHLEIFER; FIORINI; FRANSEN, 2019; UNFSS, 2018).

In this respect, standard multiplicity in a market could intensify the effects of SS on trade. If many standards exist, retailers can demand compliance with more than one SS as a prerequisite to buy a specific product, causing an increased cost for producers to get different certifications (FRANSEN, 2012). Another effect of standard multiplicity is the credibility gap among sustainability standards because the well-developed systems increasingly need to distinguish themselves from the non-credible systems (FIORINI; SCHLEIFER; TAIMASOVA, 2017). So, it leads to additional costs of packaging and labeling for producers who cannot use, in the same label, logos that are not mutually recognized (MARX; WOUTERS, 2014). As a result, standard multiplicity can cause compliance, packaging, and labeling costs for producers in such situations as described above.

Thus, producers who aspire to sell to different international markets may face multiple verifications, which can cause audit fatigue among them. Likewise, standard multiplicity can also lead to consumer confusion because the proliferation of SS makes it increasingly difficult for consumers to interpret logos, stamps, or brands on the packaging, which reduces confidence in these instruments (UNFSS, 2018).

Fransen *et al.* (2019) identify a North-South multiplicity type in the palm oil industry related to who sets the standard (developing or developed country). North-South multiplicity leads firms and producers to meet both types of standards, those adapted locally and those more global, facing a risk of heterogeneity of sustainability criteria. Winchester *et al.* (2012) argue that if the heterogeneity in regulations results in highly dissimilarities, it can make it costly for a producer to export to a specific market. In this dissertation, the sustainability standards chosen to be analyzed will help to comprehend the North-South multiplicity, with the major SS from the northern countries as RSPO, ISCC, and RSB, and from southern countries as ISPO and MSPO.

The discussion about the proliferation of SS has been centered on the overall population of Voluntary Sustainability Standards through collecting data from ITC Standard Map or Ecolabel Index. Schleifer (2019) indicates that despite many SS programs, the existing literature remains focused on a small group of highly visible cases, mainly from northern actors and globalized programs. Similarly, studies about the multiplicity of SS in agricultural commodities have also focused on private governance organizations at the overall global level (FERNANDES; BIAN, 2016; LOCONTO; DANKER, 2014; MARX; WOUTERS, 2014; UNFSS, 2018).

Little is known about the effects of standard multiplicity and interactions within it in a specific country and industry sector (FIORINI et al., 2019; FIORINI; SCHLEIFER; TAIMASOVA, 2017; SCHLEIFER; FIORINI; FRANSEN, 2019). Depending on the market, country, and the type of interactions as overlap, competition, and/or cooperation, multiplicity can be beneficial or detrimental to trade and can have different implications on trade costs (SCHLEIFER; FIORINI, 2017; SCHLEIFER; FIORINI; FRANSEN, 2019; UNFSS, 2018). Therefore, it is highly pertinent to understand the relationship between standard multiplicity and trade costs, since it is well known that higher trade costs imply fewer trade flows. This dissertation contributes to a more in-depth understanding of the standard multiplicity in the palm oil industry by addressing the following research questions: Which would be the relationship between the North-South standard multiplicity and trade costs effects in the global palm oil industry? How does the overlap or duplication among the sustainability standards affect trade costs? What is the extent of the sustainability criteria heterogeneity among the standards? How does the

competition among sustainability standards affect trade costs? And how does the coordination and cooperation among sustainability standards impact costs?

Rather than estimating the net effect of multiplicity on trade costs, the main contribution of this dissertation is to provide the causal pathways by which the standard multiplicity can impact trade costs. By doing so, we are interested in generating evidence on the circumstances in which standard multiplicity can act as barriers or catalyzers to exports. We also contribute with a sector-oriented perspective of the SS multiplicity, which gives more insights about North-South multiplicity in the palm oil sector by assessing private northern standard systems, and the local initiatives from the South.

1.2 OBJECTIVES OF THE STUDY

1.2.1 GENERAL OBJECTIVE

To find out the pathway by which sustainability standards multiplicity affect trade costs in the global palm oil industry.

1.2.2 SPECIFIC OBJECTIVES

- To analyze the standard overlap among the SS systems in the palm oil industry.
- To measure the extent of the SS criteria heterogeneity among the standards in the palm oil industry
- To examine the competition level between SS systems in the palm oil industry.
- To evaluate the degree of cooperation among SS schemes, government, and international organizations in the palm oil industry.
- To analyze how each of these interactions affects trade costs in the palm oil industry

2 THEORETICAL FRAMEWORK

2.1 THE PALM OIL SUSTAINABILITY STANDARDS IN BRIEF

Due to the variety of sustainability standards currently existing, it is impossible to affirm that all private standards are voluntary or that public ones are mandatory (HENSON; HUMPHREY, 2009). A public standard is not necessarily limited to the national level either, or a private one to the international level. Therefore, to fully understand the types of multiplicity and interactions in the palm oil industry, it is crucial

to make a typology of each SS taken into account in this study. Figure 1 shows the typology of SS schemes in the palm oil industry described in detail in this section.

Figure 1 – Forms of sustainability standards in the palm oil industry

	Public	Private
Voluntary	**Public voluntary standards**	**Multi-stakeholder voluntary standards** - RSPO - ISCC - RSB
Mandatory	**National standards** - ISPO - MSPO	**Legally-mandated private standards**

Source: Author's own work adapted from Henson and Humphrey (2009)

In the palm oil industry, SS schemes follow the traditional pattern. Private and voluntary standards act in the international market mainly, and the national standards are locally adopted and mandatory rules. In the global palm oil market, the European Union (EU-28), India, and China import 50.1% of the world's palm oil (ITC/TRADE MAP, 2019). And when it comes to sustainable palm oil, the European Union continues to be the leading market with 74% of certified sustainable palm oil imported (ESPO, 2019). However, there is still limited participation of emerging and important worldwide markets such as China and India in requesting certified sustainable palm oil (SCHLEIFER; SUN, 2018).

In particular, RSPO has a significant presence in Europe and the United States, where mainstream consumers are more aware of where ingredients come from and what impacts these ingredients may have (RSPO, 2019). Conversely, ISPO and MSPO schemes attend more accurately to palm oil markets in China and India because those standards are designed for production less "cost-conscious" corresponding to the necessities of these markets (FERNANDES; BIAN, 2016; HIGGINS; RICHARDS, 2019).

Furthermore, RSPO, ISCC, and RSB are well known to be standards that operate based on the North-South trade model, increasing the market power of big companies and not responding to the interests of southern producers. That is why they would not be well-

equipped to participate in South-South trade (SCHLEIFER, 2016). On the contrary, ISPO and MSPO certify Indonesian and Malaysian producers and offer less stringent requirements for sustainable palm oil. Then they align more closely with the South-South trade requirements (HIGGINS; RICHARDS, 2019).

RSPO is a not-for-profit organization that joins seven palm oil industry actors, from producers to NGOs. Since April 2004, this multi-stakeholder standard has been developing environmental and social principles and criteria that producers and firms in the palm oil global value chain must comply with to get the certificate. By 2020, RSPO has more than 4800 members and 3.16 million hectares certified worldwide (RSPO, 2020). According to Willer et al. (2019), the oil palm certified area is growing, and standard compliance is gaining ground. They reported that RSPO has the most significant certified oil palm area achieving 11.8% of the global total.

For its part, ISCC is a system for certifying different types of biomass in global supply chains. It was officially launched in 2010 with the primary objective of contributing to social and ecological sustainability criteria for a fully traceable and deforestation-free supply chain, avoiding conversion of biodiverse grassland, and reducing GHG emissions. Currently, the ISCC certification system has over 3800 users in more than 100 countries (ISCC, 2020). Although not exclusively for palm oil, it is a crucial sustainability standard for palm oil producers who want to sell their products for biofuel as an end-use.

Similarly, RSB introduced its global certification system in 2011 to encourage biofuels and other biomaterials sustainable production. RSB's requirements aim to ensure the effective management of forests to preserve biodiversity and ecosystem services, guarantee sustainable harvesting, and process for forest residues (RSB, 2020). Both ISCC and RBS standards are recognized by the EU Renewable Energy Directive (RED).

ISPO was launched in 2011 by the Indonesian Ministry of Agriculture as part of a broader sustainable palm oil initiative. ISPO scheme is public and mandatory for firms and producers operating in Indonesia. It currently has over 556 companies associated, which means a total area of 5.3 million hectares certified by ISPO (ISPO, 2020). The Indonesian Palm Oil Association – GAPKI reported that 67% of its members already have ISPO certification. The association aimed that by 2020, all of its members will have

been getting certified (GLOBE, 2019). But with the “New ISPO” that started to run from the end of 2020, they gave smallholders a grace period of five years until 2025 (GAPKI, 2021; “Indonesia sustainable palm oil and the legality of people’s palm oil”, 2021).

In December 2014, the Malaysian Palm Oil Certification Council (MPOCC), an independent non-profit organization, established the MSPO certification system. This standard initially was voluntary. However, since 2015 MPOCC has been recognized as a public company that sought to place the standard as mandatory certification for growers and palm oil companies in Malaysia. In this way, since 2019, the Malaysian government reported that it would be giving incentives to companies that were certified until January 1, 2020. Herewith, smallholders would be benefiting from 70% to 100% of the total auditing fee (MPOCC, 2019).

By 2020, MSPO has 423 entities associated, making a total certified area of 5.03 million hectares, representing 85.20% of the total area in Malaysia (MSPO, 2020). Among the reasons for the emergence of the ISPO and MSPO, as a public response, are the exclusion and little representativeness felt by small producers in those countries within the RSPO system (DENTONI; BITZER; SCHOUTEN, 2018; HIGGINS; RICHARDS, 2019).

To finish, the typology and the main characteristics of the sustainability standards in the palm oil market would denote a North-South multiplicity, since they differ mainly by the countries in which they are established. Hence, SS schemes in the global palm oil industry face political challenges because of the governance complexity created by this standard multiplicity, such as new local initiatives in developing countries that generate additional standards to the sector (SCHOUTEN; BITZER, 2015).

2.2 SUSTAINABILITY STANDARDS AND TRADE COSTS

In 2018, the United Nations Forum on Sustainability Standards – UNFSS[4] carried out an analysis of sustainability standards' rapid proliferation, claiming that this situation responds to a broader trend in global sustainability policies. Growth in these standards

[4] The United Nations Forum on Sustainability Standards (UNFSS) is a platform created to analyze voluntary sustainability standards (VSS) and disseminate information about them.

has been seen in almost all agricultural sectors, in which a certification process occurred mainly at the production level.

By reducing or eliminating the negative externalities of transnational production, SS promote growth and green trade. Therefore, they encourage Sustainable Development and support the achievement of the UN's Sustainable Development Goals - SDGs, so they are viewed as a possible implementation mechanism for the 2030 Agenda (UNFSS, 2018). In that way, companies feel motivated and are increasingly seeking to become certified by SS, since it represents a sustainable supply chain management strategy, market access, reputational risk mitigation, and competitiveness promotion (LEE; GEREFFI; BEAUVAIS, 2012).

While the direct impact of SS on Sustainable Development has been measured in various studies (COSA, 2013; STEERING COMMITTEE OF THE STATE-OF-KNOWLEDGE ASSESSMENT OF STANDARDS AND CERTIFICATION, 2012; UNFSS, 2018), there is still uncertainty about the potential indirect impact of SS, both on trade and on economic growth. There are unresolved issues regarding implementation and certification costs, non-transparent practices, and lack of participation of countries and production firms.

The indirect effect refers to how the SS impacts trade, then how trade affects economic growth, which lastly influences Sustainable Development. The last two relationships have been extensively studied. The positive effects of trade on output and economic growth have been recognized by various economic models such as Kaldor's Export-Led Growth Model (1970), and Krugman's (1991) Model that shows the bi-directional causal relationship between international trade and economic growth. Moreover, based on those models and other empirical studies, Silva et al. (2018) verify in their analysis that the increase in net exports generates a positive effect on GDP.

For instance, as international trade becomes more "green", the impact will be more significant for Sustainable Development (UNEP, 2013). In this regard, it has been argued that not only North-South trade brings benefits for trade. In recent years, South-South trade has also positively impacted Sustainable Development (BLOOMFIELD, 2020). Lastly, the importance of economic growth on the achievement of Sustainable Development has also been assessed (UNFSS, 2018).

However, the impact of SS on trade is still controversial, mainly if it refers to trade costs and the creation of competitive advantages (or disadvantages) in global markets. SS may create additional market barriers and potential trade costs for producers, especially smallholders in developing countries (BRANDI, 2020b; FIORINI; SCHLEIFER; TAIMASOVA, 2017; SCHLEIFER; FIORINI; FRANSEN, 2019; THORSTENSEN; WEISSINGER; SUN, 2015). Even if they are private and voluntary standards, they often act as necessary conditions for market access (NEGI, 2020). Besides, the skills required to manage compliance processes can also act as a trade barrier (HENSON; HUMPHREY, 2009). In contrast, some studies argue the trade benefits for producers of getting a SS certification as creating market access, higher or premium prices, productivity and innovation in the production process, and safe working conditions (GIOVANNUCCI; VON HAGEN; WOZNIAK, 2014; JAFFEE, 2003; MEEMKEN, 2020; RUBEN; ZUNIGA, 2011).

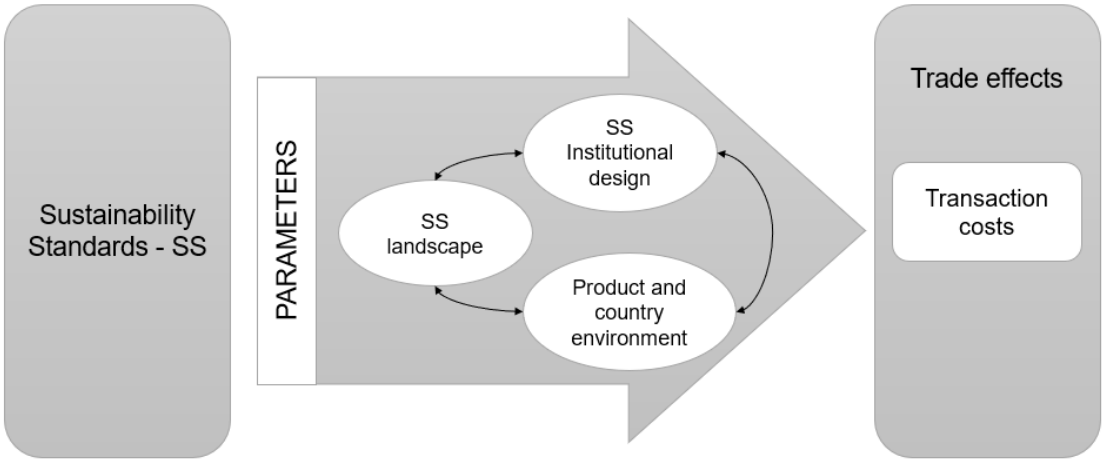
Therefore, SS can impact trade by affecting both trade costs and the level of discrimination for foreign products or foreign producers of goods and services. Regarding the level of discrimination, there should be an intention to discriminate. However, it has been seen that SS are generally not designed to have favorable treatment with a producer in one country over another in another country. On the contrary, SS intend to create potential benefits for firms as an increase in market access. In addition, sustainable demand can potentially rise and contribute to SDG, making environmental and social improvements (UNFSS, 2018). On the other hand, SS may reduce market access for certain types of producers, like smallholders or small-scale businesses in developing countries, where governments are not always technically, financially, or institutionally capable of realizing the possible benefits of SS (FIORINI; SCHLEIFER; TAIMASOVA, 2017).

Concerning trade costs, SS can influence trade by increasing compliance costs for producers, who commonly need to adapt their production techniques to get a certification. These implementation and certification costs are not always offset by the potential benefits of accessing new import markets (GIOVANNUCCI; VON HAGEN; WOZNIAK, 2014). As Andersson (2018) points out, standards are essential but may be both difficult and costly. Brandi (2020b) also argues that certification schemes might exclude small producers because it requires costs and capacities that are often out of reach

for smallholders. Additionally, there are also concerns about the number of SS that exist for the same product since it would be an incentive to adopt multiple standards and subsequently increase even more the overall trade costs (FIORINI; SCHLEIFER; TAIMASOVA, 2017).

UNFSS (2018) identifies relevant parameters that should be considered to analyze the impact of SS on trade. Figure 2 shows the parameters organized into three categories: the SS institutional design, the SS landscape, and the product and country environment of the market attended by producers.

Figure 2 – The effects of Sustainability Standards on Trade



Source: Author's own work adapted from UNFSS (2018).

The institutional design is the features of the SS system, such as the organization, the practices, and the governance characteristics (FIORINI *et al.*, 2019). It includes access to the certification, the requirements, the cost-sharing agreement that each system has, the transparency regimes, the support instruments, the compliance systems, and the form of governance (FIORINI et al., 2019; UNFSS, 2018). The analysis of these elements helps identify if a particular SS is more likely to act as a trade catalyst or trade barrier.

The second category is the SS landscape, or SS multiplicity scenario, by how many standards the sector is made up, and how these standards interact. Although it varies considerably depending on the exported agricultural commodity, some studies have verified that multiplicity of SS may act as barriers to trade because it increases information and search costs, as well as implementation and certification costs (ABBOTT; SNIDAL, 2008; MARX; WOUTERS, 2014; THORSTENSEN;

WEISSINGER; SUN, 2015). Other studies also show that certification and compliance costs in SS multiplicity are higher for smallholders in developing countries (BRANDI *et al*., 2015; LOCONTO; DANKER, 2014; RUBEN; ZUNIGA, 2011).

Therefore, the main concern regarding the increasing standard multiplicity is that it can amplify the effects of SS on trade by raising costs for exporters. For that reason, it is essential to do case-by-case in-depth assessments of the standard market impacts in different sectors (UNFSS, 2018).

Finally, the third category is related to the economic features of the relevant markets where the products are commercialized. It consists of the market structure, such as market power over the global value chain, the intensity of competition in each market, and consumer preferences in significant markets. The assessment of other parameters such as characteristics of the domestic economy, access to credit, logistical efficiencies, quality of public institutions is also included in this category (UNFSS, 2018).

The elements covered under the three categories may interact with each other, and these interactions are essential to shaping the overall effect of SS on trade. In this dissertation, the focus remains on the multiplicity of sustainability standards in the palm oil sector and its potential for creating trade costs. These relations are discussed in the next section.

2.3 SUSTAINABILITY STANDARD MULTIPLICITY AND POTENTIAL FOR CREATING TRADE COSTS

The standard multiplicity phenomenon has been increasing because of the regime complexity, the new forms of SS, and its proliferation. Abbott and Snidal (2008) describe multiplicity as a large number of SS schemes in the new transnational governance that aim to meet regulatory aspects in various ways. According to Fransen et al. (2019) multiplicity can be defined in two dimensions. Firstly, as a result of interactions among different types of organizations that set standards (NGOs, governments, and International Organizations). Secondly, as the implications of the interactions between SS and market actors, it means producers, buying firms, and consumers (FRANSEN; KOLK; RIVERA-SANTOS, 2019).

On the one hand, multiplicity[5] could be seen as a solution to fill gaps in international regulation because a single SS scheme would have a limited impact on environmental and social issues (UNFSS, 2018). In this regard, Dentoni et al. (2018) outline that SS multiplicity is an approach to governing wicked problems because the environmental, social, and economic issues to be addressed are too complicated. Moreover, many SS would be justified since the standards could tackle different sustainability issues. Likewise, multiple standards could also create benefits from the interactions and continuous learning process among them (OVERDEVEST; ZEITLIN, 2012). However, Abbott and Snidal (2008) suggest that SS have to cooperate and establish criteria to approve and recognize one another mutually if it is to reap the benefits of multiplicity in the "New Transnational Governance."

On the other hand, Fernandes and Bian (2016) argue that not only does sustainability standard fragmentation increase compliance costs, but it also makes assessments and comparisons between SS a complicated process. Trade costs effects can have several motivations. Firstly, there is evidence that producers have to meet various standards in an SS multiplicity situation because they usually sell their products to different markets and different buyers (MARX; WOUTERS, 2014). It may increase implementation and certification costs. Secondly, since there is no harmonized system between these standards and procedures, transaction and information costs for producers also may increase, making the SS a *de facto* requirement for market access (FIORINI et al., 2019; HENSON, 2008). Abbott and Snidal (2008) also agreed that firms pressured to comply with multiple SS face increase transaction, implementation, and organizational costs.

Fransen *et al.* (2019) discussed in detail six types of standard multiplicity. The first group, related to the standard-setters, comprises business society, government-nongovernment, and North-South multiplicity. The second group, related to the market actors, comprises buyer-faced, implementation and monitoring, and competitive multiplicity. The type of SS multiplicity happening in the palm oil sector is the North-

[5] From the point of view of transnational governance, it is argued that multiplicity of competing SS schemes has a number of salient virtues in comparison to old regimes led by intergovernmental organizations (ABBOTT; SNIDAL, 2008).

South multiplicity (FRANSEN; KOLK; RIVERA-SANTOS, 2019). Therefore, a literature review is conducted to have a clear picture of how this multiplicity would impact trade costs.

North-South multiplicity is related to who sets the standard (developing or developed country). It reflects a situation where globally-oriented standards established for production in various regions co-exist with locally-oriented standards developed for a specific production country. Because these types of standards may have heterogeneous criteria, so they may create trade costs for producers who must meet both types of standards (FRANSEN; KOLK; RIVERA-SANTOS, 2019).

Therefore, Higgins and Richards (2019) observe that the multiplicity in the palm oil sector arises from the development of new SS alternatives from Malaysia and Indonesia. This emergence seeks to respond to the invisibility and exclusion that mainly smallholders felt when facing a 'too high' framing of RSPO sustainable palm oil. Besides, this follows the new trend of policies from Southern countries to frame sustainability standard criteria in the South-South trade relationships. Thus, this is also a response to the powerful RSPO that did not align with the Global South markets' sustainability requirements in the palm oil sector. Abbott and Snidal (2008) describe this situation as an adverse effect of multiplicity. Governments in developing countries oppose standards they view as economically harmful or politically inconvenient, so they use multiplicity to diminish or avoid these regulatory standards.

In this context, actors in developing countries have been establishing their standards for various sectors as a reaction to private standards previously launched by companies and NGOs, mainly in developed countries. Thus, Hidayat *et al.* (2018) state that Indonesia is one of the first Southern countries to develop public and national SS for the palm oil sector, the ISPO. Still, ISPO and MSPO schemes could mainly compete with the RSPO at the national level in Indonesia and Malaysia. In other words, the competition among them is quite limited because to compete globally, the local standards would first need a more convincing balance in terms of their sustainability objectives and economic interests and to improve their implementation and enforcement mechanisms (HIDAYAT; OFFERMANS; GLASBERGEN, 2018).

Schouten and Bitzer (2015) outline that Southern standards target different audiences like in national boundaries or South-South trade, and rely on other sources to obtain legitimacy because they are in its majorities governmental initiatives if compared to Northern standards. Likewise, Giovannucci et al. (2014) describe an emerging trend in the formulation of new national SS in various sectors: China's Green Food, Indonesia Sustainable Palm Oil, Brazil's Certificate Minas Cafe, and the Sustainability Initiative of South Africa (SIZA). These SS act only within national boundaries because these domestic standards tend to be less restrictive and less credible to markets. Hence, they are not commonly useful for international global trade.

Similarly, Marin-Burgos *et al.* (2015) analyze the responses to the RSPO by Colombia, which is the 5th largest producer of palm oil in the world and the first in America. In this country, several civil society organizations have disagreed with the national interpretation of RSPO. Therefore, the study reveals a controversy about the legitimacy of the RSPO by local actors involved in these socio-environmental conflicts that resist the expansion of oil palm cultivation. Lastly, this situation could lead to a more significant proliferation of standards in the sector because it could result in new national palm oil sustainability standards created in Colombia.

Moreover, Brandi (2020b) denotes that state-driven sustainability standards create even more multiplicity in the standard market. The author argues that the introduction of ISPO has generated new competing and national standards for the palm oil industry, as in the case of the MSPO of the Malaysian Government. It also motivates the creation of national schemes in other sectors, such as in Brazil, that introduces schemes for soy oil. Nevertheless, some studies claim that the introduction of national standards could benefit producers, especially smallholders in developing countries because local supporting institutions are vital for entering the global value chain (LEE; GEREFFI; BEAUVAIS, 2012; UNFSS, 2020).

Therefore, the main implication of North-South multiplicity is the requirement heterogeneity that producers have to address. This situation is intensified by the implementation and monitoring multiplicity, where various standards are implemented and monitored at one producer. Consequently, that situation contributes to increasing costs for producers, which pass through different standards verifications with different

requirements (FRANSEN; KOLK; RIVERA-SANTOS, 2019). Besides, trade costs are one reason why producers find SS certification unattractive (FIORINI; SCHLEIFER; TAIMASOVA, 2017). So, multiplicity could negatively affect the standard governance effectiveness as it increases costs of implementation and certification for producers subject to multiple standardizations.

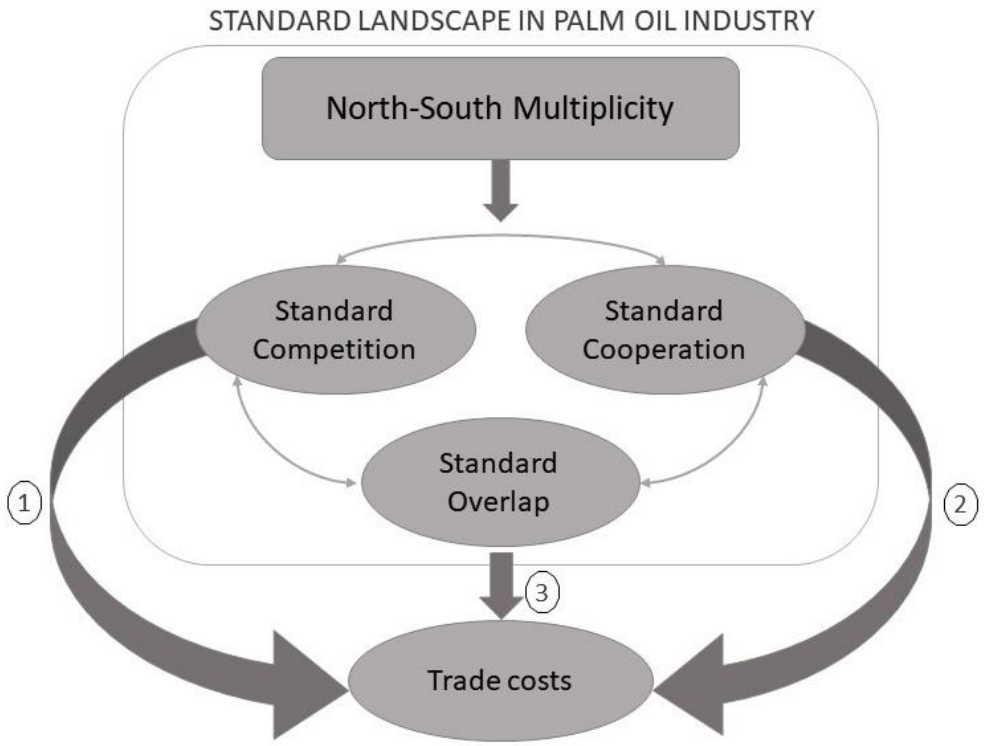
Schleifer et al. (2019) argue that compliance costs rise when producers must go on multiple verification trajectories for various standards established by the North or South actors. In this regard, the literature shows that North-South multiplicity originates trade costs for producers in the palm oil sector when accompanied by implementation and monitoring multiplicity. It also happens because firms want to sell their products to different buyers or consumer markets in the world (FRANSEN; KOLK; RIVERA-SANTOS, 2019). In these terms, palm oil is consumed in inedible sectors, such as detergents and cosmetics, the biofuel industry, and the food industry (PIRKER et al., 2016). Palm oil is found in one of every two products in the supermarket, thus becoming a global agro-food commodity. (OOSTERVEER et al., 2014).

Identifying the type of multiplicity is a first step in determining what standard multiplicity means in a specific sector (FRANSEN; KOLK; RIVERA-SANTOS, 2019). But beyond that, it is essential to evaluate the pattern of interactions among these standards and the degree to which they are subjected to overlap, competition, and/or cooperation.

2.4 CONCEPTUAL FRAMEWORK

Figure 3 shows a conceptual framework to assess the potential trade cost effects for producers in the palm oil sector regarding the North-South multiplicity context.

Figure 3 – The potential effects of multiplicity on trade costs



Source: Author's own work based on UNFSS (2018) and Fransen *et al.* (2019)

The literature review suggests that the sustainability standard landscape in the palm oil sector is predominantly shaped by North-South multiplicity[6]. Though, it could also be accompanied by implementation and monitoring multiplicity. In the North-South multiplicity context, there exists a heterogeneity of criteria in the requirements. If these different requirements are implemented and verified in the same producer, it could impact trade costs. So, the North-South multiplicity effects on trade could also be amplified by the multiplicity of implementation and monitoring in the market.

Figure 3 also shows the complex SS interactions within this multiplicity scenario: standard competition, standard cooperation, and standard overlap (FIORINI; SCHLEIFER; TAIMASOVA, 2017; UNFSS, 2018). Those interactions act as relevant parameters that are likely to shape the impacts of SS multiplicity on trade costs in a

[6] Positive implications of North-South multiplicity are more power-sharing in governance of SS between Northern and Southern actors and more responsiveness of standards to producer needs, which gives higher chances of influencing the standard setting (FRANSEN; KOLK; RIVERA-SANTOS, 2019).

specific sector. The direct effects on trade costs are represented by arrows 1, 2, and 3. However, all those three parameters can potentially interact with each other creating indirect effects of multiplicity on trade costs (internal arrows in Figure 3 offer a graphical representation).

Standard overlap expresses the share of requirements of a sustainability standard addressed by another sustainability standard in the same sector (UNCTAD, 2017). According to UNFSS (2018), it is relevant to analyze specific countries and industries to know the consequences generated by standard overlap.

Standard competition and standard cooperation reveal the strategies that SS schemes use to interrelate with others in the market (MARX; WOUTERS, 2014). The standard competition seeks to measure how much the standards differ in terms of requirements and processes among them (FIORINI; SCHLEIFER; TAIMASOVA, 2017). The cooperation is a set of strategies that aim at reducing the burden of compliance created by competition to producers (ABBOTT; SNIDAL, 2008; FIORINI; SCHLEIFER; TAIMASOVA, 2017; FRANSEN, 2015). Marx and Wouters (2014) also sustain that the negative results of the competition, such as multiple certification requirements and credibility or legitimacy gap, could be reversed by using strategies of cooperation like mutual recognition and meta-regulation.

Likewise, competition and cooperation may coexist in the market. This phenomenon is called the dynamic of co-opetition. It occurs because multiplicity is not a simplistic phenomenon, and the combination of those interactions could be optimal in some markets (ESTY; GERADIN, 2000). Accordingly, Kumar et al. (2020) one of the main drivers of the co-opetition is that the standards share objectives and criteria, as well as the fact that they want to improve their sustainability performance. The authors state 3 types of co-opetition strategies balanced-strong, competition-dominated and cooperation-dominated co-opetition. Lastly, they argued that a balanced-strong co-opetition approach to sustainability is necessary for regulator performance across all three economic, social and environmental aspects.

Finally, trade costs in our model are defined as implementation and certification costs that together made the compliance costs of a SS (FIORINI et al., 2019; SCHLEIFER; FIORINI; FRANSEN, 2019; UNFSS, 2018). As it was stated, this study

aims to shape the effects of SS multiplicity on trade cost. The relevant issue is whether the multiplicity and its parameters generate an increase or a decrease in trade cost for producers in the palm oil industry.

The North-South multiplicity scenario increases the number of standards in a market because standards are developed in northern countries and also in southern countries (FRANSEN; KOLK; RIVERA-SANTOS, 2019). This situation often results in heterogeneity criteria, and Fiorini et al. (2017) also evidence that a more significant number of standards would result in huge differences between requirements for producers. Another critical fact to remember is that powerful importing countries make standards a condition to enter the market. Therefore, large producers understand standards as a competitive advantage over small producers, who usually cannot access lucrative export markets because of the lack of certifications (HENSON; HUMPHREY, 2009; LEE; GEREFFI; BEAUVAIS, 2012). Thus, multiplicity or fragmentation could increase SS compliance costs for producers. There is also evidence in other sectors, such as the coffee or food industry, that an increase in the number of SS raises the adoption of certificates by producers (HENSON; HUMPHREY, 2009; REINECKE; MANNING; VON HAGEN, 2012; RUBEN; ZUNIGA, 2011). Therefore, our first research proposition is, the higher the number of SS schemes for the same products (multiplicity), the greater the requirement dissimilarities, and the higher the trade costs.

Arrow 1 denotes the direct effect of standard competition on trade costs. In practice, what would indicate competition between standards is when different SS systems have a similar policy focus or address the same industry or product (FRANSEN; SCHALK; AULD, 2016). Moreover, those different SS programs compete for legitimacy[7] to get external support from various stakeholders, because private and voluntary SS do not enjoy the same taken-for-granted legitimacy as public authorities (CASHORE; AULD; NEWSOM, 2004). Hence, they require to obtain it from legitimacy-providing actors such as consumers, industry associations, international organizations, etc. Therefore, SS gain legitimacy by strategizing their governance[8] models (FRANSEN,

[7] Legitimacy could be defined as the conformity with social norms, values and expectations (PALAZZO; SCHERER, 2006).

[8] The term "governance" in sustainability standards programs is "*understood as the organization of power and responsibility inside a program"* (FRANSEN, 2012).

2012), which means they could use their institutional design and sustainability criteria to compete in the market (CASHORE, 2002). Schouten and Bitzer (2015) argue that in the palm oil sector, the relationship between ISPO and RSPO appears to be more contentious and competitive because the ISPO has local producers as the audience in its institutional design.

In a market with standard competition, new local standards setters can learn from the stricter standards and improve their criteria, generating a race-to-the-top dynamic. However, many SS competing themselves could also lead the producers to a "forum shop" and to strategically choose to adopt the standard system with the most accessible requirements and lower costs, what is called race-to-the-bottom (OVERDEVEST; ZEITLIN, 2012). In this regard, Cashore *et al.* (2004) outline that while major firms and those under strong state regulatory standards are likely to join strict global sustainability standards for strategic advantage, some companies and especially smallholders are likely to join weaker competing schemes.

In this respect, the race-to-the-bottom dynamic seems to create an opportunity for producers since it would be more favorable to adopt standards with less strict criteria and lower costs (ABBOTT; SNIDAL, 2008). Nevertheless, it is revealed that private certifications are widely accepted by almost all retailers in developed countries, due to evidence of greater authority and sustainability in green trade compliance. (GULBRANDSEN, 2011). Consequently, local and public sustainability standards still need a more convincing balance regarding their sustainability objectives and economic interests to compete globally (HIDAYAT; OFFERMANS; GLASBERGEN, 2018). Regarding this, producers who aspire to sell to northern countries have to get both locally-oriented certifications and globally-oriented ones, going through the effects of North-South multiplicity.

From the transnational governance theory, standard competition should facilitate the adaptation of standards and procedures to local circumstances; promote regulatory experimentation; and avoid institutional capture by obliging SS schemes to compete with one another for legitimacy and public support (ABBOTT; SNIDAL, 2008). However, competition for legitimacy can lead to adverse consequences for producers, mostly higher trade costs, because they have to face multiple standards certifications at the same time to satisfy their traders and consumers. It happens because many standards operating in

the same market tend to distinguish themselves by depth or uniqueness of sustainability requirements and institutional design (FIORINI; SCHLEIFER; TAIMASOVA, 2017). Accordingly, UNCTAD (2017) argues that dissimilarities in regulatory requirements can increase trade costs.

Moreover, when sustainability standards do not recognize each other criteria and requirements in their governance model, standard competition creates further implementation, certification, packaging, and labeling costs for producers. The last two costs increase because the lack of mutual recognition does not permit different SS logos together in one label (MARX; WOUTERS, 2014). Therefore, our second research proposition is: the higher the standard competition, the higher the trade costs (Arrow 1).

Standard cooperation also has a direct effect on trade costs (arrow 2). According to Marx and Wouters (2014), cooperation between standards, through mutual recognition or meta-regulation, can solve increased costs and credibility gaps. As standard collaboration requires recognition and acceptance of each other criteria, it reduces compliance and labeling costs and avoids new standards or duplication in the market. Thus, better cooperation among SS could reduce trade costs for developing-country producers subjected to multiple standards (FIORINI; SCHLEIFER; TAIMASOVA, 2017).

Mutual recognition refers to a system where standards recognize each other procedures and requirements to maintain the credibility of SS (UNFSS, 2020). Therefore, mutual recognition generates positive interactions and upward convergence of SS certification schemes as it avoids entering a race-to-the-bottom dynamic (OVERDEVEST; ZEITLIN, 2012). Accordingly, mutual recognition helps in the legitimacy and credibility gap of SS systems, reducing costs for adopters as the SS harmonizes their requirements with each other (FIORINI; SCHLEIFER; TAIMASOVA, 2017; MARX; WOUTERS, 2014). Hence, producers could have the possibility of getting less SS certification, reducing trade costs of compliance.

Besides, meta-standards are defined as “the governance of the governance” (FRANSEN, 2015). Meta-regulators certified that a SS has a plan with rigorous standard-setting, monitoring, and verification procedures and can play an important role in helping companies to contribute to the 2030 Agenda (MARX; WOUTERS, 2014). Those meta-

standards set minimum criteria for credible standard systems, including stakeholder consultation, balanced participation, and adaptation to local conditions (WALTER, 2011). Still, there is a discouraging overall meta-standards scenario since hundreds of SS schemes operate independently in industrial and agricultural sectors, but few meta-standards exist (UNFSS, 2018). There exist two recognized organizations that have developed significant governance capacities and meta-governance standards: the Global Social Compliance Programme (GSCP) and the International Social and Environmental Accreditation and Labelling (ISEAL) Alliance (FIORINI et al., 2019). Lastly, it is also suggested that the UNFSS is a crucial player in the meta-regulation of sustainability standards (THORSTENSEN; VIEIRA, 2016).

Similarly, in partnership with European University Institute – ITC/EUI, the International Trade Center has assessed three cooperation instruments among standard systems (FIORINI; SCHLEIFER; TAIMASOVA, 2017). Firstly, the lower level of cooperation is the information exchange, which includes formal and informal interactions between SS schemes, and national, and intergovernmental regulators. Benchmarking is another cooperation instrument in which requirements and processes are compared among SS to facilitate equivalency. Finally, the highest level of cooperation is recognition and harmonization. Recognition can be from one side or mutual, in which standards recognize one another's criteria. On the other hand, harmonization means that SS schemes attempt to adapt to be more similar.

In some sectors or at a general level, cooperation is a daunting challenge in the sustainability standards market. Using the Ecolabel Database, Marx and Wouters (2014) demonstrate that only 64 of 426 VSS are recognized by others (equivalence recognition), and to make it worse, only seven standards apply mutual recognition. For instance, one strategy used in the Brazilian soy sector is the National Platform between UNFSS and Brazilian research institutions to provide reliable data on VSS (information exchange strategy) (UNFSS, 2018). Another great example is the merger of UTZ and the Rainforest Alliance in 2017 (harmonization) what created a single global standard to simplify certifications in agricultural commodities like cocoa, coffee, and tea (RAINFOREST, 2017).

UNFSS (2018) also suggests that government and international organizations could also promote cooperation among standards, greatly benefiting producers and firms.

For example, the government could provide platforms that help improve the understanding of standard proliferation characteristics. The government could also offer producers and companies information to compare all the standards in their area or conduct benchmark studies faster and more accessible. Likewise, it could subsidize at least minimum standards or finance a platform that allows coordination and cooperation between SS.

Additionally, the state could delegate compliance to a national SS using a baseline standard. In this context, UNFSS (2018) considers that national public standards are desirable tools for producer country governments to have incentives to progress in SDGs and adapt globally-oriented SS to local circumstances. Similarly, Lee et al. (2012) affirm that having national standards also works best as a basis for producers to be more prepared to adapt to global standards.

According to Abbot and Snidal (2008), states and international organizations should "orchestrate" SS by establishing criteria for assessing certification schemes and disseminating this information to consumers and other actors, and fostering collaboration and comparison among competing schemes to identify, diffuse, and scale-up effective practices and approaches. In this manner, the benefits of multiplicity could be reaped while minimizing the disadvantages of regime complexity. Fransen et al. (2019) also argue that through cooperation strategies among standards, North-South multiplicity impacts are reduced because standards pass through harmonization criteria and processes.

Standard cooperation in a SS multiplicity landscape represents the ideal type of New Transnational Governance (ABBOTT; SNIDAL, 2008). In this respect, producers would not have to go through many verification standards. With a higher level of cooperation, producers would probably be required to have fewer SS certifications to sell their products to different markets. In a North-South multiplicity, cooperation is needed to evade duplicating standard requirements and to avoid an increase in compliance costs (FRANSEN; KOLK; RIVERA-SANTOS, 2019). Therefore, our third research proposition is the higher the cooperation among SS, the lower the trade costs (Arrow 2).

The relationship between standard overlap and trade costs is shown through arrow 3. Standard overlap expresses how similar requirements are between two standards (UNCTAD, 2017). When standards requirements do not overlap among them means that

they present the highest heterogeneity. Consequently, producers should face higher costs to adequate and comply with all these different requirements. Winchester et al. (2012) argue that heterogeneity in regulation means higher implementation costs for producers to access a specific market. In the palm oil sector, heterogeneity could occur when local-producer-focused standards, that mainly serve domestic or South-South markets (FRANSEN; KOLK; RIVERA-SANTOS, 2019), differ from global-oriented standards, set by northern actors. Therefore, in a North-South multiplicity scenario, compliance costs rise because producers face different standards, so they must go through multiple verifications for dissimilar requirements.

On the other side, low heterogeneity means that standard requirements overlap each other. Hence, producers would only adequate their production techniques and processes to one set of criteria, implying that this could cover all the other SS schemes. As Drogue and DeMaria (2010) argue, similarities among regulations impact trade positively because it does not act as trade barriers. In this respect, regulatory convergence can reduce costs while maintaining the benefits of standard systems (UNCTAD, 2017). Thus, our fourth research proposition is the lower the standard overlap, the higher the trade costs (Arrow 3).

Figure 3 also exhibits that standard competition, standard overlap, and standard cooperation interact with each other. All this together can cause indirect effects on trade costs. According to Fiorini et al. (2017) standard competition leads to deep differentiation among SS criteria and processes. So, in highly competitive standard markets, producers must implement and adapt to many dissimilar standard criteria to comply with different certifications that retailers demand. In this manner, standard competition reduces standard overlap and increases trade costs for producers (FRANSEN, 2015).

In contrast, better cooperation can be a solution to fragmentation because if SS systems have different requirements but cooperate among them, producers could probably pass-through fewer certification processes. Fiorini et al. (2017) confirm that in the higher level of cooperation, which is harmonization, standards systems adapt their criteria on purpose to be more similar. Therefore, standard cooperation allows alignment of requirements, processes, and audits, which positively increases standard overlap and reduces trade costs (ABBOTT; SNIDAL, 2008).

Standard overlap also could affect cooperation because, with lower standard overlap, it is more challenging to pursue higher cooperation strategies. It happens because low overlap among requirements means that standards are dissimilar, then it should be required a lot of effort if a SS scheme is willing to cooperate with others. On the other hand, even with a high level of standard overlap, it does not mean that costs are reduced immediately because the lack of cooperation between them could also increase costs for producers. It is called duplication in industry cover (UNFSS, 2018). That is why it is relevant to analyze specific countries and industries to know the effects of multiplicity and its interactions.

Finally, the standard competition and the cooperation standard can also interact in the market, defining a co-opetition strategy. If there is a balanced level of co-opetition, there would be several benefits in the standards system, such as the reduction of inefficiencies or inability, since the standards go through a learning process to strengthen their regulatory performance (ESTY; GERADIN, 2000). Another benefit would be the stimulation of innovation and knowledge sharing with partners, as well as the ability to enter new markets and achieve bigger goals (KUMAR; CONNELL; BHATTACHARYYA, 2020).

Furthermore, there are also some limitations of having a co-opetition in the standard market. Due to the increase of regulatory capture by the more powerful groups. However, Esty and Geradin (2000) affirm that this would be a simplistic vision since the mix of cooperation and competition in the market would actually stimulate that standards always feel pressured to develop winning proposals for both, their adopters and competitors in the market. On the other hand, there may also be a level of conflict between the SS when competition and cooperation in the market coexist. This could cause an increase in costs for everyone involved, including adopters (CYGLER et al., 2018).

This theoretical framework reveals significant implications in standard multiplicity features, varying across sector/product or country context. The link between standard multiplicity and trade costs (implementation, certification, packaging, and labeling) is exposed in this framework. Finally, the focus is kept on producers' effects because it is more common to push down all these costs to producers, while benefits of price mark-ups stay with buying firms (FRANSEN; KOLK; RIVERA-SANTOS, 2019).

3 METHODOLOGY

3.1 STANDARD OVERLAP APPROACH

We follow the regulatory overlap method defined by UNCTAD (2017) to measure the overlap among sustainability standards in the palm oil industry. We calculated the Standard Overlap Index (SOI) to determine the share of sustainability standard requirements already covered by another standard.

Table 1A in Appendix 1 presents 318 requirements covered in at least one of the five most important SS schemes RSPO, ISCC, RSB, MSPO, and ISPO. We considered requirements in environmental, social, and management dimensions. The data is provided by Standard Map Database – SMD that collects, reviews, and categorizes standards information on requirements and processes in many sectors and markets.

Therefore, the specific requirement (*r*) applied by a sustainability standard (*i*) is defined as a dummy variable:

$$x_i^r = \begin{cases} 1, & if\ the\ sustainability\ standard\ i\ applies\ the\ requirement \\ 0, & if\ no\ such\ requirement\ is\ applied \end{cases} \quad (1)$$

The standard overlap index (SOI) between two standards *i* and *j*, calculated from the perspective of *j* is:

$$SOI_{ij} = \frac{\sum_{r=1}^{R} x_i^r\, x_j^r}{\sum_{r=1}^{R} x_i^r} \times 100 \quad (2)$$

SOI index ranges between [0,100] and increases with the similarities between requirements among standards. SOI = 0 means no similarities of requirements between sustainability standards. When the index gets the maximum value, SOI = 100, there is complete standard overlap.

Table 1 illustrates an example of how the SOI is calculated. The first column shows thirteen different types of requirements. In the second and third columns, we observe that Sustainability Standard 1 (SS 1) applies 11 of the standard requirements while Sustainability standard 2 (SS 2) uses 9. It is indicated by the dummy variable, which takes the value "1". Furthermore, seven requirements are adopted by both SS, which is considered as the number of overlapping requirements. Then, it can be assumed that a

producer that possesses the SS 2 could also comply with the inspection of the SS1 in those seven requirements that they have in common. However, there is no overlap regarding four other requirements, so producers with SS 2 need to comply with those requirements when certifying with SS 1. Finally, Table 1 shows that the share of standard overlap could be calculated from the perspective of SS 1 or SS 2.

Table 1 – Example of standard data mapping regarding Standard Overlap

Standard Requirements	**SS 1**	**SS 2**
Soil: General principal	1	1
Soil erosion	1	1
Soil conservation	1	1
Soil quality	1	1
Soil nutrients	1	1
Soil productivity	1	0
Soil biodiversity	1	0
Soil contamination	1	0
Soil preparation for specific crops	0	1
Soil maintenance	0	1
Soil enhancement by use of cover crops	1	0
Soil compaction	1	1
Other criteria relating to soil	1	1
Total number of requirements covered	11	9
Number of overlapping requirements		7
SOI from the perspective of SS 1		7 out of 9: **77,8 %**
SOI from the perspective of SS 2		7 out of 11: **63,6 %**

Source: Author's own work based on UNCTAD (2017)

It is worth noting that the Standard Overlap Index is asymmetric as it indicates the share of requirements applied by one SS that is also applied by another standard. However, the vice versa measurement will result in a different proportion. In Table 1, from the perspective of SS 1, SOI is 77,8%, but from the perspective of SS 2, it is 63,6%.

3.2 STANDARD COMPETITION APPROACH

The standard competition dynamic in the palm oil industry is assessed through the level of differentiation between SS. In this approach, SS systems behave like firms. Certificates or eco-labels are the products they offer to their potential clients, especially producers, in the global value chain because the certification process mainly occurred at

the production level (UNFSS, 2018). Therefore, to compete in the market, SS systems seek to differentiate their products as much as possible (MARX; WOUTERS, 2014).

Fiorini et al. (2017) argue that many competing standards operating in the same industry tend to strongly differentiate each other in requirements and processes. Accordingly, the level of competition in the standard market refers to different SS systems that have a similar policy focus and address the same industry and product (FRANSEN; SCHALK; AULD, 2016). Consequently, higher standard competition in the market is exposed when sustainability requirements and institutional design between standards are more dissimilar.

Rau et al. (2010) developed the Heterogeneity Index of Trade (HIT) to measure the dissimilarity of regulations and standards between an importing country and an exporting country. So, an adaptation of the HIT is appropriate to measure the heterogeneity among sustainability standards requirements and procedures.

The Heterogeneity Index of Standards (HIS) is calculated to determine the dissimilarities between Sustainability Standards in the global palm oil industry. Standard Map (2020) provides information on the degree of obligation for each requirement presented in Table 1A (*Appendix 1*). The degree of the obligation describes the extent to which a requirement needs to be implemented by producers pursuing certification.

Following Standard Map methodology (2020), we propose a ranking score for the degree of the obligation of the sustainability requirements, which ranges from one (the least restrictive) to five (the most restrictive) (Table 2).

Table 2 – Degree of obligation[9]

	Rank	Variable
Compliance must be met immediately; otherwise, applicants are excluded from the certification/verification process.	5	Ordinal
Within one year: compliance must be met in less than 12 months after initial registration/certification formalities.	4	
Within three years: compliance must be met in less than 36 months after initial registration/certification formalities.	3	
Within five years: compliance must be met in a period defined as more than 36 months and less than 60 months after initial registration/certification formalities.	2	
Compliance "should" be met, but non-compliance is not a matter of exclusion or sanction. Or compliance is not required by the Standard	1	

Source: Author's own work based on Standard Map database (2020)

Let x_{ir} be the rank of the degree of the obligation of the requirement *r* for the standard *i*, and x_{jr} be the rank for the same requirement *r* for the standard *j*. Define R as the total number of requirements *r (318 in our case)*, and max (x_{sr}) and min (x_{sr}) as the maximum and minimum value of the rank of the degree of the obligation of the requirement *r* in the entire dataset *s*. Based on the Grower index of dissimilarity, the HIS index between two sustainability standards is defined as follows:

$$HIS_{ji} = \frac{1}{R}\sum_{r=1}^{R} DS_{jir}^{HIS} \tag{3}$$

Where DS_{jir}^{HIS} is the measure of the dissimilarity for each requirement r, calculated as follows:

$$DS_{jir}^{HIS} = \frac{\left|x_{ir} - x_{jr}\right|}{\max x_{sr} - \min\ x_{sr}} \tag{4}$$

[9] This rank measures how quickly the requirement must be met. So, when the rank is equal to 1, the compliance should be met OR it is not required. Therefore, HIS index does not contain the Standard Overlap Index because, in this case, a requirement that ranks 1 for HIS would not always be iqual to 0 in the SOI index. Hence, the importance of calculating, separately, the SOI to reveal the level of overlap between the standards and the HIS index that takes the difference in the degree of the obligation among standards.

The HIS index ranges between [0,1] and increases with differences in the degree of the obligation of the requirements. HIS = 0 means no difference in the degree of the obligation of requirements between sustainability standards. When the index gets the unit value, HIS = 1, the difference in the obligation is the largest.

Regarding the institutional design features, Fiorini et al. (2019) claim that sustainability standard schemes use their processes, structures, and organization characteristics to differentiate themselves from others and to get support and affiliation from producers.

To measure the dissimilarity in the institutional design between two sustainability standards, we propose the Heterogeneity Index of Institution Design – HIID. For that purpose, we consider the main SS Institutional Design – ID features divided into six dimensions derived from several variables, as presented in Table 3. The dimensions of cost-sharing arrangement, support mechanisms, monitoring systems, and transparency regime are widely acknowledged for sustainability standards and addressed by several studies (FIORINI et al., 2019; SCHLEIFER; FIORINI; FRANSEN, 2019; UNFSS, 2018). Furthermore, it was added the dimension regarding standard-setter and involvement of producers in the decision-making process, which are relevant in the context of North-South multiplicity in the palm oil standard market (FRANSEN; KOLK; RIVERA-SANTOS, 2019; STANDARD MAP, 2020). All the variables are nominal, so the values they assume present different categories rather than a rank or an order.

Regarding the standard-setter, we divided it into two categories, public and private entity. Standards set by public sector entities commonly mean more support, best cost-sharing schemes, and welfare maximization for producers; at the same time, they have more legal enforcement power than the private ones (UNFSS, 2018). Therefore, it could result in a higher capacity to compete in some sustainability standard markets (FIORINI et al., 2019). Another dimension of institutional design is whether producers are inserted or not in the decision-making process of the sustainability standard (STANDARD MAP, 2020)

Cost-sharing arrangements mean that a SS system includes an agreement to distribute compliance costs among the value chain actors and not merely charges these costs to the producers (UNFSS, 2018). This dimension consists of two variables being

implementation and certification costs. Then, we consider if the producers bear these costs alone or share with other players in the global value chain, or if there is no specific information about this on the standard schemes (FIORINI et al., 2019).

Support mechanisms include different variables as standard and documents, technical assistance in the requirement, technical assistance beyond requirements, financial aid, equipment, procedures on remediation[10], and group certification or verification[11] (STANDARD MAP, 2020; UNFSS, 2018). We consider only the existence or non-existence of these types of support.

The monitoring system could be made for first-party, second-party, or third party. According to Giovannucci et al. (2014), third-party enforcement mechanisms are more credible to the SS. Therefore, standard systems should have a third-party monitoring system to be more reliable.

The different ways SS schemes provide information to other actors in the supply chain comprise the SS's transparency regime dimension. Hence, the variables contemplated on this aspect are standards and national adaptation documents, governance structure, certification and verification processes, dispute settlement resolution policies, and financial statements (FIORINI et al., 2019). We consider only the existence or non-existence of these types of information disclosure.

[10] It refers to the set of corrective measures that producers or companies must follow to address non-conformities during the certification process or even when certification is suspended or revoked (STANDARD MAP, 2020).

[11] Group certification or verification is a system made especially for independent oil palm smallholders that are seeking certification jointly (RSPO, 2010).

Table 3– SS institutional design features

Institutional Design dimension	Values
Standard-setter	0. Private entity 1. Public entity
Involvement of producers in the decision-making process	0. Do not involve producers 1. Involve producers
Cost-sharing arrangement	
Implementation costs	0. Producers alone 1. Producers jointly with other players 2. No specific information
Certification costs	0. Producers alone 1. Producers jointly with other players 2. No specific information
Support Mechanisms	
Supporting documents	0. Does not provide access to supporting documents 1. Provide access to supporting documents
Technical assistance	0. Does not provide technical assistance for compliance with SS 1. Provide technical assistance for compliance with SS
Technical assistance beyond requirements	0. Does not provide technical assistance beyond compliance with SS 1. Provide technical assistance beyond compliance with SS
Financial assistance	0. Does not provide access to financial assistance 1. Provide access to financial assistance
Equipment	0. Does not provide support through equipment 1. Provide support through equipment
Procedures on remediation	0. Does not provide a procedure for clients that address non-conformities 1. Provide a procedure for clients that address non-conformities
Group certification/verification	0. Does not allow group certification or verification 1. Allow group certification or verification
Monitoring system	0. First-party Only 1. Second-party only 2. Third-party only

Transparency Regime	
Standards and national adaptation documents	0. Does not disclose information on standards and national adaptation documents 1. Disclose information on standards and national adaptation documents
Governance structure	0. Does not disclose information on the governance structure 1. Disclose information on the governance structure
Certification/verification	0. Does not disclose information on certification/verification 1. Disclose information on certification/verification
Complaints dispute settlement resolution policies	0. Does not disclose information on complaints dispute policies 1. Disclose information on complaints dispute policies
Financial statement	0. Does not disclose information on financial statement 1. Disclose information on financial statement

Source: Author's own work based on UNFSS (2018), Fiorini et al. (2019), and SMD (2020)

Let x_{if} be the institutional design feature *f* in the standard *i*, and x_{jf} the same feature *f* for the standard *j*. Define F as the total number of features *f*, and max (x_{sf}) and min (x_{sf}) as the maximum and minimum value of institutional design feature *f* in the entire dataset. Based on the Grower index of dissimilarity, the Heterogeneity Index of Institution Design - HIID between two sustainability standards is as follows:

$$HIID_{ji} = \frac{1}{F}\sum_{f=1}^{F} DS_{jif}^{HIID} \tag{5}$$

Where DS_{jif}^{HIID} is the dissimilarity for each institutional design feature *f*, calculated as follows:

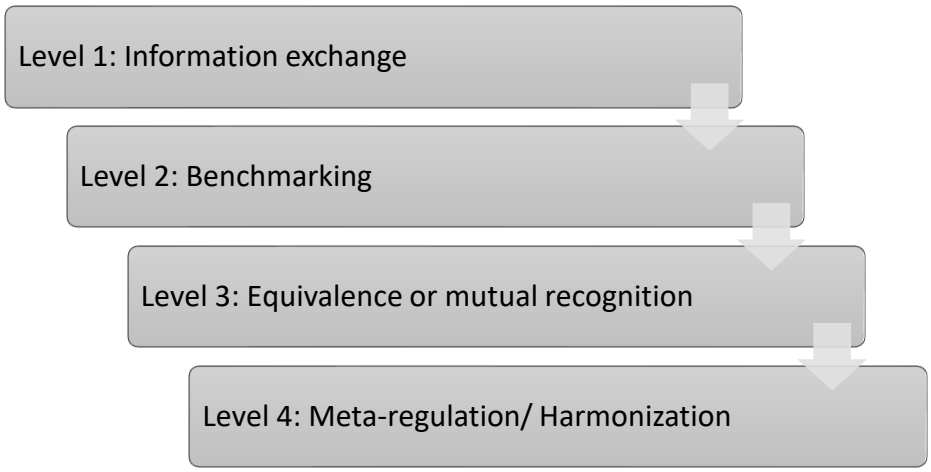
$$DS_{jif}^{HIID} = \frac{\left|x_{if} - x_{jf}\right|}{\max(x_{sf}) - \min(x_{sf})} \tag{6}$$

The HIID index ranges between [0,1] and increases with differences in institutional design dimensions. HIID = 0 means that there is no difference in the institutional design between the two sustainability standards. When the index gets the unit value, HIID = 1, the institutional design difference is the highest. Finally, having together HIS and HIID indexes, we could measure the differentiation level among SS (in sustainability requirements and institutional design), which provides the competition in the market. Therefore, the higher HIS and HIID, the higher standard competition.

3.3 STANDARD COOPERATION APPROACH

To identify the cooperation strategies that could be happening in the global palm oil industry, we draw from Marx and Wouters (2014) and Fiorini et al. (2017) four strategies that SS systems, government, and international organizations have been following to interact in the cooperation field (Figure 4).

Figure 4 – Strategies of Standard Cooperation



Source: Author's own work based on Marx and Wouters (2014) and Fiorini et al. (2017)

As it was stated, SS systems could achieve four levels of cooperation. The purpose of our analysis is to outline the level of cooperation in the global palm oil market. Thus, the methodology used to analyze cooperation is the Matrix Method. This is a qualitative method based on creating categories located in the rows and subgroups selected for the study presented in the columns (GROENLAND, 2018).

In our qualitative matrix, the categories in the rows will be the four levels of cooperation as listed in Figure 4. Finally, in the columns, this matrix will represent the relationship between SS schemes, SS schemes, and the government, and between SS schemes and international organizations. Those actors significantly impact the cooperation dynamic (FIORINI; SCHLEIFER; TAIMASOVA, 2017). The matrix is completed according to the information of cooperation found in this market.

3.4 DATA

The primary data source is the Standards Map Database - SMD managed by the International Trade Centre. Standard Map is one of the largest databases and one of the

most comprehensive resources available on sustainability standards (FIORINI; SCHLEIFER; TAIMASOVA, 2017; SCHLEIFER; FIORINI; FRANSEN, 2019). SMD mainly contains information about private SS, so we collected information about the RSPO, ISCC, and RSB there.

On the other part, information about MSPO was directly collected from the secretariat through an electronic email request. Although we requested information from the ISPO secretariat, we did not get any responses. Therefore, the sources of data used for this standard were information available publicly or accessible through the homepage of the standard organization and the websites of other relevant external organizations.

We use the Standards Map Database for the standard overlap and competition analysis to get information concerning sustainability requirements and the level of differentiation of institutional design regarding RSPO, ISCC, and RSB. To organize and classify the data of MSPO and ISPO, we analyze original documents and webpages, and the report sent by the MSPO secretariat.

Regarding the cooperation strategies, we visited the UNFSS platform, ISEAL alliance platform, International Trade Centre – ITC Sustainability Reports, Standard Map Database, and websites of the five SS schemes analyzed in this dissertation.

All calculations are processed using the R Software in the RStudio 1.2.5042 version, updated in 2020.

4 RESULTS AND DISCUSSION

4.1 STANDARD OVERLAP ANALYSIS

The Standard Overlap Index (SOI) values for each pair of sustainability standards are presented in Table 4. These values should be read in percentage and from the perspective of the standard positioned in columns. For example, the RSPO standard overlaps the ISCC requirements by 71.6%. Table 4 also shows that standard overlap is not symmetric. For instance, 79.6% of ISCC requirements are also applied by the RSPO standard. However, the RSPO standard overlaps with ISCC requirements in 71.6%. It indicates that for producers who hold ISCC certificates is presumably less costly to comply with RSPO requirements. However, for producers or firms with RSPO certification is a little more expensive to obtain the ISCC standard.

In general, the level of standard overlap is high in the palm oil market. Most pairs of standards have high overlap values, except for ISPO, which has very low values. It is worth noting that the standard overlap indices for private standards are higher than for public standards. This result is expected since the North-South multiplicity phenomenon in the palm oil industry generates heterogeneous criteria between standards. Also, the SOI level among private standards is different. For example, the RSB has a lower level compared to the RSPO and the ISCC, which can be explained by the fact that RSB, unlike the other private standards, is more focused on palm oil as a biofuel product.

Table 4 – Standard Overlap Index (SOI)

	RSPO	ISCC	RSB	ISPO	MSPO
RSPO		79.6	60.9	37.0	66.8
ISCC	71.6		64.0	36.8	60.9
RSB	76.9	89.8		39.2	67.2
ISPO	79.8	88.1	67.0		88.1
MSPO	88.2	89.3	70.2	53.9	

Source: Author's own work based on Standard Map Database (2020) and MSPO (2018)

Moreover, according to UNCTAD (2017) regulations with a low share of standard overlap are considered to be less stringent in their requirements, and vice versa. In this regard, the SOI levels of RSPO and ISCC standards are much higher than the MSPO and ISPO standards. Therefore, we can say that the RSPO and ISCC may be more stringent than the MSPO or ISPO. Additionally, it can be deduced that producers who possess standards with a higher level of overlap can enjoy lower costs when being certified by other standards on this market. On the contrary, if we look at ISPO, its levels of overlap are very low[12]. Then, for a producer from Indonesia, who has this national standard, there

[12] This review has been conducted as a desk-based study of the documents that are available through the ISPO website, which are limited and quite difficult to navigate. Therefore this study may have omitted the review of some documents. We also recognize that ISPO is going through a strenghthening process, so the findings may be further altered by the "New ISPO" announced this year. This process also caused the ISPO website to go off the air and in 2021, it is no longer accessible (see http://www.ispo-org.or.id/index.php?lang=en).

may be more difficulties to be certified by another standard in the global palm oil market, if compared with Malaysian producers, for example.

ISPO has the lowest index values, but the ISPO-MSPO index presents a slightly higher value, with an overlap of 53.9%, which could be responding to the fact that MSPO is also a public standard with similar requirements in this market. It is also observed that MSPO has a high level of similarity with ISPO of 88.1%, representing that the Malaysian producers would have lower implementation costs if they had to be certified by ISPO to sell in the Indonesian market, for example. It coincides with what we review in the theory since these two public standards have fewer requirements and are more focused on the national markets or the South-South trade.

It should also be pointed out that RSPO standard overlap index with the MSPO (79.8%) and ISPO (88.2%) are higher than with the ISCC (71.6%) or with the RSB (76.9%). It may be because RSPO, MSPO, and ISPO were primarily created for the palm oil sector, differently than the ISCC and RSB, which were developed for all biofuels products. In this regard, there is also more similarity between the ISCC and RSB, which takes the highest value of standard overlap among the indices, reaching 89.8%.

The standard overlap index allows us to shape the multiplicity of standards presented in this sector. If we have a high level of overlap, the standards are similar and converge in their sustainability requirements. It would indicate that producers could be facing similar standards, and possibly would have the opportunity to reduce the number of verifications, and therefore decrease the trade costs. However, in the standards market, this will also depend on the level of cooperation. If the standards do not harmonize or recognize their requirements, this high overlap only becomes duplication, increasing the cost of certification for producers.

In addition, an analysis that allows us to observe the focus of some standards in the palm oil market is also relevant. Because some standards that have a high overlap index, could present lower values when they are examined from the perspective of the different aspects of sustainability, and vice versa. Thus, these variations are important to know the existence of single-focus areas standards. In this regard, an analysis of SOI sub-indices was also carried out, examining each aspect of sustainability. For that, it was analyzed 136 environmental requirements, 146 social requirements, and 36

administrative requirements. All these requirements were considered with equal weight in the SOI index analysis, based on the three-pillar model that assumes that sustainability is the balance and intersection of environmental, social, and economic considerations (GIBSON, 2006).

Table 5 presents the environmental, social, and management SOI sub-indices. First, it exhibits the average of environmental requirements standard overlap. This sub-index shows that the private standards (RSPO, ISCC, and RSB) have higher values of standard overlap, indicating that they cover most of the environmental requirements. Conversely, public standards have lower values, especially ISPO that presents lower similarities with others. It shows that ISPO does not cover as many environmental criteria as the others, making it one of the weakest standards in this regard. For example, in our database, it is seen that the ISPO covers very few criteria related to the use and management of alternative energies, the use and storage of water, the preparation and use of a Forest Management Plan, and the monitoring of prohibited chemical substances.

Table 5 – SOI sub-index by sustainability aspect

Environmental Standard Overlap Sub-index					
	RSPO	ISCC	RSB	ISPO	MSPO
RSPO		89.4	75.3	47.1	71.8
ISCC	61.8		68.3	39.0	57.7
RSB	71.1	93.3		40.0	64.4
ISPO	80.0	96.0	72.0		58.1
MSPO	82.4	95.9	78.4	58.1	
Social Standard Overlap Sub-index					
	RSPO	ISCC	RSB	ISPO	MSPO
RSPO		72.1	50.8	27.9	62.3
ISCC	81.5		59.3	33.3	64.8
RSB	82.7	85.3		34.7	68.0
ISPO	77.3	81.8	59.1		88.6
MSPO	92.7	85.4	62.2	47.6	

Management Standard Overlap Sub-index					
	RSPO	ISCC	RSB	ISPO	MSPO
RSPO		82.1	60.7	46.4	71.4
ISCC	76.7		63.3	40.0	60.0
RSB	81.0	90.5		52.4	76.2
ISPO	86.7	80.0	73.3		93.3
MSPO	90.1	81.8	72.7	63.6	

Source: Author's own work based on Standard Map Database (2020) and MSPO (2018)

Furthermore, environmental SOI sub-indices for ISCC are very high, reaching 96% of overlap with ISPO and MSPO. It confirms that ISCC covers almost all the environmental criteria that other standards require. The ISCC surpasses even the RSPO in environmental criteria, as it is seen, the SOI of the ISCC-RSPO is 89.4%, however on the opposite side RSPO-ISCC, it is only 61.8%. These results appear because ISCC covers more criteria related to waste segregation, monitoring, and measuring solid waste volumes to avoid air and water pollution. In addition, it also exceeds the requirements associated with the use of alternative energies, including solar, wind, etc. On the one hand, we see that the ISCC that had SOI at the 80% level goes to the 90% level in this regard, indicating that it is a certificate more focused on the environmental aspect of sustainability. On the other hand, the SOI of RSPO with the other standards is at the level of 70%, however, its sub-indexes in the environmental part are in a range of 60%, indicating that the RSPO is not necessarily focused on the environment.

On the other side, table 5 also shows the average of social requirements overlap. It may be noted that the SOI sub-indices are higher for the RSPO standard, which is more focused on labor organization systems. Here, we see that the RSPO SOI with the other standards is at the 70% level, however, its sub-indices in the social part rise to a range of 80%. The RSPO includes criteria related to the International Labor Organization (ILO). Accordingly, RSPO is a reference in social aspects, so producers with other certifications in the market would find it more challenging to adequate to social requirements if they want to obtain RSPO standards. On the other side, RSB and ISPO standards seem not to contain as many social requirements as the others. In our database, ISPO lacks

requirements related to the rights of indigenous people or minorities, gender policies at work, criteria associated with work conditions, and human resources management.

Finally, Table 5 indicates the values of the standard overlap for management requirements. It is seen that standards overlap the most, having in general higher values. The five standards have criteria on the general principles of economic viability, employee training on sustainability aspects, and require an Occupation Health and Safety (OHS) management system. However, the RSPO and the ISCC have higher percentages of overlap, demonstrating that it covers the majority of management requirements. Specifically, the RSPO only differs slightly from the other standards because it includes more requirements related to having an Environmental and Social (E & E&S) management system.

4.2 STANDARD COMPETITION ANALYSIS

Table 6 shows the HIS index for each pair of SSs and the sub-indices for each aspect of sustainability. These indices measure the differences in the degree of the obligation of the sustainability requirements. These results are symmetric, which means that, for example, the difference between the pair MSPO-ISPO is the same as that between ISPO-MSPO.

Thus, the level of difference is given by the index HIS, which on average, takes values close to 0.5. So, it means that the level of competition is moderate in this market. Although most of the HIS values between SS pairs are less than this average, there are quite high values in some pairs of sustainability standards, such as 0.71 between the ISCC-ISPO. It means that those standards are using entirely different strategies to compete in the market. That is, one of them requires less time to comply with a requirement or asks to be met immediately, but the other is more flexible, asking the compliance within three or five years or just as a recommendation.

It is worth mentioning that while MSPO does not express relevant differences from the private standards, ISPO does display higher HIS and HIS sub-indices, especially when compared to ISCC. It shows the divergence between ISPO and other standards in this market, which is predicted by the North-South multiplicity.

However, in the case of the MSPO, it converges more with private standards, and when it comes to the HIS for the MSPO-ISPO, the pair have the lowest value, meaning that the degree of obligation is quite similar. It reinforces the hypothesis that MSPO was created following the example of ISPO as a national standard. Both of them aim to reframe sustainability concepts in southern producer countries.

Table 6 – HIS and HIS sub-index by sustainability aspect

Heterogeneity Index of Standard - HIS					
	RSPO	ISCC	RSB	ISPO	MSPO
RSPO		0.42	0.43	0.58	0.36
ISCC			0.37	0.71	0.49
RSB				0.58	0.41
ISPO					0.28
MSPO					
Environmental Heterogeneity Sub-Index of Standard					
	RSPO	ISCC	RSB	ISPO	MSPO
RSPO		0.49	0.29	0.48	0.31
ISCC			0.35	0.76	0.53
RSB				0.48	0.43
ISPO					0.28
MSPO					
Social Heterogeneity Sub-Index of Standard					
	RSPO	ISCC	RSB	ISPO	MSPO
RSPO		0.38	0.48	0.67	0.41
ISCC			0.39	0.66	0.45
RSB				0.67	0.41
ISPO					0.29
MSPO					

Management Heterogeneity Sub-Index of Standard					
	RSPO	ISCC	RSB	ISPO	MSPO
RSPO		0.33	0.39	0.58	0.38
ISCC			0.36	0.72	0.54
RSB				0.58	0.38
ISPO					0.26
MSPO					

Source: Author's own work based on Standard Map Database (2020) and MSPO (2018)

By looking at each sustainability aspect, the same pattern is observed, in which ISPO presents higher differences with the private standards and a more significant similarity with the MSPO. In the environmental aspect, the most important difference is between the ISPO and ISCC standards with 0.76. The ISCC system is one of the most rigorous standards for environmental issues in the biofuel market established in the EU, which could explain the significant divergence it has with ISPO standards. The highest similarity is found between the RSPO and the RSB with 0.29. RSPO also presents a low index of heterogeneity with the MSPO and the ISPO regarding environmental criteria. Significantly, the RSPO-MSPO HIS index is 0.31, meaning that both standards are similar regarding the time to comply with the requirements. Our database shows that the RSPO and MSPO require immediate compliance or in less than 12 months after initial registration/certification formalities for almost all of their requirements.

Regarding the social aspect, the criteria are closer between the RSPO-ISCC (0.38) and the ISCC-RSB (0.39). However, the situation is different between the RSPO-RSB, where the index increases to 0.48. Moreover, the highest differences are between the RSPO-ISPO and the RSB-ISPO, both with a high value of 0.67. The time to comply with requirements is quite different between the ISPO and the private standards, which agrees with a study carried out by the Forest Peoples Program (2017) that compares mainly social criteria and principles in the palm oil standard market.

Finally, the trend is similar to the other features in the management aspect, showing a more significant divergence for the ISCC standard that presents higher HIS values with the MSPO (0.54) and the ISPO (0.72). In our database, the ISCC requests that 31 of its 36 management criteria must be met immediately. These criteria are related to

fair competition, production efficiency, long-term sustainability plan, and factors associated with a strategic E&S management system. Accordingly, this could reveal that the requirements and principles in administration and management aspects diverge quite a bit between national and private standards.

Secondly, Table 7 presents the results of the Heterogeneity Index of Institutional Design - HIID. In this regard, values are also close to 0.5, reinforcing the moderate level of competition in this market. Although very low indices are observed among the private SS, there is a greater difference index when the public standards are compared to the private ones. Finally, it confirms previous findings in the literature, where Southern countries' national standards diverge from private standards institutional design in the SS palm oil market.

The difference between the institutional design of private and public standards is reflected in our database primarily in the support mechanism provided by the standard systems to the producers or adopters. Some private standards give greater assistance such as support documents, technical assistance beyond the basic requirements, and financial assistance. Furthermore, when we look at cost-sharing arrangements, national standards show great concern about providing incentives for more and more actors to share certification and implementation costs. That is not observed in the private systems that leave the producers to cover all the compliance costs.

Another difference is also observed in the transparency regime of the standards. Most of the organizational documents, from the text of the standard to documents where the certification and verification processes are detailed, are public and open in private standards. However, in public schemes, there is difficulty in accessing these documents. For example, in the case of the MSPO, the standard documents are sold, and other complementary organizational information can only be accessed through a request. In the case of the ISPO, these documents are not publicly available in English. Besides, it is challenging to access corporate data through an electronic request, which indicates a lack of transparency on the part of national standards.

Table 7 – Heterogeneity Index of Institutional Design (HIID)

	RSPO	ISCC	RSB	ISPO[13]	MSPO
RSPO		0.24	0.41	0.71	0.47
ISCC			0.29	0.82	0.47
RSB				0.53	0.65
ISPO					0.35
MSPO					

Source: Author's own work based on Standard Map Database (2020) and MSPO (2018)

4.3 STANDARD COOPERATION ANALYSIS

Figure 5 shows the level of cooperation in the palm oil industry by summarizing the instruments found in this standard market. Several authors have pointed out that it is essential to assess collaboration between sustainability standards and between governments and international organizations (FIORINI; SCHLEIFER; TAIMASOVA, 2017; MARX; WOUTERS, 2014; UNFSS, 2018). Therefore, these groups are presented in the columns of the matrix. The rows give the levels of cooperation that the market has reached.

[13] Due to the transparency issue that was discussed in the institutional design aspect, we have not had access to official ISPO documents, only to studies in which they have participated previously, see (ISPO; RSPO, 2015). Therefore, it is likely that this has influenced the calculated value of the indices since there is some data that we may not be considering in this study due to lack of access to information.

Figure 5 – Standard Cooperation Matrix

Low

High

Cooperation Strategies Matrix			
Level of cooperation	Cooperation between Standards	Cooperation with governments	Cooperation with international organizations
Informational Exchange	• ISPO and RSPO Joint Study	• SPOI with ISPO	• UNFSS with RSPO, ISCC, and RSB. • ITC Standard Map with RSPO, ISCC, and RSB.
Benchmarking	• RSPO vs MSPO • RSPO and POIG • MSPO and ISCC	• The Swiss State Secretariat for Economic Affairs (SECO) with RSPO and ISCC	• IUCN National Committee of the Netherlands. (RSPO, ISCC, ISPO, and MSPO) • European Commission study. (RSPO, ISCC, ISPO, and MSPO) • Forest People Program. (RSPO, RSB, ISCC, ISPO, and MSPO).
Equivalence or Mutual Recognition		• Government of Indonesia with ISPO • Government of Malaysia with MSPO • China Green Food Development Centre with MSPO	
Meta-regulation / Harmonization			• ISEAL Alliance with RSPO

Source: Author's own work adapted from Fiorini et al. (2017)

We observe a medium level of cooperation, represented mainly by benchmarking strategies. It shows that greater coordination between the five standards analyzed, the key governments of the sector, and the international organizations, is still necessary to happen. So, the way of improving and harmonizing the requirements and processes of these standards, and eliminating the gaps and contradictions between their implementation and procedures, have to be worked in the global palm oil standards

market. All this will ultimately help to reduce trade costs for producers, mainly in developing countries, who frequently need to meet multiple standards.

We observe a frequent recurrence of the informational exchange strategy between the actors since all the quadrants are full. In this context, there is a more significant amount of cooperative efforts from private standards. It may be a consequence of the information transparency since private standards have all their information in public access. Therefore, they are easily included in information exchange databases that revise their criteria and analyze them. On the other hand, we also see two efforts at this level from the ISPO, which is positive since it is carried out with northern actors such as the Sustainability Palm Oil Initiative (SPOI) and the RSPO. Based on this strategy, the ISPO has been benefited because it can incorporate new sustainability requirements that previously did not count as requirements on High Conservation Values (BRANDI, 2020a; ISPO; RSPO, 2015).

Regarding the informational exchange strategy, we notice the joint study between the ISPO and the RSPO. This study was carried out in 2015, led by a commission from the Ministry of Agriculture of the Republic of Indonesia and the RSPO, and facilitated by the United Nations Development Program (UNDP) and the SPOI. This study started a process called “strengthening ISPO” in Indonesia. So, this type of cooperation reflects how public and local standards benefit from private and international ones, learning from new systems and implementing them to be more competitive internationally. In this respect, Brandi (2020a) argues that experimentalist governance benefits the standard market through a mechanism of public comparative analysis.

This is also the Sustainable Palm Oil Initiative case, which is a platform created by the Government of Indonesia, the UNDP, and several multinational companies. The main objective of SPOI is to support Indonesian Sustainable Palm Oil to become globally recognized, addressing the key challenges such as deforestation and improving the livelihoods of smallholders. In this regard, this platform aims to promote synergies between the ISPO and the RSPO so that costs, time, and complexity for producers can be reduced (UNITED NATION DEVELOPMENT PROGRAMME, 2021).

Lastly, at this level, there are two international platforms created to assess Voluntary Sustainability Standards. UNFSS and the ITC standard map database elaborate

impact reports of sustainability standards. They address private standards like the RSPO, the ISCC, and the RSB. For example, when analyzing the role of national platforms, UNFSS emphasizes that ISPO was born as a response to RSPO, and highlights that private certifications induce the development of new public schemes in developing countries (UNFSS, 2018).

In level 2 of cooperation, there is greater participation of the standards; likewise, the governments and international organizations have been more concerned about including all public and private standards. These benchmarking studies allow us to analyze the standards, compare them and better understand the North-South multiplicity dynamic in the palm oil market. We notice that the RSPO has the highest participation in six of the seven benchmarking studies. It is also essential to recognize the initiative of the MSPO with the ISCC, who worked together to strengthen MSPO Principles and Criteria.

It can also be observed that public standards seem to have taken advantage of benchmarking cooperation strategies. For example, in 2021, the ISPO launched a new strengthened standard for its adopters to have better possibilities of accessing international markets (BRANDI, 2020a; GAPKI, 2021; “Indonesia sustainable palm oil and the legality of people’s palm oil”, 2021). Similarly, the MSPO's Secretariat informed that the MSPO-ISCC study results would be used to strengthen MSPO Principles and Criteria, including a system to harmonize the requirements under the ISCC scheme shortly. (MSPO SECRETARIAT, 2020).

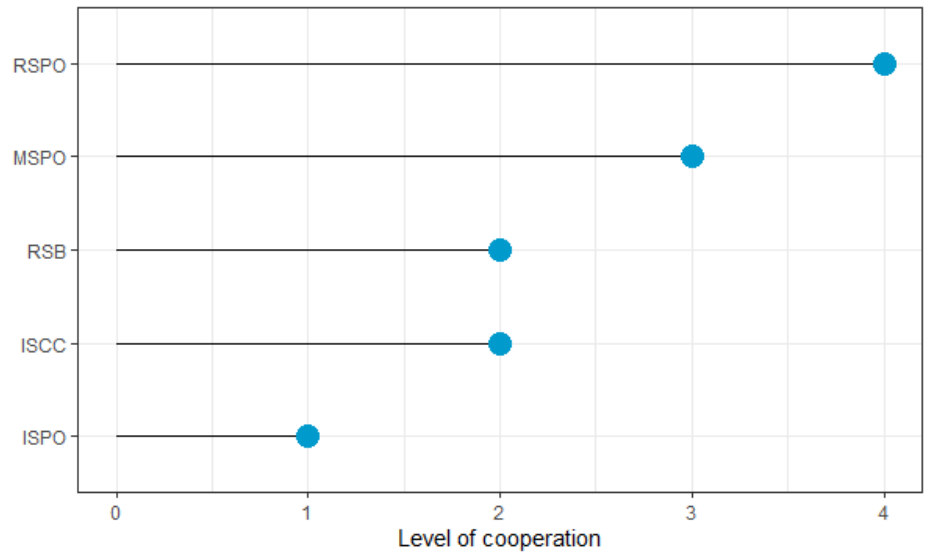
At level 3 (Equivalence or Mutual Recognition), we can see that the Government of Indonesia, through its Ministry of Agriculture, created the ISPO standard, currently mandatory for all companies in the country. ISPO is strongly aligned with existing legal and regulatory requirements that is why it is recognized all over the country. It was also a strategy of the Indonesian government to fulfill its purpose of reducing national GHG emissions. Similarly, the MSPO is a sustainability system incorporated by the Government of Malaysia to ensure the sustainable production of palm oil. Therefore, MSPO is accepted nationally as the standard of management system for sustainable oil palm cultivation (MSPO SECRETARIAT, 2020). Finally, MSPO informed that it is currently working closely with China Green Food Development Centre (CGFDC) so that the Green Food Authentication certification recognizes MSPO-certified palm oil. This

recognized equivalence will allow MSPO-certified producers to use the CGFDC logo in China, reducing several audits and verifications.

In the highest level of cooperation (Meta-regulation/Harmonization), we find ISEAL. This global alliance works as an umbrella of Sustainability Standards that comply with a Code of Good Practice for Setting Social and Environmental Standards (Standard-Setting Code). This institution looks ambitiously to generate collaboration and transparency between the sustainability systems that make it up. Since 2015, the RSPO is an ISEAL Full Member by showing that it is a credible and effective system in the global palm oil market.

Figure 6 shows the cooperation efforts taking by each SS scheme. We notice greater participation in cooperation strategies by the private sector. The RSPO participates in all levels and cooperates with governments, international organizations, and other standards. It is the only SS scheme that pursues the last level of cooperation, being a member of ISEAL, representing the palm oil market. It should also be noted that the MSPO participates more in the second and third levels of cooperation, collaborating with the RSPO, the ISCC, the Malaysian government, and the Chinese government. The ISCC and RSB participate more as objects of benchmarking study of other international organizations and governments. Finally, in the case of ISPO, it takes part more commonly in the first level with the joint study with the RSPO and the SPOI organization.

Figure 6 – Level of cooperation by Sustainability Standard



Source: Author's own work

Our findings show a medium level of cooperation on average in the market, but it is still a fragmented indicator if analyzed standard by standard, being the RSPO the one that participates the most among the deepest levels of cooperation. Additionally, the other standards have remained at more superficial levels, cooperating less with the different standards in both local and international contexts. Therefore, the direct effect of the level of cooperation on trade costs is not entirely clear in the palm oil market. What is clear is that more implementation of the standard cooperation strategies needs to be applied in this market. The harmonization strategy would help cover the gaps and differences between requirements and processes, reducing trade costs for producers, mainly in developing countries, who frequently need to meet multiple standards.

4.4 THE EXTENT OF MULTIPLICITY AND POTENTIAL TRADE COST IN THE PALM OIL MARKET

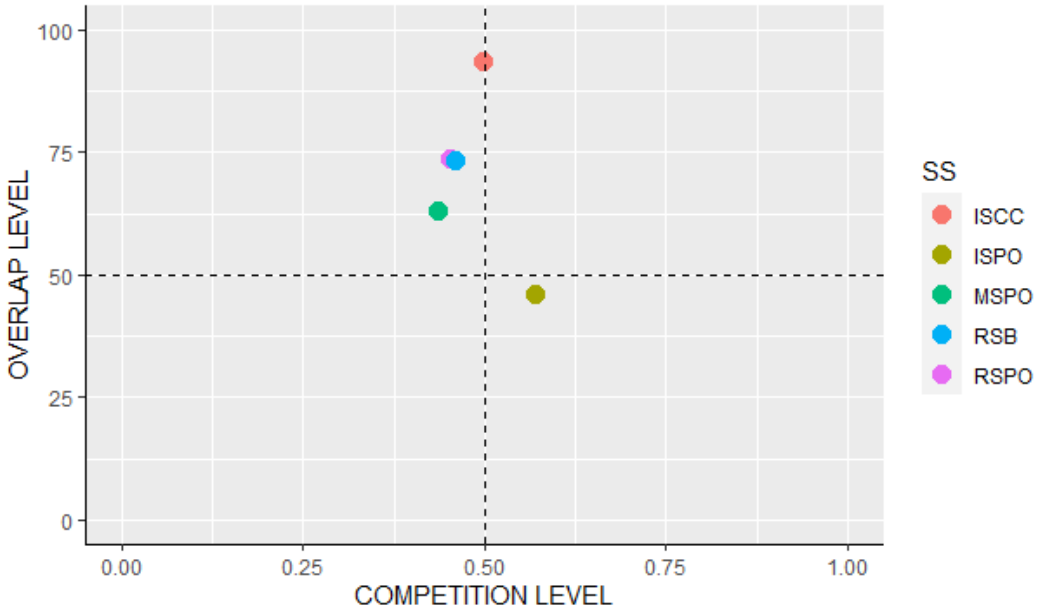
By combining the standard overlap level of each sustainability standard, measured by the SOI (from 0 to 100%) with the standard competition level, calculated by HIS (from 0 to 1) and HIID (from 0 to 1), we want to identify those standards more likely to cause potential trade costs compared to their peers. To do so, we evaluated the five sustainability standards, calculating the average of the SOI, HIS, and HIID values considering the perspective of each standard. By putting together the HIS and HIID indices in the competition level axis, we can also conclude that the competition in the oil palm market is medium in general. In Figure 7, the standard overlap level is considered along the vertical axis, while the standard competition level is measured along the horizontal axis.

The bottom right corner of Figure 7 indicates a higher potential for standards to cause an increase in trade cost for producers, as it simultaneously represents a low level of overlap and a high level of competition. In this quadrant, the standards would not converge with each other in requirements and also compete for differentiating more intensively in the market. Secondly, the top right corner can also represent some increases in trade costs since it expresses a high level of overlap and competition. So, the standards are very similar, but at the same time, there is intense competition, which would result in duplication in the market. Therefore, the producer would have to go through several equivalent certifications, increasing its certification cost to access new markets. Thirdly, the bottom left corner represents an unusual situation in a standard market. It illustrates a low level of overlap and competition, indicating that SS are not interacting so much.

Finally, the top left corner would represent the best situation in the market as it shows a high level of overlap and a low level of competition. Then, it could be easier for standards to harmonize their requirements depending on the drive of the actors and decision-makers of the standards.

The sustainability standards plotted in Figure 7 lie mainly at the top central region, implying that they might still be causing multiple costs of certification. However, in the long term, they have the opportunity to move towards the top left, which would be the ideal scenario to reduce the trade costs of sustainable certification. We can note that RSPO, RSB, and MSPO are already in the top left quadrant, albeit very close to the limit, so they may have less potential to cause trade costs. In the case of the ISCC, it is above all other standards in terms of overlap, suggesting that it has more remarkable similarity with the other standards. However, its medium level of competition still does not allow it to converge with the other standards in the market. On the other hand, the ISPO is located in the worst quadrant, being the standard that has the greatest potential to generate trade costs for producers.

Figure 7 – Relationship between Standard overlap and standard competition



Source: Author's own work

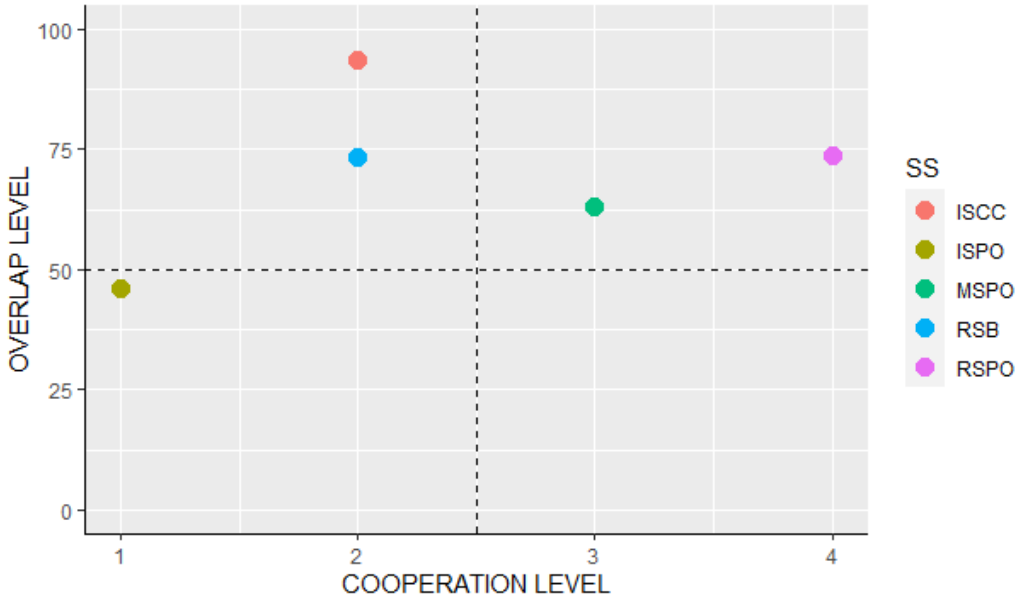
Having a high level of overlap in the market can also facilitate cooperation strategies between standards. For instance, harmonization of criteria or mutual

recognitions might be reached smoothly. Figure 8 shows the relationship between the standard overlap and the cooperation level. The SOI index represents overlap in the vertical axis, and cooperation increases from 1 (informational exchange) to 4 (Meta-regulation / Harmonization) along the horizontal axis.

The bottom left quadrant is where the standard overlap is low and the cooperation level is minimum. It means potentially higher trade costs for producers, who would have to adapt and implement different standard requirements. With a low level of cooperation, it would imply multiple verification processes and multiple compliance costs. The top right quadrant represents a high level of overlap and cooperation, which is the situation with less potential to create trade costs. In the top left quadrant, we have the case of high overlap and low cooperation. This potentially increases certification costs, since we find duplicate standards that do not coordinate in the market. In the bottom right quadrant, we have a situation in which the standards are willing to collaborate; however, their requirements differ considerably.

Figure 8 shows that the standards are distributed at all levels of cooperation and with high overlap in most cases. However, only two SS have achieved a deeper level of cooperation as the RSPO and MSPO, while the others are starting their efforts on cooperation. The case of the ISPO, which is near to the bottom left corner, shows the most potential to cause trade costs. Our results also show that the high level of SS overlap in the palm oil market is not well exploited since standards with similarities could still move to deeper levels of cooperation. The case of ISCC is emblematic since it has a higher share of overlap with the other standards, but it is still at a low level of cooperation in the market. In this respect, this standard would not have to make much effort to achieve a mutual equivalence or a harmonization with others. Finally, the one who has advanced the most in this process is the RSPO which is closer to the top right corner, revealing fewer potential implementation and certification costs for producers

Figure 8 – Relationship between Standard overlap and standard cooperation



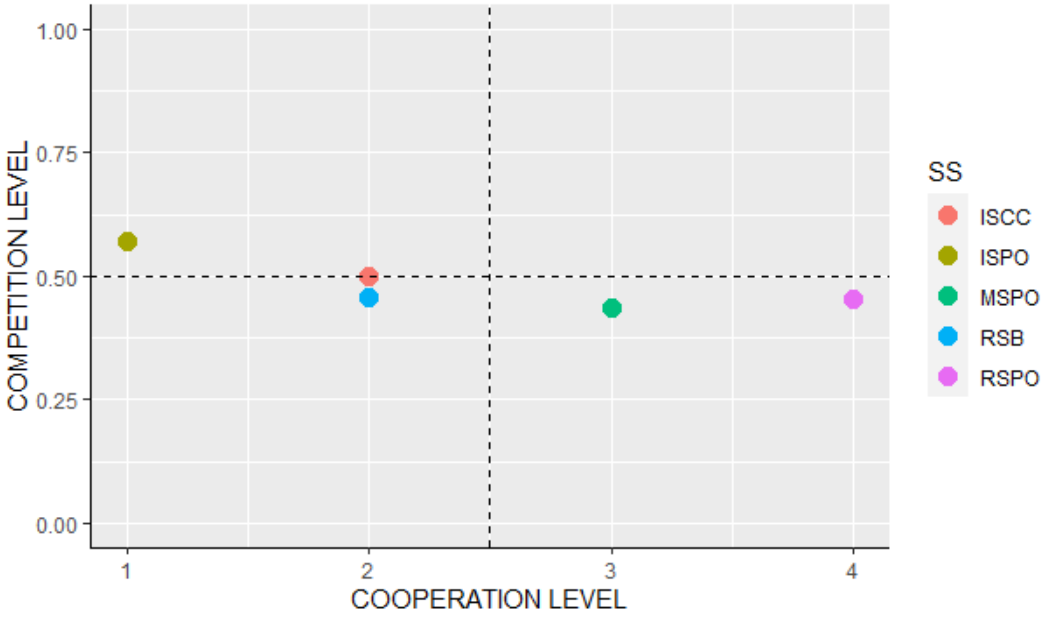
Source: Author's own work

Lastly, we have the connection between the cooperation and the competition level in Figure 9. The bottom right quadrant is the least potential to cause trade cost in the market because it means reducing competition and going further level of cooperation. We observe that the standards are very dispersed in the middle of the graph, which evidences a dynamic of co-opetition in the palm oil market. This result is in line with the features of North-South multiplicity where there is rivalry among standards controlled by developed-country versus developing-country actors; then they are reluctant to cooperate easily (FRANSEN; KOLK; RIVERA-SANTOS, 2019).

The dynamic of co-opetition that is currently evident in the standard market responds to the regime complexity characteristic of the SS palm oil industry, therefore, co-opetition is presented as the best model to achieve optimal governance so far . The type of co-opetition that we find in our results is strongly balanced, which is the most viable type of strategy in the transnational trade governance of sustainability market (KUMAR; CONNELL; BHATTACHARYYA, 2020). In this regard, we can affirm that the standards are undergoing a process of experimentation, taking advantage of the cooperations to learn from each other, but without ceasing to be competitors (BRANDI, 2020a; ESTY; GERADIN, 2000).

The standard that cooperates the most and is closer to the bottom right corner is the RSPO. On the contrary, standards as the ISPO, ISCC, and RSB are located in the medium left side, which potentially could cause trade costs. One of the reasons for low cooperation is the presence of non-green markets, which allows major palm oil producer countries, like Indonesia and Malaysia, continue selling in markets such India or China without facing substantial sustainability restrictions (HIGGINS; RICHARDS, 2019; NESADURAI, 2019; SCHLEIFER, 2016). It is also known as South-South trade which influences that cooperation between southern and northern actors does not flow as it should. An example is a mutual recognition between the MSPO and the Chinese Government. This cooperation strategy opens a new big market for Malaysian palm oil producers and demonstrates the importance of looking at potential markets in the southern hemisphere.

Figure 9 – Relationship between Standard competition and standard cooperation



Source: Author's own work

Finally, our results, pointing co-opetition in the market, represent a current situation that is possible to change in the long-term. Based on the experimentalist governance feature of the transnational trade governance, it states that over time with multiple standards in the market, this leads to experimentation that encourages more cooperation than the competition (ABBOTT; SNIDAL, 2008; OVERDEVEST; ZEITLIN, 2012). Furthermore, co-opetition dynamic shows that only some standards are cooperating in the market while others are still competing for more adopters. Therefore

there will be producers going through multiple certification processes and making different labelling to separate logos or sustainable brands. Hence, co-opetition is currently still driving to an increase in certification, implementation and packaging costs for producers.

Systematically in our findings, the RSPO is placed near the ideal situation, confirming the effort it makes in the market to integrate with others and have greater cooperation. This result corroborates the benchmarking studies that we have reviewed in section 4, where the RSPO is placed as one of the most robust and demanding certification systems, and at the same time, the one that could serve as a reference in the palm oil market (FOREST PEOPLES PROGRAMME, 2017; SCHLÖSSER; WALTER, 2020; TINHOUT; VAN DEN HOMBERGH, 2019). On the contrary, ISPO is consistently in the worst-case scenario. Therefore, it can potentially cause additional trade costs for Indonesian producers.

To sum up, our findings revealed direct and indirect effects of multiplicity on trade costs. These effects are clearer in some pairs of sustainability standards in this market, for instance, the RSPO is the least possible to cause potential trade costs. Additionally, in recent years, the market trend has been the coexistence of competition and cooperation. This result is consistent with Brandi (2020a), who points out that the governance dynamics seem to be moving from a more competitive to a more collaborative and coordinated standard market. Hence, something similar to a transnational regime of unifying the standards and achieving mutual recognition has started.

5 CONCLUSION

This study aimed to find the pathway by which standard multiplicity affects trade costs in the palm oil industry and contributes to a more systematic understanding of its interactions: standard overlap, standard competition, and cooperation. As well as generating evidence on the situations in which standard multiplicity can act as barriers or catalyzers to exports. We examined the direct effects of overlap, competition, and cooperation interactions among standards on trade costs. We subsequently analyzed the indirect effects of multiplicity combining such interaction and revealing the favorable and disadvantageous circumstances for trade costs.

Our main results showed high standard overlap, medium level of competition, and medium cooperation considering all requirements between the standards in the palm oil market. Therefore, the approach taken in our study helps in defining the type of interaction as a co-opetition within a North-South multiplicity. In this respect, we found that the co-opetition is positive for the transnational trade governance of standard market but it is yet causing additional costs of certification, implementation, and packaging.

Using the SOI index, we observed low criteria heterogeneity in the market, indicating that the standards have converged in their requirements, suggesting a relatively low cost of implementation for producers. However, certification costs would only decrease if there were also a deeper level of cooperation between SS, such as the criteria harmonization, which is not still visualized in the global palm oil market. Furthermore, the SOI Index values vary considerably among the pairs of SS, showing a higher overlap in the ISCC-RSB pair. In contrast, the overlap ends up being very low for ISPO-RSPO. Besides, we notice quite different results when comparing only between private standards (not relevant divergence) and between private and public standards (higher divergence).

By looking at the direct effect of competition dynamic in the palm oil market, we see that there are still pairs of standards that differ more than others, such as the ISPO-ISCC, which is the pair that shows very high indices in the market. It was also the case of the MSPO-RSB that had non-convergent indices. Consequently, we can conclude that the southern standards have more differences in requirements and processes with northern standards not explicitly limited to the palm oil industry. Therefore, it might create additional certification costs for Indonesian and Malaysian producers who desire to get the ISCC or RSB standards to sell palm oil as a biofuel product. It is further reinforced when we focus on the environmental aspect in which competition is higher since the sub-HIS indices rise among the southern and northern standards.

Furthermore, on the cooperative side, southern public standards focus more on cooperating with the RSPO, as it is the leading standard in this segment. It is shown in the cooperation studies that have been carried out between the MSPO-RSPO and the ISPO-RSPO. That would indicate a positive direct effect of cooperation on trade costs, especially implementation costs for producers in Malaysia or Indonesia willing to access the RSPO certification.

The indirect effects of our model better revealed the circumstances in which multiplicity has an impact on trade costs. Our analysis joined the overlap and the competition part, and the results are in line with various ranking found in quantitative benchmarking studies in the palm oil standard market, which highlight the distance between the RSPO and the ISPO (BARTHEL et al., 2018; FOREST PEOPLES PROGRAMME, 2017; SCHLEICHER et al., 2019; SCHLÖSSER; WALTER, 2020; TINHOUT; VAN DEN HOMBERGH, 2019; YAAP; PAOLI, 2014). When we analyzed the relationship between standard overlap and standard cooperation, or between standard overlap and standard competition, we also found that RSPO is best located. At the same time, ISPO is in the most disadvantageous position.

In this respect, one of the factors that can help to improve cooperation in the palm oil standard market is the action of southern governments to reclaim their legitimacy in the regulation system. Therefore, as they are major players in the international market and managers of the ISPO and MSPO, they should take advantage of this to promote and boost deeper cooperative relationships for these standards. Another factor that improves cooperation is the dynamic of co-opetition existing nowadays in this market because it encourages standards to cooperate more than competing due to the benefits of sharing knowledge and the increase of efficiency in the standard market.

Future research could investigate in more detail how our indices correlate with palm oil certified production quantity to assess the consequences of standard multiplicity in the market. In addition, the duration of SS interactions in the palm oil industry may be studied, as we could see that these relationships evolve with time, and trade costs may also be associated with this. Furthermore, this dissertation opens many alternatives to research around the co-opetition dynamic and its consequences in the global palm oil industry. Finally, drivers of the still lack of cooperation by southern standards should be investigated and how this affects producers in these countries.

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APPENDIX 1. STANDARD DEGREE OF OBLIGATION

Requirements	RSPO	ISCC	RSB	MSPO	ISPO
Soil: General principal	5	5	5	1	1
Soil erosion	5	5	5	4	3
Soil conservation	5	5	5	4	1
Soil quality	3	4	5	1	1
Soil nutrients	4	5	5	4	1
Soil productivity	4	1	5	1	1
Soil biodiversity	4	5	5	4	1
Soil contamination	4	5	5	4	1
Soil preparation for specific crops	1	5	1	1	1
Soil maintenance	1	5	5	4	1
Soil enhancement by use of cover crops	5	5	5	4	1
Soil compaction	4	5	5	1	1
Other criteria relating to soil	4	5	1	4	3
Soil					
Forestry: general principle	1	5	1	1	1
Reforestation	5	1	1	1	1
Deforestation prevention/remediation	5	5	1	4	3
Forest conservation	5	5	1	1	1
Forest conversion into production lands	5	5	5	4	1
Principle's conversion of agriculture land to non-agriculture purposes	1	5	1	1	1
Forest maintenance records of forested areas for 5-years period	5	1	1	1	1
Forest management plan (FMP): baseline objectives and assessment of current conditions (stockings, species, age classes of trees, etc.)	5	1	1	4	1
Preparation of public summary of the forest management plan (FMP)	5	1	1	1	1
FMP monitoring system	5	1	1	1	1
Making publicly available FMP monitoring results	5	1	1	1	1
Forest					
Chemicals/ Natural organic inputs: general principle	1	5	5	1	1
Chemicals or substances prohibition	1	5	1	1	1
List of prohibited chemicals	5	5	5	1	1
Respect of list of permitted chemicals	1	5	1	1	1
List of authorized chemicals	1	5	1	1	1
Integrated Pest Management IPM/ICM	5	5	5	1	1
Training on Integrated Pest Management (IPM)	5	5	1	1	1

Chemicals and related materials: general principle	1	5	5	4	3
Agrochemicals (fertilizers, pesticides, soil, fumigants...)	5	5	5	1	1
Chemical's storage and labelling	5	5	5	1	1
Chemical's equipment and containers storage & cleaning	4	5	5	1	1
Protection on non-target areas from agro-chemical use	4	5	5	1	1
Regular re-calibration of agro-chemical application equipment	1	5	5	1	1
Production/process chemicals (extractive industries, cleaning, food & non-food manufacturing)	1	1	5	1	1
ORGANIC NATURAL INPUTS: general principle	1	5	1	1	1
Use of organic fertilizer	1	5	1	1	1
Equipment/ training	1	5	1	1	1
Chemicals: selective & targeted application	5	5	5	1	1
Training on chemicals handling and exposure	5	5	1	4	3
Chemical's variation to prevent pest resistance	1	5	5	1	1
Chemical substances storage/disposal/waste/labelling	5	5	5	4	1
Treatment of waste of chemical substances	5	5	5	4	3
Criteria related to use and management of hazardous chemicals	5	5	5	4	3
GMOs / genetically modified varieties risk prevention	1	1	5	1	1
Genetically modified crops and products traceability and labelling	1	5	5	1	1
Other	1	5	1	1	1
Inputs					
Biodiversity: general principle	1	5	5	4	3
Criteria to ensure adherence to international conventions on biodiversity	5	5	5	4	3
Sustainable management and use of resources	1	5	5	4	1
Habitat/eco-system restoration/rehabilitation	5	5	5	4	1
impact assessment policy for new production	5	5	5	4	1
Protection of rare and threatened species and their habitats	4	5	5	4	1
Requirements for no net loss in biodiversity	1	5	1	1	1
Impact assessment for ongoing production/harvesting	5	5	1	4	3

WILDLIFE: general principle	1	5	1	4	3
Use of wildlife species and resources	5	5	5	4	3
Specific criteria relating to rare, threatened or endangered wildlife species	4	5	5	4	1
Housing of wildlife living specimens	1	5	1	4	3
Impacts on wildlife populations	4	5	5	4	3
Protecting biodiversity zones via set asides	5	5	5	4	1
Ecological niches/corridors	5	5	5	4	1
Criteria related to maintaining or protecting rare, threatened or endangered ecosystems	5	5	5	4	3
Criteria to avoid crop disease cross-contamination	1	5	1	4	1
Use of local seeds	1	5	5	1	1
Native species protection against invasive alien species	5	5	1	1	1
Protection of ecosystems against invasive species	4	5	5	1	1
High Conservation Value Areas	5	5	5	4	3
Prohibition of production on land with High Conservation Value (HCV) with conversion cut-off date no later than 2009 or at least five years history	1	5	5	4	1
Criteria related to HCV as intended in the HCV Resource Network	5	1	1	4	1
Prohibition of production on land with High Conservation Area recognized by independent expertise	5	5	1	4	3
Legally protected and internationally recognized areas for their biodiversity	5	5	5	4	3
Risk and impacts on ecosystem services	5	5	5	4	3
Biotechnology use	1	1	5	1	1
Clearing of land with fire/explosives	5	5	5	4	3
Post-production practices (impact assessment - rotation of crops)	5	5	5	4	1
Human settlements in or close to production areas	1	5	5	1	1
Criteria related to natural wetlands and/or watercourses affected by production	5	5	5	4	3
Criteria related to sustainable harvesting	1	5	5	1	1
Wild catch fisheries: sustainable exploitation of marine resources including restoration of overfished and depleted stocks.	1	1	5	1	1
Biodiversity					
WASTE MANAGEMENT: general principle	1	5	5	4	3

Treatment and use of solid waste	4	5	5	4	1
Monitoring and measuring solid waste volumes	1	5	1	4	3
Rating to reducing solid waste volumes	4	5	1	4	3
Solid waste reduction / re-use / recycle	4	5	5	4	3
Non-solid waste	4	5	5	1	1
Criteria related to waste segregation	1	5	1	1	1
Run-off of waste chemicals, mineral and organic substances	5	5	5	4	3
Air pollution	5	1	5	4	3
Pollution incidents mitigation: procedures for risks monitoring and records keeping	5	5	5	4	3
Transboundary effects of air pollution	1	5	5	1	1
Noise, odor and other pollution nuisance	1	5	1	1	1
Composting	1	5	1	4	1
Waste packaging	1	5	1	1	1
Waste disposal (incl. Solid waste, non-solid waste, hazardous waste)	4	5	5	4	3
Disposal of hazardous waste	4	5	5	4	3
Handling / disposal of waste by third parties	1	5	1	1	1
Waste elimination through the use of fire	4	5	5	4	1
Avoidance of uncontrolled waste landfilling	4	5	1	1	1
Other criteria relating to waste management	1	5	1	4	3
Waste					
WATER USE & MANAGEMENT: general principal	4	5	5	4	3
Water management plan	4	5	5	4	1
Water dependencies	1	5	5	1	1
Water use, reducing, including reuse and recycling	4	5	3	4	1
Wastewater management / treatment	4	5	3	4	1
Criteria relating to limitations of wastewater volume	1	5	5	1	1
Water contamination / pollution	5	5	5	4	1
Transboundary effects of water pollution	1	5	5	1	1
Water quality	1	5	5	4	1
Water disposal / storage	4	5	5	4	1
Monitoring of water usage	4	5	5	4	1
Natural wetlands are maintained in undrained conditions	5	5	5	4	1
Water usage records keeping	4	5	5	4	1
Other criteria relating to water	1	5	5	4	1
Water					

ENERGY USE & MANAGEMENT: general principal	4	5	1	4	1
Application of a "clean production principles"	1	5	3	1	1
Reduce use of energy resources	4	5	3	4	3
Use of alternative energies including solar, wind, etc.	4	5	1	4	3
Use of solar energy	1	5	1	1	1
Use of hydropower energy	1	5	1	1	1
Use of wind energy	1	5	1	1	1
Use of wood-based energy	1	5	1	1	1
Use of biofuels	1	5	5	1	1
Use of non-renewable energies: General Principle	4	5	1	4	3
Energy					
CARBON POLICIES: general principle	1	5	5	1	1
GHG carbon emissions monitoring	5	5	5	4	1
Analysis of possible alternatives to reduce GHG emissions	5	1	1	4	1
Quantify GHG emissions	5	5	5	4	1
Monitoring/reducing non-carbon	5	5	5	4	1
Sequestration of green-house gases: general principles	5	5	5	4	3
Soil or trees sequestration	1	5	1	1	1
High Carbon Stocks areas monitoring and management	5	1	1	1	1
Criteria related to the protection of high carbon landscapes / land with High Carbon Stocks (HCS)	5	5	5	1	1
Climate – Carbon					
ENVIRONMENTAL					
HUMAN RIGHTS & LOCAL COMMUNITIES: general principle	1	5	5	4	3
Basic human rights and local communities' engagement	4	5	5	4	3
Practices endangering food security	5	5	5	1	1
Promotion/enhancement of education	5	5	4	4	3
Promotion/enhancement of medical care services	5	5	4	4	3
Promotion/enhancement of housing and sanitary facilities	5	5	5	4	3
Rights of indigenous people (ILO 169)	5	5	1	4	1
Minority rights	5	5	5	4	1
Protection of minority rights and marginalized groups	4	1	5	4	1

Social culture and sites	5	5	5	4	1
Internationally recognized / legally protected sites and cultural heritage	1	5	5	1	1
Community access to cultural heritage	1	5	1	1	1
Access to historical, cultural, archaeological and spiritually sites	5	5	1	1	1
Services and benefits to local communities	4	5	5	1	1
Compensation for use of local communities' facilities	4	5	1	4	1
Engagement & consultation with local communities	4	5	5	4	1
Land title and use rights	5	5	5	4	1
Supporting local communities economic develop	4	5	5	4	1
Hiring workers from local communities	4	5	5	1	1
Hiring workers from local communities	4	5	1	1	1
Purchasing local materials, goods, products and services	4	1	5	1	1
Grievance mechanisms for communities	5	5	5	4	1
Conduct of security personnel towards communities	5	1	1	1	1
Impact assessment on health, safety and security of local activities	4	5	5	4	3
Impact assessment on access to basic services to local communities	4	5	5	4	3
Involuntary resettlement, physical displacement and/or economic displacement	5	1	5	1	1
Compensation and benefits for displaced persons	5	1	5	4	3
Livelihood restoration for displaced persons	1	1	5	4	3
Investments and associated possible impacts on land-users	5	5	5	4	3
Free, prior and informed consent of local communities	5	1	5	4	3
Producers are required to identify customary rights of tenure	5	5	5	4	3
Local communities' access to livelihoods	5	1	5	4	3
Human rights and Local Communities					
CONDITION OF WORK: general principles	1	5	5	4	3
Sexual exploitation / harassment	5	5	5	4	1
Training supplier's management and workers on sexual harassment	5	1	1	1	1
Safety at work (ILO 184)	5	5	5	4	1
Safety at work - legal compliance	5	5	5	4	1

Electrical equipment's safety	1	5	5	1	1
Verification and maintenance of building safety	1	5	5	1	1
Fire preparedness (drills, equipment, signs)	4	1	5	1	1
Emergency exits and evacuation procedures	4	5	5	4	1
Publicly available evacuation procedures	4	1	1	1	1
Regular and scheduled emergency exit maintenance	1	1	5	1	1
Training on safety issues	5	5	5	4	1
Occupational health and safety, as defined in IL	5	1	1	4	1
Workplace safety	4	5	5	4	1
Safety equipment and personal protective equipment	5	5	5	4	1
Machinery / equipment safety	1	5	1	1	1
Emergency first aid kits	4	5	5	4	1
Safety procedures for handling chemicals	5	5	5	4	1
Monitoring of accidents records	4	5	5	4	1
Training of workers on procedures to deal with accidents	5	5	5	4	1
Healthy work conditions	4	5	1	4	3
Workers' access to safe drinking water	4	5	5	1	1
Workers' access to decent sanitary facilities etc.	5	5	5	1	1
Dormitories and canteens	5	5	5	4	3
Workers' entitlement to breaks (e.g., meal breaks)	1	5	1	4	3
Infirmary at production site	5	5	1	4	3
Prohibition of physical violence, intimidation	5	5	1	4	3
Criteria for keeping records of disciplinary measures	1	5	1	1	1
Security issues / role and behavior of security guards	1	5	1	1	1
Privacy protection	1	1	5	1	1
Worst forms of child labor (ILO 182)	4	5	1	4	3
Labor Practices - Conditions of Work and Social Protection					
CONDITIONS OF EMPLOYMENT: general principle	1	5	5	4	3
Workers' compensation for medical costs in case of work-related accidents	4	1	1	4	3
Access to medical insurance	4	5	1	4	1
HUMAN RESOURCES MANAGEMENT: general principal	4	5	1	4	1

Employment / hiring practices - legal compliance	5	5	1	4	1
Transparent recruitment processes, including intermediaries	4	1	1	4	1
Workforce reduction policies and practices - legal compliance	5	5	1	1	1
Payroll records and pay slips	5	5	1	4	1
Performance assessment (for promotion, trainings)	4	5	1	4	1
Assessment of vulnerable workers performance (for promotion, trainings)	4	1	1	1	1
Worker's equipment costs (incl. Uniforms)	5	5	1	1	1
Criteria on recruitment fees	5	1	1	1	1
Clear employment contracts	5	5	1	4	1
LEAVE DAYS: general policy (public holidays, annual leave…)	5	5	1	1	1
1 rest day off in 7-days period or more stringent policy	1	5	1	1	1
Special leave (sickness, marriage, family leave)	5	5	1	1	1
Pensions and social security benefits	1	5	1	1	1
Child labor and minimum age (ILO 138)	5	5	5	4	1
Child labor legal compliance policy	5	5	1	4	1
Maintenance of age records of workers	5	5	1	4	1
Child labor remediation policy	4	1	1	1	1
Hiring and employing young workers	5	5	5	4	1
Good conditions of work for young workers	5	5	1	4	1
Young workers working hours	4	1	1	1	1
Young workers access to effective grievance mechanisms	1	5	1	1	1
Equal remuneration (ILO 100)	5	5	5	4	1
Maximum working hours	5	5	5	4	1
Hours of work and overtime monitoring	5	5	5	4	1
Other criteria relating to the conditions of employment	4	1	1	4	3
Part-time / contract workers' rights	5	5	5	1	1
Subcontracted workers' rights	4	5	5	4	3
WORK AND LABOR RIGHTS: general principle	1	5	1	4	3
Voluntary employment - No force labor (ILO 29 &105)	5	5	5	1	1
Rights to refuse overtime	5	5	1	4	3
Overtime compensation required/specified	5	5	5	4	3
Template/format for terms of labor contracts	5	5	1	1	1

Migrant workers' employment and contract management	5	1	1	1	1
Illegal/excessive deductions or fees (incl. Recruitment fees)	5	1	1	4	3
Prohibition of monetary deposits, financial guarantees or retention of personal possessions	5	5	1	1	1
Criteria on wage deductions	5	5	1	1	1
Criteria on debt bondage	5	1	1	1	1
Criteria on employment / recruitment agencies	4	1	1	1	1
Criteria on communication of terms of employment	4	1	1	4	3
Criteria on termination of employment	5	1	1	1	1
Retention of workers' documentation (ID, passport)	5	5	5	1	1
Use of contracts in written form	5	5	1	4	3
Worker’s mobility and freedom of movement	1	5	5	1	1
Timely payment of wages	5	5	5	4	3
Realistic work targets for production, quota or piece work	4	1	1	1	1
Minimum wage	5	5	5	4	3
Living wage	4	5	1	4	1
Policies and procedures to address workers' grievances	4	5	5	4	1
Labor Practices - Employment and Employment Relationships					
Policies and procedures addressing human rights	5	5	1	4	1
Freedom of association (ILO 87)	5	5	5	4	1
Collective Bargaining (ILO 98)	5	5	5	4	1
No discrimination at work (ILO 111)	5	5	5	4	1
Criteria on discrimination at recruitment stage	4	1	1	4	1
Non-discrimination of persons with disabilities	5	5	1	1	1
Workers’ access to training programs	5	5	5	4	3
Joint committees and unions	1	5	1	4	3
Non-discrimination regarding unions	5	5	1	4	3
Formation of workers representation in countries where it is not supported by legislation	5	5	5	4	3
Worker’s awareness of procedures and best practices	5	5	5	4	3
Policies and procedures to monitor workers' satisfaction	1	5	1	1	1
Other criteria relating to empowerment of workers	1	5	4	1	1
GENDER ISSUES: general principle	1	5	5	1	1

Gender policies and best practices	5	5	5	1	1
Women's access to health and safety services	1	5	1	1	1
Gender considerations in impacts and risks assessment of production	5	1	1	1	1
Gender considerations in stakeholder engagement process	4	1	5	1	1
Criteria relating to women's land ownership	4	1	1	1	1
Women's rights at work	5	5	5	1	1
Maternity/paternity leave days	5	5	1	1	1
Non-discrimination based on gender	5	5	5	4	3
GENDER POLICIES AT WORK - general principles	5	5	5	1	1
Family-friendly policies to increase the labor force participation of women	5	5	1	1	1
Development assistance policies which promote the economic role of women	1	1	5	1	1
Incentives to women or develop their careers (e.g., specific training)	5	1	1	1	1
Integration of women migrants in labor force	5	1	1	1	1
Workers' grievance includes the gender balance dimensions	4	1	1	1	1
Female workers'' entitlement to breaks	1	1	1	1	1
Assessment of female workers performance	5	1	1	1	1
Management systems practices to monitor, evaluate and remediate gender specific issues	1	1	1	4	3
Labor Practices - Human Development and Social Dialogue					
SOCIAL					
ECONOMIC VIABILITY: general principle	5	5	5	4	3
Fair competition	1	5	1	1	1
Production efficiency productivity	5	5	1	1	1
Long term sustainability management plan / continuous improvement	5	5	5	4	3
ADMINISTRATION AND MANAGEMENT: general principle	5	5	1	4	3
Economic Viability					
ENVIRONMENT AND SOCIAL (E&S) MANAGEMENT SYSTEMS: general principles	5	5	5	4	3
Staff training on sustainability issues	5	5	5	4	3
Assessment of water usage	5	5	5	4	3
Assessment of risk and impacts on water levels of water resources used	5	5	5	4	3
Assessment of risk and impacts on water quality of water resources used	5	5	5	4	1

Environmental risk and impacts	5	5	5	4	1
Assessment of soil condition	5	5	5	1	1
Assessment of biodiversity risks and impacts	5	5	5	4	1
Environment and social risks mitigation and performance improvement	5	5	5	4	1
Organizational capacity for environmental and social (E&S) management	5	5	5	4	1
Effectiveness of E&S management systems	5	5	5	4	1
Reporting on and making publicly available E&S management system	5	1	1	1	1
Emergency response plans or strategies to climate related hazards	1	5	1	1	1
Stakeholder analysis and engagement planning in E&S management systems	5	5	5	4	3
Verification of mandatory certificates and permits	5	5	5	1	1
Occupation Health and Safety (OHS) management system	5	5	5	4	3
Respect of natural or cultural heritage	1	5	1	1	1
Other criteria relating to administration and management issues	4	1	1	4	3
Sustainability Management					
Market data and analysis	5	5	1	1	1
Supply chain stakeholders mapping	1	1	5	4	3
Use of price premium	5	1	1	1	1
Setting-up contracts with traders	4	5	1	4	3
Inclusion of suppliers (sustainability strategy)	4	5	1	4	3
Supply chain responsibility (beyond primary production)	5	1	5	4	3
Access and selection of inputs and varieties (traditional versus improved/engineered)	1	5	5	1	1
Traceability of inputs / varieties and records of materials used	1	5	5	1	1
Infrastructure (Transport, storage, testing, laboratories &)	1	5	5	1	1
Responsible intensification of productivity	5	5	1	1	1
Policies encouraging clients, staff and suppliers to consider sustainability issues	4	1	1	4	1
Group organization and management (e.g., cooperatives)	1	5	1	4	1
Subcontracting (disclosure of, prior approval, auditor's access to)	5	5	1	1	1
Supply Chain Responsibilities					
Management					