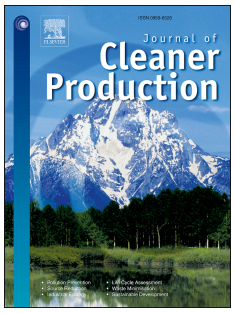
Accepted Manuscript



Benchmarking agri-food sustainability certifications: Evidences from applying SAFA in the Ecuadorian banana agri-system

Lorenzo Bonisoli, Emilio Galdeano-Gómez, Laura Piedra-Muñoz, Juan Carlos Pérez-Mesa

PII: S0959-6526(19)32393-5

DOI: https://doi.org/10.1016/j.jclepro.2019.07.054

Reference: JCLP 17579

To appear in: *Journal of Cleaner Production*

Received Date: 24 October 2018

Revised Date: 15 June 2019

Accepted Date: 6 July 2019

Please cite this article as: Bonisoli L, Galdeano-Gómez E, Piedra-Muñoz L, Pérez-Mesa JC, Benchmarking agri-food sustainability certifications: Evidences from applying SAFA in the Ecuadorian banana agri-system, *Journal of Cleaner Production* (2019), doi: https://doi.org/10.1016/j.jclepro.2019.07.054.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

Title Page

Benchmarking agri-food sustainability certifications: evidences from applying SAFA in the Ecuadorian banana agri-system

Lorenzo Bonisoli [a,b] * lbonisoli@utmachala.edu.ec

Emilio Galdeano-Gómez[b] galdeano@ual.es

Laura Piedra-Muñoz[b] lapiedra@ual.es

Juan Carlos Pérez-Mesa[b] juancarl@ual.es

[a] Unidad Académica de Ciencias Empresariales, Universidad Técnica de Machala, Km.5 1/2 Vía Pasaje, 070222 Machala, El Oro, Ecuador

[b] Department of Economics and Business, University of Almería (Mediterranean Research Center on Economy and Sustainable Development, CIMEDES), Ctra. Sacramento s/n, 04120 Almería, Spain

* corresponding author

ACCEPTED MANUSCRIPT

ACCEPTED MANUSCRIPT

Benchmarking agri-food sustainability certifications: evidence from applying SAFA in the Ecuadorian banana agri-system

Abstract

Certified products are a possible way to obtain and improve sustainability. Nevertheless, their effectiveness in enhancing agri-system sustainability is strongly questioned in the academic arena. This study aims to examine in depth the effect of certification on sustainability achievement. For this purpose, organic and Fairtrade Ecuadorian banana is analysed against the conventional banana. This study employs an original approach that operationalises SAFA (Sustainability Assessment of Food and Agriculture). This tool was chosen for the analysis because of the wide spectrum of sustainability issues considered in the evaluation, along with the fact that it is easy for producers and decision makers to implement and understand, and offers the consequential possibility to identify precise measures to enhance sustainability in the short term. Results show that organic and Fairtrade farms achieve more sustainable performance than those of conventional farms in terms of governance, environmental and economic dimensions. Nevertheless, conventional farms display better outcomes in matters of social sustainability. The reason most likely lies in the size and processes of farms rather than their certification standards. This study may be used by practitioners as a valid benchmark for the implementation of SAFA to other agri-systems and by decision-makers as a guide for the regulation of agri-sector processes.

Keywords: Certifications, SAFA, Fairtrade, Organic, Ecuador

1. Introduction

In recent years, several certification schemes have been created to assess product sustainability for customers. This trend is not only present in agriculture but also a wide range of sectors, such as fishery, forestry, and tourism (Dietz et al., 2018; Tröster and Hiete, 2018; Wibowo et al., 2018). Nevertheless, the effect of certification on system sustainability is strongly debated and a common consensus is far from being reached.

In fact, with regard to this academic debate, several studies have confirmed the benefit of certifications on improving agriculture sustainability as a whole (Barham and Weber, 2012; de Olde et al., 2016; Torres et al., 2016), soil quality (Pritchett et al., 2011), farm profitability (Haggar et al., 2017), energy and material usage (La Rosa et al., 2008), animal welfare (Boggia et al., 2010), biodiversity (Underwood et al., 2011) and workforce wellbeing (Krumbiegel et al., 2018).

However, other studies have reported that, in some cases, the impact of certifications is not completely clear. In particular, data on soil quality (Leifeld, 2012), environmental impact (Foteinis and Chatzisymeon, 2015; Patil et al., 2014) and societal sustainability of certified farms (van Calker et al., 2007) are not as positive as expected, revealing a clear necessity to analyse this issue in depth.

This study engages in this academic discussion by completing an extensive evaluation and comparison of the sustainability of certified and conventional agri-products. To do so, an original approach was developed which combined manager interviews, farm visits and producer and worker surveys to operationalise the FAO's Sustainability Assessment of Food and Agriculture (SAFA; FAO, 2013a).

SAFA is the instrument chosen for this study as it offers three critical advantages: the wide spectrum of sustainability themes considered in the evaluation, the ease with which it can be used and understood by producers and decision makers, and, the consequential possibility to identify precise measures to improve system sustainability in the short term.

This study applies the described methodology to the Ecuadorian banana agri-system. Ecuador is a country that is highly dependent on the exportation of raw material, where the banana is the top exported agri-product, representing 23.13% of the overall non-oil based exportation of the country (AEBE, 2017). For this reason, it is important to evaluate the sustainability of this system, considering that most producers have adopted private certifications and changed their production to match the growing demand for certified products in western countries. Furthermore, this particular market constitutes a rather interesting subject due to both the existence of several certifications that are strongly influenced by market trends and the absence of studies on sustainability, especially concerning the various certified productions and their comparison with conventional banana.

Although several studies discuss the sustainability of certified products, most of them either focus on a specific sustainability aspect or employ an only-for-experts method (Fess and Benedito, 2018). The present study contributes to the debate in three main ways: evaluating the four sustainability dimensions of certified and conventional agri-systems, applying an original approach that operationalises SAFA, and providing comprehensible results that may be translated into practical suggestions for producers and decision makers for the improvement of the sustainability of agri-food sectors.

The article is organised as follows: firstly, the debate on certification and related issues are analysed; secondly, an overview of the Ecuadorian agri-system and the main certifiers it is described; thirdly, the methodology is presented; fourthly, the results of the evaluation are reported and discussed; and finally, conclusions are drawn and further lines of research are suggested.

2. Certified Products

In the last decade, a growing number of farmers have arranged their production process in order to obtain a private institution quality certification. Certification, even if it is not the sole route for sustainable agriculture, provides controlled planning to make progress in the sustainability of agricultural practices through the implementation of well-defined indicators and auditing instruments (Tayleur et al., 2017). More specifically, certification could be a valid solution for small farmers in developing countries, where the government does not always completely control territory and agricultural procedures (Barrett et al., 2001).

With regard to the most contentious issues that have emerged in the academic debate, this section first examines those certifications whose primary purpose is to enhance the well-being of producers and then addresses the organic product certifications.

2.1. Social well-being certifications

In the last thirty years, the wide implementation of neoliberal policies in Latin American agri-sector has brought about the transformation of agriculture from a Fordist national model of mass-market food production and consumption (Friedmann and McMichael, 1989) to a speciality item oriented

production aimed at wealthy consumers in the global market (Raynolds, 2008). In this context, alternative food networks developed as a countermeasure to "the unsustainable industrial food system and the exploitative trading relations embedded in global supply chains" (Goodman et al., 2011).

The first key issue related to certifications is efficiency. Several studies show that certified products are, in general, more sustainable than those that are not certified. For example, in the Ecuadorian banana agri-system, organic production results in better outcomes, both for the environmental point of view and in terms of producer revenues (Castro et al., 2015; Melo, 2005; Melo and Wolf, 2007; Ruben et al., 2008). Moreover, evidence shows that Fairtrade (FT) agriculture enhances women participation to networks benefits, farming practices and cash access in both Latin American (Lyon et al., 2010) and African (Bassett, 2010) agri-systems. Finally, certification is effective in enhancing producers' sustainability, as it is for fishery (Borland and Bailey, 2019), it increases occupational health and safety for rural communities in forestry (Şen and Güngör, 2018) and it strengthens revenues in the tourism industry (Hellmeister and Richins, 2019).

Despite the previously-mentioned benefits, a significant number of studies have identified several aspects related to sustainability certification efficiency that deserve further analysis.

The first topic of interest related to certified products is their acceptance within the destination market, i.e. the North. In general, although the majority of European consumers claim to be seriously interested in the social and environmental sustainability of the products they purchase, giving ethical aspects priority in the selection of products, economic factors still prove crucial in the selection process (Gracia and de Magistris, 2008). Moreover, there are many variables which bring into question whether said claim (a commitment to sustainable products) actually generates real purchase; in particular, certified product sales are affected by scarce availability and deficient communication on store shelves (Annunziata and Scarpato, 2014). Furthermore, certifications result to have low visibility and scarce level of understanding (Annunziata et al., 2019) so that they are rarely considered in the consumer's decision process (Peschel et al., 2019). Finally, the level of professionalism in the sale of certified products is generally low (Bellucci et al., 2012).

Another aspect that has undermined the capacity of the certified products market to improve the sustainability of agri-systems is the proliferation of certifications that complement, substitute or compete with each other (Lambin and Thorlakson, 2018). As in the case of the Dutch coffee market, FT has not become the standard for the market but it was used by the key stakeholders (such as retailers and roasting companies) as a benchmark for developing new standards that prove more feasible for their business models (Ingenbleek and Reinders, 2013).

Big companies play a crucial role in the certified products market. In fact, in general, big companies that are found to be less interested in sustainable marketing than the small mission-driven firms (Howard and Jaffee, 2013), entered this market demanding high standards products and expensive certifications (Raynolds, 2008) or creating self-owned certification process (Fridell et al., 2008). For this reason, and to compete with the top Fairtrade certifier, Max Havelaar, other institutions created less demanding standard certificates, such as Utz Kapeh, Rainforest Alliance (RA) (Bacon, 2005; Bacon et al., 2008) and 4C (Ingenbleek and Reinders, 2013). In the case of RA, in order to minimise producers' expenses, labelled products that contained only partially certified matter (Ingenbleek and Reinders, 2013) and, in some cases, it failed to generate better environmental outcomes (Bellamy et al., 2016). The situation resulted in lower producer incomes (Minten et al., 2018), the indebtedness of small-holder farmers (Wilson, 2010) and a higher rate of people below

the poverty line among the certified producers with respect to their conventional counterparts (Bassett, 2010; Beuchelt and Zeller, 2011).

To understand this contradiction, it is necessary to take a step back and direct the analysis of the whole process at the so-called "ethical commodities". Mutersbaugh and Lyon (2010) define ethical commodities as those for whom a significant portion of their value relies on ethical qualities that are proven by widely accepted and verifiable standards. Hence, since those qualities are extrinsic to the product and thus not detectable by commodities testing, a certification process is necessary to make ethical qualities visible to consumers. Nevertheless, the resulting certification supply-chain, from the point-of-origin to ethical consumers, incurs an ethical contradiction; in fact, despite its ethical intentions, the market of certified products assumes neoliberal beliefs according to which the consumer rather than public institutions should be the driver of development and sustainability (Moberg, 2014). In addition, since the logic of a certification process reflects consumer concerns and values of developed countries, the FT market often neglects specific features of the point-of-origin's social, environmental and economic situations and forces it to match external standards (Wilson and Jackson, 2016).

By doing so, the market of certified products reproduced a neo-colonial situation in which what for consumers is a matter of choice, for producers is a matter of survival (Melo and Hollander, 2013), as explained, for instance, by Raynolds and Ngcwangu (2010). These authors explored a case study of South African rooibos tea and demonstrated how US consumers shaped the production at the point-of-origin.

2.2. Organic products certification

There is an extensive literature that explores a variety of aspects on organic products. This study focuses on some key topics related to the consumption of this kind of product. The first aspect addressed is the environmental impact of organic agriculture as it is traditionally the main reason why sustainability researchers have concentrated their attention on this type of production system. The second point of interest studied is the supposed increased profitability that Organic Agriculture (OA) should generate for farmers. Once the sustainability of OA at the point-of-origin is discussed, the study investigates the demand that drives the implementation of OA, namely the perception and acceptance of Organic products among consumers.

OA is considered to be a benefit to the environment by enhancing climatic resilience (Scialabba and Müller-Lindenlauf, 2010), reducing soil degradation (Niggli et al., 2007), improving pest resistance (Birkhofer et al., 2008) and soil fertility (Bonanomi et al., 2016), creating a more efficient use of natural resources such as water (Thierfelder and Wall, 2009), demanding less energy inputs (Pimentel et al., 2005) and contributing to food safety (Azadi et al., 2011). Nevertheless, some authors point out certain limitations to the belief that "organic is always better". In particular, Tuomisto et al. (2012) conclude that if on one hand organic production records higher soil organic matter content, lower nutrient loss and lower energy requirements, on the other hand, it results in higher nitrogen leaching and ammonia and nitrous oxide emissions per product unit than those generated by conventional crops. In addition, because yields are lower (at least 20% according to De Ponti et al., 2012), organic farming needs more land use and is therefore unlikely to supply the worldwide food demand (Connor, 2008). Furthermore, Hole et al. (2005) find that OA contributes to biodiversity even if it is unclear whether OA would offer greater benefits to biodiversity than carefully targeted prescriptions applied to conventional farming. Finally, Templer et al. (2018)

conclude that ecological farm health is reinforced only if organic processes overtake basic labelling requirements, thus the positive effects of organic certification on agroecosystem health cannot be taken for granted.

Organic farming increases farmers' income (Parvathi and Waibel, 2016), contributes to the reduction of poverty among small farmers (Ayuya et al., 2015), generates a higher return on investment (ROI) (Kleemann et al., 2014) and proves to be less risky than conventional methods (Pimentel et al., 2005). However, even in this case, it is possible to report some in-depth analysis. For instance, contrary to the above investigation, Ibanez and Blackman (2016) and Froehlich et al. (2018) conclude that if OA results in improved environmental benefits, there is no evidence that it positively affects farmers' economy. A possible explication of this conclusion may be found in the research of Kleemann and Abdulai (2013), whose findings indicate that economic returns of organic farms are substantial only if farmers go beyond the organic-by-default step and intensively implement agri-ecological practices. Finally, Veldstra et al. (2014) find that in some cases farmers who undertake organic practices prefer not to certify their products because of the high cost of the certification process.

The studies on the acceptance of Organic Products (OP) among consumers focused on two different points: the profile of the OP consumers (*who*) and the reasons for consuming OP (*why*) (Monier-Dilhan and Bergès, 2016).

Regarding the first aspect (*who*), with the aim of establishing a profile of OP consumers, it was found that, in general, the propensity to purchase OP tended to increase with social status and the presence of young children in a household (Wier et al., 2008), a higher education level (Monier et al., 2009) family structure, access to organic products and higher expense capacity (Dimitri and Dettmann, 2012). Furthermore, the rate of OP consumers is higher among education and health professionals (Vehapi and Dolićanin, 2016), while it is lower among elder householders and African Americans (Dettmann and Dimitri, 2010). It is notable that the cluster analysis of Rodrigues et al. (2016) and Oroian et al. (2017), conducted in Brazil and Romania respectively, obtain similar findings in that they identify three groups of consumers: Greeners, which associate OP to sustainable development and are represented by older people; GMO-Freers, more interested in healthy food and generally younger; and those who do not have interest in OP or simply focus on taste of food.

This last study mentioned leads to the second question (*why*), which has generally aroused more interest among academics. In fact, it is possible to identify two different possible reasons: an "egoistic" reason that corresponds to concerns about food safety, which is based on the belief that OP is healthier than conventional produce, and an "altruistic" reason that associates OP with a better positive "environmental" impact (Yadav, 2016). Nonetheless, the results seem to considerably vary according to country and age. In fact, even if the two reasons always have a positive impact on all OP consumers (Yadav and Pathak, 2016), French (Monier-Dilhan and Bergès, 2016), German and US (Rana and Paul, 2017) consumers, for example, are more driven by environmental impact reasons, while Indian (Yadav, 2016), Malaysian (Rana and Paul, 2017), Turkish, Iranian and Pakistani (Asif et al., 2018) are more conditioned by personal health values.

Finally, three studies on consumer intentions are particularly remarkable in the sense that they approach the exploration of said intentions in selecting OP from a different perspective. The research of Hwang (2016), for example, takes a psychological angle and finds how self-presentation, namely the component of self-identity, whose goal is the management of the self in

social settings, is one of the major factors that drive older consumers' purchase intentions, while ethical self-identity, which reflects the extent to which ethical issues are related to private consumption practices, does not improve purchase intention. With another approach, in order to explain the gap between consumers' claims of interest in OP and their actual behaviour, the study by Chekima et al. (2017) focuses on consumption rather than purchase and finds that consumption of OP is higher when consumers are more concerned about the future, so producers and marketers should advertise future gains of OP in order to foster consumption. Subsequently, Apaolaza et al. (2017), rather than focusing on health as a motivation for the acceptance of OP, state that better health is a consequence of OP consumption, because it shapes consumers' lifestyle.

3. Case Study: Banana sector in Ecuador

This section presents two aspects are presented: an overview of the Ecuadorian banana agri-system and the main certifiers that operate in it.

3.1. Ecuadorian banana agri-system

Macroeconomic figures in 2018 show that Ecuador has the lowest inflation rate of all Latin America (1.12%), an unemployment rate of 5.4%, and an external debt of 33.8% of GDP, one of the lowest values with respect to the main South American economies, such as Argentina (10.0%; 8.4%; 35.3%), Brazil (5.4%; 11.5%; 18.0%), Chile (3.0%; 6.5%; 66.3%), Colombia (3.2%; 9.2%; 42.5%) and Peru (3.7%; 6.7%; 38.4%) (Focus Economics, 2018).

Nevertheless, poverty is still an important issue. Although in the 2007-2017 period the poverty rate (less than 84.5 USD per month according to BCE, 2017a) had decreased by 41.41%, in December 2017 it reached the value of 21.5% of total Ecuadorian population, in other figures, 3.62 million (m) people were living below the poverty line. The extreme poverty rate (less than 47.6 USD per month according to BCE, 2017a) has also decreased in the last ten years by approximately 52.12%, and in December 2017 it accounted for 7.9% of the Ecuadorian population, i.e. 1.33 m people (BCE, 2017a). Poverty is more common in rural areas, where poverty rate accounts for 39.3%, while in urban areas it is considerably lower, i.e. 13.2 (BCE, 2017a). Inequality is also an important issue, even if Ecuadorian governmental action in the last decade has managed to reduce the rich-poor gap. In fact, the Gini coefficient has decreased from 0.54 to 0.46 in the period 2004-2015 (BCE, 2017b).

This study focuses on the Ecuadorian banana agri-sector. Ecuador's exportations, which in 2016 represented about 19% of GDP, depend primarily on raw materials. The main exported product is petroleum, which accounts for 32.5% of total exportation, followed by banana (15.61%), (AEBE, 2017).

Banana plantations are concentrated in three Ecuadorian provinces (91.8% of national production), namely, Los Rios (58,219 ha. of production), Guayas (47,388 ha.) and El Oro (43,165 ha.). The present study focuses on the last province (Figure 1).

Figure 1. El Oro province location

In 2016, with $2.62 billion (b), banana accounted for 15.61% of the total Ecuadorian exportation (AEBE, 2017). The principal destination of Ecuadorian banana is the European Union (EU) with 31.86% of the exported product in 2016; Russia (22.55), United States (14.86) and Middle East (10.12) are the other main destinations. However, in the period 2010-2016, there is a notable negative trend in trade with United States (US), whose trade decreased 13.25%, while there is remarkable growth in exportation to Russia (+36.3%), Turkey (+11%), EU (+6.22%), New Zealand (from 28.7 to 72.6 k tons), Japan (from 46 to 157.8 k tons), and China (from 2.2 to 173.9 k tons).

3.2. Principal certifiers in the Ecuadorian banana agri-system

In Ecuador, in the banana agri-sector, there are at least four main private certifications: Global Gap, Rainforest Alliance, Fairtrade Labelling Organization (FT) and Organic product (IFOAM):

Global Gap was born as EUROGAP in 1997 as an initiative by the retailers' group Euro-Retailer Produce Working Group in response to the growing demand of many UK retailers for harmlessness of food and the respect of fair principles in production practices. In 2007, the name changed to Global Gap (Gap stays for Good Agricultural Policies) as the focus spread from European to Worldwide producers. As of 2017, this certification was present in 125 countries (GlobalGap, 2018).

Rainforest Alliance was born in 1986 as a project launched by a group of volunteers led by Daniel Katz who were concerned about the problem of deforestation. The project consisted of creating standards for farmers and economic advantages for certified products (Rainforest Alliance, 2018). In 1990, RA established the standards for the banana sector and two years later certified its first banana farms. In 2015, RA Rainforest Alliance certification covers 1.2 million farms in 42 countries, growing 101 different crops on about 3.5 million hectares (ha). Moreover, it certifies 15.1% of the total world production of tea, 13.6% of cocoa and more than 5% of both coffee and bananas (Milder and Newsom, 2015).

ACCEPTED MANUSCRIPT

Fairtrade movements rose in Europe during the fifties. The aim of these organisations was to transform the North-South linkage from exploitation to sustainable development using a "not aid but trade" philosophy (Raynolds, 2000).

In 1997, the main FT organisations gathered under the Fairtrade "umbrella" called Fairtrade Labelling Organisation International (Raynolds, 2000), which in 2003 created FLOCERT, the independent certification body of the Fairtrade system (Flocert, 2018). In 2016, FT agriculture accounted for 1.6m farmers and workers and raised 150m euros of FT premium for sustainability and training initiatives, community education and health resources, and equipment (FLO, 2017). Banana is the principal crop in FT production with 579,081 million metric tons of sold product, 58% of which corresponds to organic banana. In Ecuador, in 2018, FT paid a bonus of USD 1.00 per commercial box of 19.4 kg of Fairtrade banana, which represented an extra 16.12% over the conventional price of USD 6.20 fixed by MAGAP for the exportation banana box (El Telegrafo, 2017).

Organic agriculture movements began to appear in the sixties in Europe and the United States. Although there was no single definition of "organic", most movements struggled to create sustainable agriculture which respected the environment and without the utilization of chemical fertilizers (Raynolds, 2000).

In 2015, organic agriculture was present in 179 countries, accounting for 90.6 m ha of agricultural land (1.10% of total agricultural land), 2.4 m producers and market size of USD 81.6 billion (bn) with a per capita consumption of USD 11.1 (IFOAM, 2016). The consumption of Organic products (OP) has risen exponentially worldwide in the past decade (Rana and Paul, 2017).

4. Methodology

The instrument to evaluate the difference between systems sustainability is SAFA. In this section, SAFA is explained in detail, and the academic literature implementing SAFA is discussed.

4.1. SAFA framework

SAFA is a FAO project, which was developed between February 2011 and June 2013 that involved more than 250 stakeholders from 61 countries. It consists of four tools. The first is the guidelines that explain the sustainability principles used in the elaboration of the framework (FAO, 2013a). The second is a detailed list of 116 sustainability indicators which cover 58 sub-themes, 21 themes and 4 sustainability dimensions (FAO, 2013b). The third is the software that elaborates the results in order to describe the sustainability of the analysed system using a polygon organised in the 21 themes and in five levels of sustainability, from an "unacceptable sustainability" red level to an "optimal sustainability" dark green level (FAO, 2014). Finally, the brand new tool is an application for smartphones, designed specifically for small farms since it uses a lower number of indicators and an even easier process (FAO, 2015).

4.1.1. Users, purposes and principles

As explained by FAO (2013a), SAFA is a holistic framework whose main competitive advantage in relation to other SATs is its flexibility. SAFA relies on the methodological principles of holism,

relevance, rigour, efficiency, performance-orientation, transparency, adaptability and continuous improvement. SAFA is designed for multiple users, from farms to governments, and for multiple purposes, from self-assessment to implementation of regional planning.

4.1.2. SAFA dimensions and themes

SAFA is a holistic framework that applies a hierarchical structure in which, at the more general level, there are four sustainability dimensions: Good Governance, Environmental Integrity, Economic Resilience, and Social Well-being. The second level is comprised of 21 sustainability themes and the third level consists of 58 sub-themes. Finally, the most specific level corresponds to 116 indicators that quantitatively or qualitatively investigate precise verifiable data or facts. Each indicator is supported by a guide that explains how to measure the item and the thresholds that must be referenced to assign a score on a 5-point scale. Details of SAFA structure and SAFA dimensions and themes are given in Tables 1 and 2.

Table 1. SAFA structure

Dimension	Themes	Sub-themes	Indicators
Good Governance	5	14	19
Environmental Integrity	6	14	52
Economic Resilience	4	14	26
Social Well-being	6	16	19
Total	**21**	**58**	**116**

Source: FAO (2013a)

Table 2. SAFA dimensions and themes

Dimensions	Themes
Good governance	G1. Corporate Ethics
	G2. Accountability
	G3. Participation
	G4. Rule of Law
	G5. Holistic Management
Environmental integrity	E1. Atmosphere
	E2. Water
	E3. Land
	E4. Biodiversity
	E5. Materials and Energy
	E6. Animal Welfare
Economic resilience	C1. Investment
	C2. Vulnerability
	C3. Product Quality and Information
	C4. Local Economy
Social well-being	S1. Decent Livelihoods
	S2. Fair Trading Practices
	S3. Labour Rights
	S4. Equity
	S5. Human Health
	S6. Cultural Diversity

Source: FAO (2013a)

4.1.3. SAFA key competitive advantages

According to the literature, SAFA reveals some key competitive advantages:

- Flexibility. SAFA can be implemented in different contexts, at different scales or levels by different users and multiple purposes (Kassem et al., 2017).
- High credibility, since it was developed by an independent UN organisation without the support of private corporations or NGOs (Bonisoli et al., 2018; Jawtusch et al., 2013).
- User-friendly. SAFA is very user-friendly, both in its application (time and cost saving) and its results comprehensibility. In addition, suggestions for possible improvements are clearly linked to the established thresholds of sub-themes and may directly motivate change (Gayatri et al., 2016).
- Comprehensiveness. The 116 indicators make the assessment detailed and highly thorough; it even identifies those sustainability aspects of which users are unaware (de Olde et al., 2017; Gayatri et al., 2016; Jawtusch et al., 2013).
- Finally, SAFA can be implemented with other sustainability tools such as quality certifications (for example Fairtrade) or other SATs (for example COSA and RISE) (Schader et al., 2014).

4.1.4. Indicators assessment

SAFA employs three kinds of indicators: indicators that evaluate whether the organisation has set a sustainability target to achieve, indicators that assess which sustainability practices the organisation has developed, and finally indicators that examine the sustainability performance of the organisation. Generally speaking, the latter group is the most important, which is why the majority of the indicators belong to this group. Nevertheless, since some performance is difficult to assess or impossible to measure, SAFA considers the practices implemented, and when there are no relevant practices, or there is limited evidence, the assessment focuses on targets (FAO, 2013a).

For example, the Environmental integrity indicators E 1.1.1, E 1.1.2 and E 1.1.3 compose the sub-theme Greenhouse Gases (E 1.1). The first indicator is a target-base that investigates whether the organisation has a formal written plan for the reduction of GHG. The second indicator lists a series of practices and asks which are implemented. Finally, the third indicator calculates the organisation's GHG emissions (FAO, 2013b).

The weight of indicators is different: a full sustainable target-based indicator has a quantified score of 1, a practice-based indicator a score of 2, and a performance-based a score of 3 points. Then, SAFA calculates the percentage of points achieved on possible points per dimension and provides the result following the scheme (see Table 3):

Table 3. Indicators score

Percentage points achieved / points achievable	SAFA Colour	This study score
> 80%	Dark green	> 4.1
60 – 80 %	Light green	3.1 to 4.0
40 – 60 %	Yellow	2.1 to 3.0
20 – 60 %	Orange	1.1 to 2.0
< 20 %	Red	< 1.0

Source: own elaboration

4.1.5. Studies that implement SAFA methodology

Because of its key competitive advantage, SAFA has received a widespread acceptance among both researchers and users. It is possible to group some of the most relevant studies that implement SAFA methodology into five groups (results shown in Table 4):

- Sustainability assessment of an agri-system using the complete SAFA framework. In this group, it is important to mention Jawtusch et al. (2013), which is a pilot study that implements the 2012 version of the framework and is aimed at evaluating users' reaction to the new approach. Furthermore, two other studies demonstrate the vast capacity of SAFA to be applied in developing countries: Gayatri et al. (2016), who apply the framework to beef cattle farming in Indonesia; and Ssebunya et al. (2016), who focus on the small-holder coffee producers in Uganda. Finally, of particular interest are the works of Landert et al. (2017), who apply SAFA to evaluate the sustainability of the urban food system in Basel, Switzerland, and Al Shamsi et al. (2018), who apply SAFA in order to assess food sovereignty in an Italian and Emirates agri-system.
- Partial sustainability assessment using SAFA. It is the case of Theurl et al. (2017), who analyse greenhouse gas emissions along vegetable supply chains in Austria using the SAFA indicators that address this topic.
- Sustainability assessment using some of the SAFA indicators. Notable among this group are two related studies implemented in the Czech Republic: Hřebíček et al. (2013), which aims to find a list of sustainability indicators to be aimed at both farmers and policymakers; and Kassem et al. (2017), which identify a set of indicators to be applied to small farmers. Similar to the latter, Gaviglio et al. (2017) use the Good Governance SAFA indicators along with other frameworks to establish a set of indicators for the evaluation of an Italian agri-system.
- SAFA applied in synergy with other frameworks. Two examples are Hřebíček et al. (2015), who apply SAFA along with GRI to study the topic of sustainability reporting, and Gasso et al. (2015), which evaluate the sustainability of Danish maize for biogas systems in synergy with two other specific frameworks. Finally, having significant bearing on the scope of this study is the work of Schader et al. (2014), who employ SAFA as a third referee to detect differences and trade-offs of six different sustainability frameworks. A particular case is the study of Dabkiene, (2016) who evaluates the usefulness of the information provided by the European agricultural database FADN (Farm Accountancy Data Network) using SAFA indicators as a benchmark.

- SMART application. SMART (Sustainability Monitoring and Assessment Routine Sustainability) is an indicator-based tool that operationalises SAFA. In the work of Jawtusch et al. (2013) the tool is presented and explained, and in Schader et al. (2016) SMART is detailed, explained and applied to a sample of a case study. Finally, Ssebunya et al. (2018) applied SMART to evaluate and compare the sustainability of organic and conventional coffee in Uganda.

Table 4. References implementing SAFA methodology

Group	References
Complete sustainability assessment using SAFA	Gayatri et al. (2016) Ssebunya et al. (2016) Landert et al. (2017) Al Shamsi et al. (2018)
Partial sustainability assessment using SAFA	Theurl et al. (2017)
Sustainability assessment using some of the SAFA indicators	Hřebíček et al. (2013) Kassem et al. (2017) Gaviglio et al. (2017)
SAFA applied in synergy with other frameworks	Hřebíček et al. (2015) Gasso et al. (2015) Schader et al. (2014) Dabkiene (2016)
SMART applications	Jawtusch et al. (2013) Schader et al. (2016) Ssebunya et al. (2018)

Source: own elaboration

4.1.6. SAFA process

SAFA follows a four-step process:

- Mapping. The first step is the mapping of the analysed system in order to describe key relationships among the system's members. The aim is to identify players, procedures, time-space boundaries and recognise the main goal of the evaluation.
- Contextualization. In this second step, the user must revise the sub-theme in order to identify those that can be applicable to the system from those that are either not relevant for the system or dependent on unavailable data and information.
- Indicators. In this step, the necessary documentation and information are collected and the indicators that have been selected are rated according to a 5-point scale whose thresholds are established by the framework guideline. Because the rating depends on the user's judgement, it is necessary that he or she explain the reason for each indicator's score.
- Reporting. In the last step, scores are entered in the SAFA Tool Software and a polygon is created to show the results. In this step, it is important that the user clarify the evaluation outcomes and suggest possible improvements.

4.2. Sample

To compare the effect of certification on sustainability assessment, two different organisations were considered. The first (identified with the letter *A*) is a group of 89 small farmers whose property range is from 1 to 32.23 hectares. These farmers belong to an association, which in 2013 began a programme to obtain both FT and Organic certification along with GlobalGap. Thanks to economic results, the association experienced rapid growth that resulted in tripling the number of members in a three-year period. The association sells directly to European retailers without intermediaries and its clients are mostly located in Germany and Italy.

The second institution (identified with *B*) is a group of 22 producers that sell their products to a single export firm that was created four years ago to cope with the demand of a great European retailer. At the moment, the group sells its conventional banana to two big European retailers whose clients are located in Eastern Europe, mainly in Russia, Czech Republic and Turkey. They respect the private quality standards established by the retailers that were originally based on Rainforest Alliance standards, but they do not have other certifications (see Table 5).

To undertake the investigation, an original approach was developed for the operationalisation of SAFA that consists of three basic steps. The first involved a series of structured interviews with seven managers and employees of the two organisations to obtain the bulk of the Good Governance and Economic Resilience dimensions and a part of the Environmental Integrity dimension. Then, farm visits were conducted to control the application of rules and procedures required to fulfil the Environmental Integrity dimension. Finally, two surveys, which were applied to a random sample of 27 farmers and 440 workers, were the basis for fulfilling the Social Well-being dimension.

Table 5. Sample features

Features	**Group *A***	**Group *B***
Members	89	22
Total hectares	586.78	941.08
Hectares range	1.00 – 32.23	1.95 – 130
Hectares mean and s.d.	6.59 – 5.61	42.78 – 34.57
Location	El Oro province	El Oro province
Production	Organic	Conventional
Certifications	FLO – IFOAM – Global Gap	Retailers certifications
Product destination	Western Europe	Eastern Europe

5. Results

The way SAFA calculates the score for each theme is the arithmetic mean. Nevertheless, SAFA rounded the score to the next integer so that, for example, 3.1 and 3.9 both score 4. This study prefers to keep one decimal digit, hence in Table 6 and Figures 2-5 scores are shown with decimals, while in Figures 6-8 scores are described as they appear in the SAFA report. Table 6 shows a summary of the main results by dimensions.

Table 6. Analysis results summary

Theme	*A* – score	*B* – score	*Main differences between A and B scores*
		Good governance	
G1: Corporate ethics	3.7	3.3	The mission statement is not known by all employees in *B*. *A* has a committee of needs analysis and a process for security regulation.
G2: Accountability	4	4	-
G3: Participation	1.5	1.5	-
G4: Rule of law	3.0	2.0	Some members of *B* do not fully respect workers' rights. In *B* there is a lobbying activity endorsed by dealers that tries to influence government without stakeholder participation.
G5: Holistic management	4.5	4.5	-
		Environmental integrity	
E1: Atmosphere	2.3	2.0	*A* land-cover change to more complex and diverse systems, such as organic agriculture.
E2: Water	4.4	3.9	*A* does not use highly hazardous chemicals that have potential adverse effects on aquatic life.
E3: Land	4.3	3.4	*B* presents a considerable amount of degraded land.
E4: Biodiversity	2.0	1.8	Presence of mix-cropping in *A*.
E5: Material and energy	2.8	1.9	The inspection found the use of fire to dispose of waste in *B*.
E6: Animal well-being	-	-	
		Economic resilience	
C1: Investments	4.3	3.0	The premium of FT results in better returns of *A*.
C2: Vulnerability	3.0	2.0	Better cash flow trend and available financial net for *A*.
C3: Product quality and information	4.4	4.0	The total organic process of *A* results in better quality food.
C4: Local economy	4.5	4.5	-
		Social wellbeing	
S1: Decent livelihood	3.1	3.5	*B*'s farmers and workers declare to be better off than *A*'s.
S2: Fair trading practices	4.0	5.0	Under the box price restitution agreement found in *A* process.
S3: Labour rights	3.3	4.5	Presence of illegally hired workers and child labour found in *A*.
S4: Equity	3.3	4.3	*A*'s farmers less willing to hire women and disabled people.
S5: Human safety and health	4.5	4.5	*A* show a higher rate of accidents but also a formal plan aimed at not contaminating the surroundings.
S6: Cultural diversity	2.0	2.0	-

5.1. Good Governance (G) dimension results

In this dimension, the results of the two organisations are quite similar as they differ consistently only on one theme out of five (see Figure 2).

The difference regarding theme G1 is in the mission statement: in both cases a mission statement is present, but only in *A* it is known by all employees. Nevertheless, in both cases, the mission

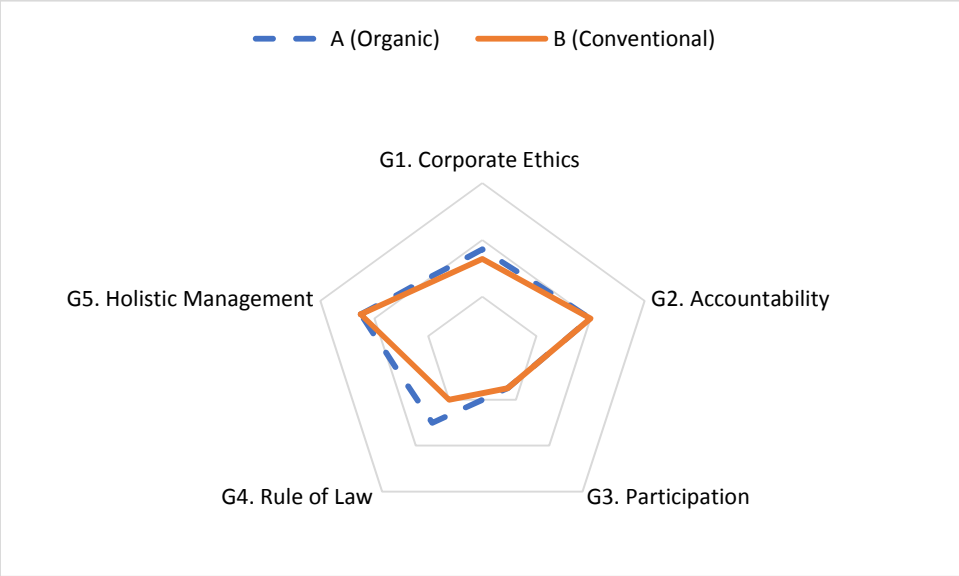
statement seems to be a general requirement imposed from above (certifier bodies) rather than a real guideline the organisation wants to follow. On the other hand, *B* endorses a partial risk analysis provided by the private certifier, while there is no evidence of a formal risk for *A*.

An interesting result was obtained in theme G3. In fact, both organisations fail to identify and involve stakeholders in their information and decision-making processes. More importantly, even the concept of "stakeholders" itself is unknown to these organisations.

The only significant difference in this dimension was found in theme G4: in this case, two indicators display a slight variance in performance. Firstly, *A* does not undertake any lobbying activity, while *B* does, albeit not intensively; secondly, in some case, some farms of *B* were found to partially breach workers' rights, even if, in general, *B* complies with all work regulations. This last point is possible as *B* members are mostly medium and big size farms where rights violations are more easily detected, while for small-holder *A* members, workers' issues are arranged in a personal manner and hence are more difficult to detect. Thus, the fact that the same right violation is made by both organisations is quite probable.

G2 and G5 show very similar results.

Figure 2. Good Governance (G) dimension results



5.2. Environmental (E) Integrity dimension results

The combination of organic production and FT standard along with the presence of 20 agri-forest farms is the most likely explanation for the better results of *A* in relation to those of *B* in all themes (see Figure 3).

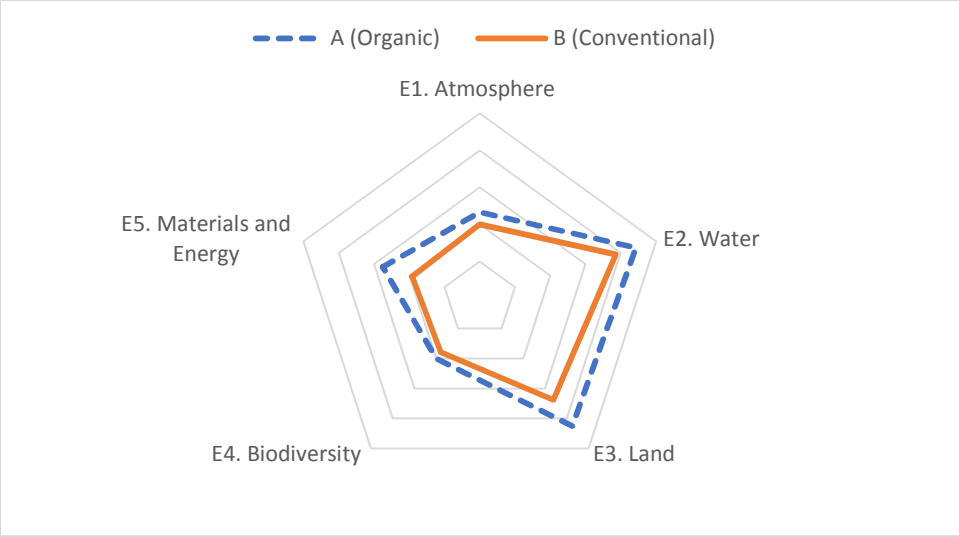
Regarding E1, the lack of a precise plan for lowering GHG and air pollutant emissions and information on the air quality in the area could explain why both organisation registered rather low scores. Nevertheless, the above-mentioned factors, i.e. organic process and agri-forest farms, give an advantage to *A*.

B achieves good performance in both Water and Soil themes since practices and performance in these organisations are substantially positive. *B* implemented a process by which water used in banana handling is recycled for irrigation and imposed 30-metre buffer zones to prevent water contamination. Regarding soil quality, decades of pesticides resulted in a poor organic matter level for both organisations since the organic crop is a recent introduction in the local environment. However, the soil analysis that both organisations carry out every two years reveals chemical and biological results in accordance with locally established standards. The difference between the two organisations is the presence in *B* of 40 has. of degraded land whose status is yet to be defined as all efforts to restore it produced insignificant outcomes.

Biodiversity is a very weak point for both *A* and *B*. The demands of a monocrop and the intensive exploitation of rural areas had a strong impact on biodiversity. Wild animals almost disappeared, along with local endogenous plant species. Despite plans protect and restore wildlife in accordance with market requirements, the situation is far from sustainable. Organic standards that demand a minimum presence of intercropping and agri-forest farms that implement a high rate mixed cropping with the presence of not cultivated land result in a slight difference between *A* and *B* scores. In fact, while the effect of the organic process is limited by intensive cropping, agri-forest farms are just a small percentage of the total farms of *A*. Hence, the results outline how only agri-forest is a system that may be sustainable for biodiversity.

Finally, the attitude of farms towards using raw non-renewable material and energy from non-renewable sources weakens the performance in the last theme since both organisations have planned to substitute the use of diesel with electricity as the primary source of energy. The difference in results is due to some infractions of certifiers' regulations, which took place during on-site visits to *B* (such as the use of fire to dispose of waste).

Figure 3. Environmental (E) Integrity dimension results



5.3. Economic resilience (C) dimension results

Organic banana reaches a higher price than conventional and FT certification implies extra cash for social and production investment. Consequently, the organic sector is more profitable than the

conventional sector. This situation is reflected in the results of the economic dimension (see Figure 4).

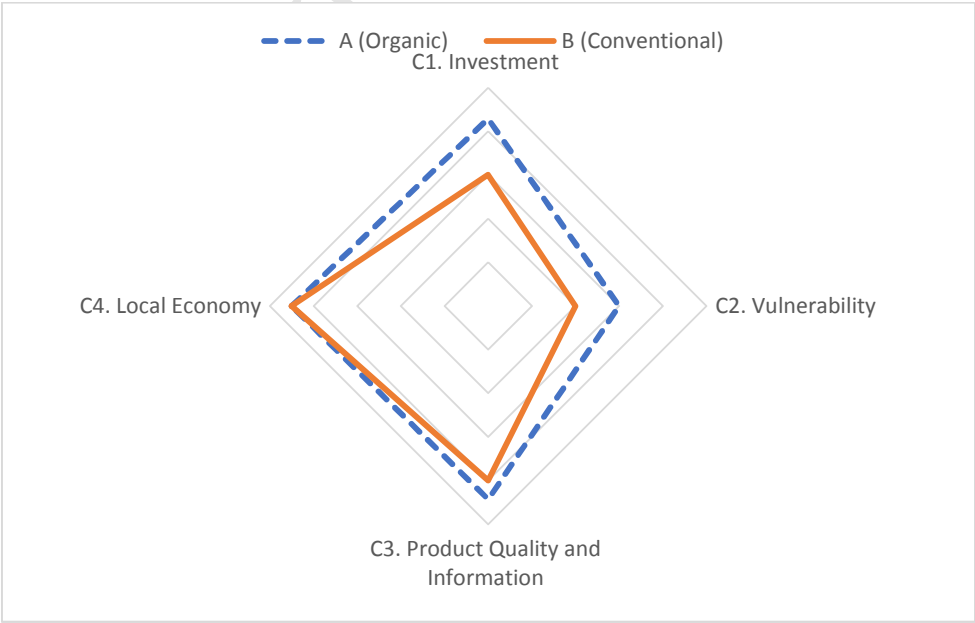
A proves to be sustainable in three out of four themes. In C1, the Fairtrade premium is USD 1.00 per banana box and accounts for USD 0.5m per year to be spent on technological or social improvements. Thanks to this aid, *A* implemented several improvements such as the introduction of new machinery (e.g. water recycling, bunch transportation) and implementation of social services (e.g. farmers health service). In addition, *A* bought a 20has farm to manage directly.

C2 shows the common situation of high vulnerability. The main reason is the dependence on one single crop. Monoculture is the basis of the entire banana sector and only agri-forest farms grow a consistent percentage of other crops along with banana trees. Other points of vulnerability include the scarce number of customers, which in the case of *B* are only two big retailers, the lack of financial risk analysis and a product scarcity prevention plan. However, *A* is less vulnerable than *B* as it has access to a financial net (provided by the *Banco de Crédito*) and a more reliable cash flow trend in the last five years.

Slight differences emerged in theme C3, in fact, both certifiers and customers require measures that ensure food quality and contamination prevention. The gap in the results is due to the fully organic process implemented by *A* that does not use any chemical product.

Results in C4 are totally identical; both organisations pay all taxes due and hire only local workforce. Regarding this last point, it is important to underline that in the last decade some farms hire immigrant workers at lower wages; nevertheless, this practice resulted in a drop in productivity and product quality since banana plantations require an expert workforce and tacit knowledge that was impossible to find in unskilled workers. For this reason, at present, no farm hires foreign workers.

Figure 4. Economic Resilience (C) dimension results



5.4. Social (S) Well-being dimension results

If in the previous dimensions *A* equals or exceeds *B*'s results, in the Social Well-being dimension the results of *B* reveal a more sustainable scenario than that represented by *A*'s performance. In particular, *B* surpasses *A* in four out of six themes (see Figure 5).

Theme S1 addresses life conditions of workers and farmers. Since *B*'s producers are bigger, it comes as no surprise that their workers are also better off than *A*'s. Also, *B*'s workers declare a higher income, as 77% of them declare they can satisfy the needs of their families with their wages versus 39% of *A*'s.

Theme S2 addresses fair trade with customers. Even though, in general, *A* enjoys fair relationships with customers and prices are established by the government, there is evidence of the unofficial price arrangement once or twice a year when buyers expect sellers to return part of the regular price "under the table". This happens when small farms sell to big exporters, but there is no evidence that this arrangement occurs with big farms too, thus *B* is probably immune to this practice.

Theme S3 is linked to labour rights. In this case, the difference in size is the source of the difference in the results. In fact, big farms are more likely to be subject to workers' rights inspections than small-holder farms, because the latter are usually located far from villages and personal arrangements between employers and workers are preferred to formal regulation. For this reason, the analysis reveals 25% illegally contracted workers in the farms of *A* and the presence of child labour, in particular among employers' family members.

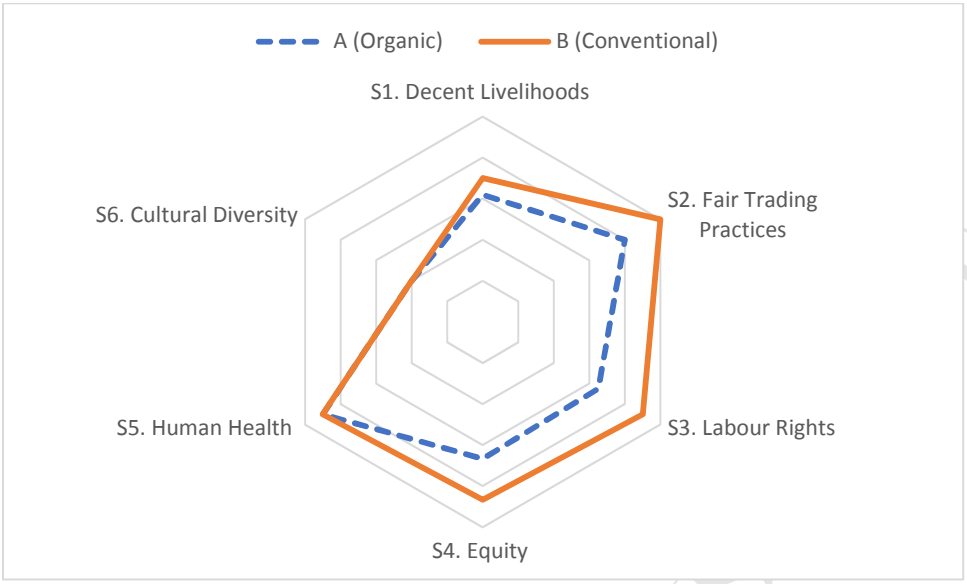
Theme S4 is related to equity with respect to minorities, women and disabled individuals. The difference is the fact that not all *A*'s farmers claimed to respect women's right to maternity leave, but a third of them prefer to hire a man rather than a woman to avoid this situation. Similarly, *A*'s farmers did less to reduce the gap in hiring disabled people than *B*'s farmers did.

Theme S5 relates to health and safety. Although both organisations supposedly provide training courses in first aid and safety, a higher rate of accidents was found in *A*. This fact is probably related to the less strict observance of safety regulations of small farms. Nevertheless, *A* performs better than *B* as it possesses, according to FT standards, a formal plan aimed at not contaminating the surrounding environment, even though in both *A* and *B*, there is no evidence of surrounding contamination.

As for theme S6, which is related to indigenous knowledge and local species, it is rather interesting that both *A* and *B* obtained the same results. In both cases, records show very poor outcomes as no plans or contracts take into account indigenous intellectual property and plant species respond to market demand rather than local needs.

ACCEPTED MANUSCRIPT

Figure 5. Social (S) Well-being dimension results



5.5. Overview

However, SAFA is a tool that allows different levels of depth. In fact, the analysts may refer to very high-quality data or simply personal estimations. The accuracy of the score is reported on a 3-point scale for each theme in the spider graph (Figure 6).

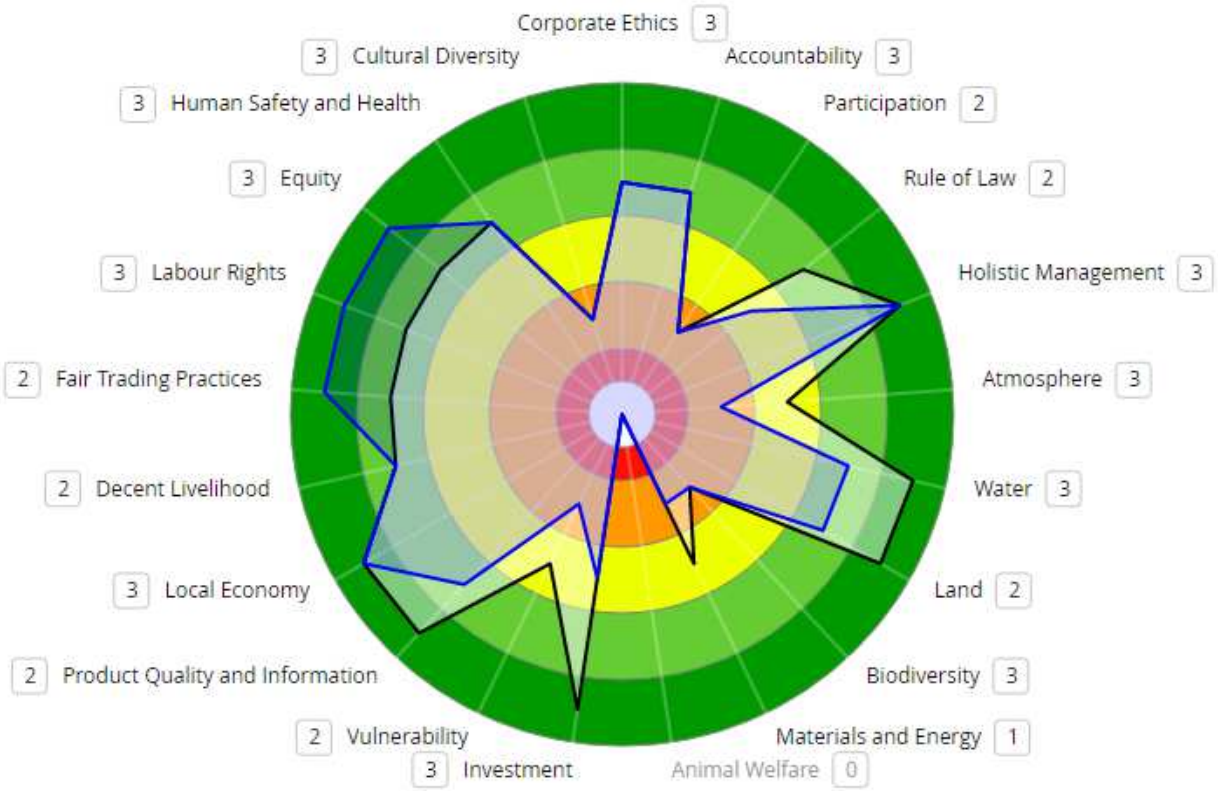
The way SAFA calculates the score for each theme is through arithmetic mean. The present analysis kept one decimal digit. In contrast, SAFA rounded the score to the next integer so that, for example, 3.1 and 3.9 both score 4. The scores are displayed below as they appear in the SAFA tool.

An overall view of the evaluation results shows how no theme is rated “unacceptable”, so it is possible to conclude that certification and government effort succeeded in guaranteeing a minimum level of sustainability.

At the same time, it is important to observe that 9 out of 20 themes report the same score for both organisations; 8 themes reveal progress for *A* over *B*, and 3 themes display an advantage of *B* over *A* (see Table 7).

In addition, *A* achieves the “Best” scores 6 times, while in 3 themes it scores the lowest rate of “Limited” (see Figure 7). However, *B* scores “Best” 5 times and “Limited” 6 times (see Figure 8).

Figure 6. Overall SAFA results



Rating:

Best	Limited
Good	Unacceptable
Moderate	Not relevant

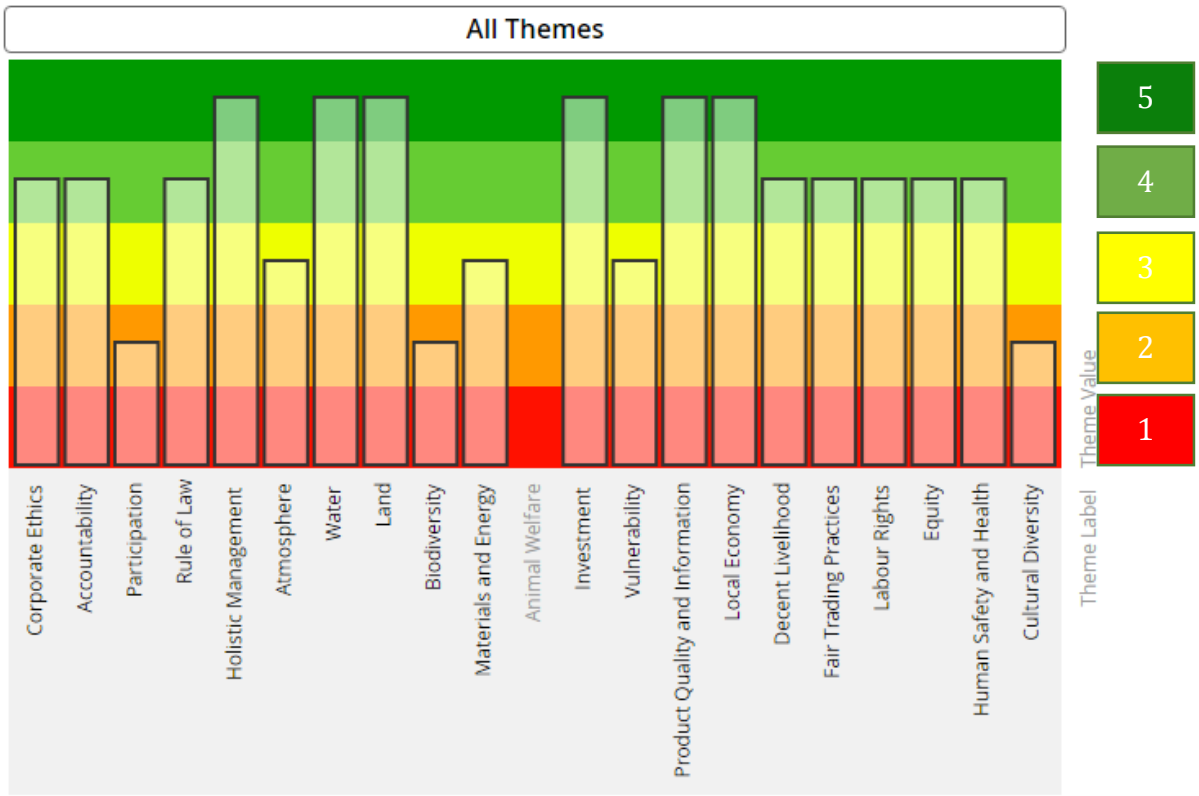
Accuracy score: 0 no data; 1 – low quality data; 2 – moderate quality data; 3 – high quality data.

ACCEPTED MANUSCRIPT

Table 7. Results comparison

Comparison *A* (Organic) vs *B* (Conventional)	Code	Theme name
A is more sustainable than B	G4	Rule of law
	E1	Atmosphere
	E2	Water
	E3	Land
	E5	Materials and energy
	C1	Investment
	C2	Vulnerability
	C3	Product quality and information
A and B are equally sustainable	G1	Corporate Ethics
	G2	Accountability
	G3	Participation
	G5	Holistic management
	E4	Biodiversity
	C4	Local economy
	S1	Decent livelihood
	S5	Human safety and health
	S6	Cultural diversity
B is more sustainable than A	S2	Fair trading practices
	S3	Labour rights
	S4	Equity

Figure 7. *A* scores per themes



Rating:

Best

Good

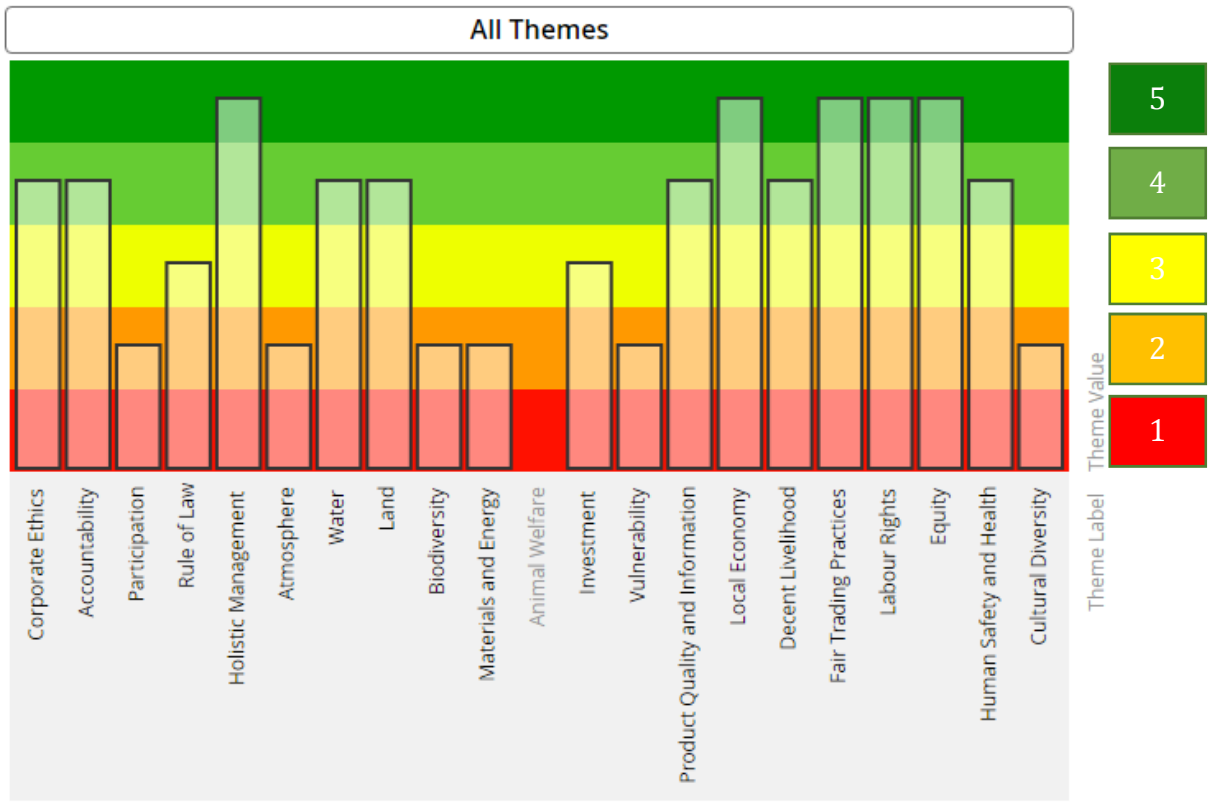
Moderate

Limited

Unacceptable

Not relevant

Figure 8. *B* scores per themes



Rating:	
Best	Limited
Good	Unacceptable
Moderate	Not relevant

6. Discussion

These results generate the need for an in-depth analysis of three main aspects: firstly, the main objective of this study, i.e. the effect of certification on banana agri-system sustainability; secondly, the actual situation of the banana agri-system; and, finally, the effectiveness of SAFA.

6.1. Certifications

The positive effect of certification on sustainability is indubitable: both organisations would have scored considerably worse if they had not respected certifiers standards. Furthermore, the difference between the two organisations is generally ascribable to better standards implemented by *A*.

In particular, if in the Environment dimension, the organic process of *A* results in better performance in atmosphere, water land and energy themes, FT standards generate better achievements in Economic and Governance dimensions.

Interestingly, *B* surpasses *A* in three social well-being themes. The fact that FT is stricter than private standards seems not automatically lead to a better level of sustainability. There may be different explanations for this outcome, but two seem the most probable: the first is that FT

standards are matched by private standards; the second is that the cause of this result is more likely to be found in other aspects, for example, in the size and processes of the single farm rather than in the certification standards. The latter is precisely the line of study in Clercx and Huyghe (2013), who remark how certifications are more concerned with the product than land and thus underrate complex social dynamics at, for instance, workforce level.

Nevertheless, to investigate this situation more in depth, it is necessary to conduct another study focused on social sustainability at worker level, since this group represents the weakest participants in the system.

6.2. The banana agri-system

The analysis reveals some interesting aspects of the agri-system. First of all, sustainability is an issue that has only received attention from stakeholders in recent years as a consequence of consumers' interest and requirements. A deep interest in the sustainability of local agriculture from producers and key stakeholders appears to be far from being achieved.

Specifically, the weakest points in the evaluation were shown to depend more on the situation of the agri-system rather than on a single organisation. In fact, in three themes both *A* and *B* have the lowest mark: the lack of performance in Participation, Biodiversity and Cultural diversity reflects backwardness of the entire system and the use of land in the past (Clercx et al., 2015).

In the last decade, the government has developed policies focused on sustainable development (Santos et al., 2016; SENPLADES, 2013) that are more the result of from-above planning rather than the product of a collective stakeholders' agreement.

Hence, the implementation of a bottom-up sustainability programme is once again a solution recommended by the present study.

6.3. Sustainability assessment tools

SAFA demonstrates its capacity to represent an agri-system. The 114 indicators applied in this study (the five indicators of theme E6 were not applied as the farms do not grow livestock) cover a wide spectrum of aspects, so all relevant factors were analysed. Hence, SAFA fully demonstrates its capacity to evaluate in depth a specific agri-system and its approach allows for a sound evaluation that is easily understood by both researchers and, more important, farmers. In fact, the visual representation of scores leads farmers to ask for the reason why a specific indicator scored badly and the possible way to improve the performance and raise the mark.

Nonetheless, the high variety of themes is the main obstacle to its application since the analysis of the four dimensions requires a process where several steps are necessary to plan the analysis and different instruments must be applied simultaneously. In this study, a novel approach for the operationalisation of SAFA was applied. It consists of set structured interviews with seven managers and employees of both organisations, inspections of farms to control the application of rules and procedures and two surveys of farmers and workers. The process took a total of nine months; thus, the instrument cannot be considered as quick and agile as it seemed initially. However, since a relevant part of the time was spent designing the operational approach, practitioners applying the same approach could conduct the analysis more rapidly.

Moreover, the framework reflects the limitations of the top-down approach. In particular, since farmers are not involved in the process of defining indicators, they could not understand the logic and relevance of some indicators.

For example, indicator S6.1 refers to indigenous communities and asks if farmers respect indigenous rights and intellectual property. In this case, farmers state that they have no contact with indigenous people since those communities are present in other parts of the country and not in the province. However, in particular in the case of small farmers, although they do not belong to the native community, they may consider themselves as indigenous, since their ancestors were the first to cultivate those lends. Thus, the indicator proved difficult for researchers to manage and irrelevant to farmers.

For this reason, as recommended by Bonisoli et al. (2018), a solution could be a combination of SAFA and a bottom-up approach, MESMIS for instance, so that SAFA indicators could be the basis for a participative process involving key stakeholders in indicators recognition.

7. Conclusions

The present study presents an analysis of the sustainability of certified agri-food produce. This analysis contributes to the academic debate concerning the comparison between certified and conventional agri-systems in three key ways: it develops an exhaustive evaluation that comprehends the four sustainability dimensions, employs an original approach that operationalises SAFA, and delivers a detailed evaluation whose results can be transformed into actions to improve the sustainability of a system that strongly depends on market demand.

The study utilised SAFA as an instrument to assess and compare the sustainability of the certified and conventional banana agri-systems because of the wide spectrum of sustainability themes considered in the evaluation, it can be easily implemented and understood by producers and decision makers, and the consequential possibility to identify precise measures to enhance sustainability in the short term.

The results demonstrate that the certified banana system performs at a higher level of sustainability in the governance, environmental and economic dimensions, yet it leads to lower sustainability outcomes in the social dimension. This finding is particularly important since it calls into question whether certification schemes actually achieve one of their two main objectives, i.e. the improvement of stakeholder's well-being.

Nevertheless, SAFA reveals that the agri-system displays certain flaws regardless of the type of production. For instance, with the sole exclusion of agri-forest farms, all producers are growing a monoculture, and intercropping is not considered an option since the introduction of a second crop would mean a drop of revenues. This fact increases vulnerability and jeopardises soil quality. Moreover, there is no evidence of any air contamination control or air contamination awareness among farmers and workers as the vast majority of farms still use fuel-based energy generators rather than renewable-based ones. Finally, most of the material utilised is raw and non-renewable, and a satisfactory waste recycling scheme is a target still far from being reached.

The present study has the limitation that it analyses a specific sector of Ecuadorian agriculture. However, the depth and set of factors analysed offers a methodology that can be extended to the assessment of sustainability in other agri-systems, particularly in those where there may be

controversy between different certifications. Furthermore, this paper applies an original approach for the operationalisation of SAFA, which could possibly be implemented by other practitioners, although its detailed presentation is beyond the scope of this analysis.

Additionally, this study discloses, on one hand, a general higher level of sustainability of certified farms and, on the other hand, the need for ensuring demand for certified products in destination markets. Hence, further studies could target at least three possible subjects. Since certified producers obtain lower results in social sustainability, an initial issue to address could be the analysis of reasons and the identification of possible measures that might improve performance in this dimension. Secondly, due to the high scores in environmental and economic sustainability, future research should consider the most suitable marketing tools aimed at enhancing demand for certified products in both local and foreign markets. Finally, since the decisive performance in all sustainability dimension of agri-forest farms, an in-depth inquiry targeting decision-makers is required, one which contemplates large-scale financial and operational aid for a possible conversion of conventional farms to agri-forest. In the three cases, SAFA could provide a reliable basis for carrying out said research.

Acknowledgement: This work was partially supported by Spanish MCINN and FEDER aid [project ECO2017-82347-P], and European Commission [EMME project, AMIF/2017/AG/INTE/821726].

References

AEBE, 2017. Anuario 2017. Guayaquil.

Al Shamsi, K.B., Timpanaro, G., Cosentino, S.L., Guarnaccia, P., Compagnoni, A., 2018. A sustainable organic production model for “food sovereignty” in the United Arab Emirates and Sicily-Italy. Sustain. https://doi.org/10.3390/su10030620

Annunziata, A., Mariani, A., Vecchio, R., 2019. Effectiveness of sustainability labels in guiding food choices: Analysis of visibility and understanding among young adults. Sustain. Prod. Consum. 17, 108–115. https://doi.org/10.1016/j.spc.2018.09.005

Annunziata, A., Scarpato, D., 2014. Factors affecting consumer attitudes towards food products with sustainable attributes. Agric. Econ. Ekon. 60, 353–363.

Apaolaza, V., Hartmann, P., D ’souza, C., López, C.M., 2017. Eat organic – Feel good? The relationship between organic food consumption, health concern and subjective wellbeing. Food Qual. Prefer. 63, 51–62. https://doi.org/10.1016/j.foodqual.2017.07.011

Asif, M., Xuhui, W., Nasiri, A., Ayyub, S., 2018. Determinant factors influencing organic food purchase intention and the moderating role of awareness: A comparative analysis. Food Qual. Prefer. 63, 144–150. https://doi.org/10.1016/j.foodqual.2017.08.006

Ayuya, O.I., Gido, E.O., Bett, H.K., Lagat, J.K., Kahi, A.K., Bauer, S., 2015. Effect of Certified Organic Production Systems on Poverty among Smallholder Farmers : Empirical Evidence from Kenya Effect of Certified Organic Production Systems on Poverty among Smallholder Farmers : Empirical Evidence from Kenya. World Dev. 67, 27–37. https://doi.org/10.1016/j.worlddev.2014.10.005

Azadi, H., Schoonbeek, S., Mahmoudi, H., Derudder, B., De Maeyer, P., Witlox, F., 2011. Organic

agriculture and sustainable food production system: Main potentials. Agric. Ecosyst. Environ. 144, 92–94. https://doi.org/10.1016/j.agee.2011.08.001

Bacon, C., 2005. Confronting the coffee crisis: Can Fair Trade, organic, and specialty coffees reduce small-scale farmer vulnerability in Northern Nicaragua? World Dev. 33, 497–511. https://doi.org/10.1016/j.worlddev.2004.10.002

Bacon, C.M., Méndez, V.E., Fox, J.A., 2008. Cultivating Sustainable Coffee: Persistent Paradoxes, in: Confronting the Coffee Crisis: Fair Trade, Sustainable Livelihoods and Ecosystems in Mexico and Central America. https://doi.org/DOI:10.7551/mitpress/9780262026338.003.0014

Barham, B.L., Weber, J.G., 2012. The Economic Sustainability of Certified Coffee: Recent Evidence from Mexico and Peru. World Dev. 40, 1269–1279. https://doi.org/10.1016/j.worlddev.2011.11.005

Bassett, T.J., 2010. Slim pickings: Fairtrade cotton in West Africa. Geoforum 41, 44–55. https://doi.org/10.1016/j.geoforum.2009.03.002

BCE, 2017a. Reporte de pobreza, ingreso y desigualdad. Quito.

BCE, 2017b. Estadísticas macroeconómicas presentación estructural., Banco Central del Ecuador. Quito. https://doi.org/10.1515/ibero-2013-0044

Bellamy, A.S., Svensson, O., van den Brink, P.J., Tedengren, M., 2016. What is in a label? Rainforest-Alliance certified banana production versus non-certified conventional banana production. Glob. Ecol. Conserv. 7, 39–48. https://doi.org/10.1016/j.gecco.2016.05.002

Bellucci, M., Bagnoli, L., Biggeri, M., Rinaldi, V., 2012. Performance Measurement In Solidarity Economy Organizations: The Case Of Fair Trade Shops In Italy. Ann. Public Coop. Econ. 83, 25–59. https://doi.org/10.1111/j.1467-8292.2011.00453.x

Beuchelt, T.D., Zeller, M., 2011. Profits and poverty: Certification's troubled link for Nicaragua's organic and fairtrade coffee producers. Ecol. Econ. 70, 1316–1324. https://doi.org/10.1016/j.ecolecon.2011.01.005

Birkhofer, K., Bezemer, T.M., Bloem, J., Bonkowski, M., Christensen, S., Dubois, D., Ekelund, F., Fließbach, A., Gunst, L., Hedlund, K., Mäder, P., Mikola, J., Robin, C., Setälä, H., Tatin-Froux, F., Van der Putten, W.H., Scheu, S., 2008. Long-term organic farming fosters below and aboveground biota: Implications for soil quality, biological control and productivity. Soil Biol. Biochem. 40, 2297–2308. https://doi.org/10.1016/j.soilbio.2008.05.007

Boggia, a., Paolotti, L., Castellini, C., 2010. Environmental impact evaluation of conventional, organic and organic-plus poultry production systems using life cycle assessment. Worlds. Poult. Sci. J. 66, 95. https://doi.org/10.1017/S0043933910000103

Bonanomi, G., De Filippis, F., Cesarano, G., La Storia, A., Ercolini, D., Scala, F., 2016. Organic farming induces changes in soil microbiota that affect agro-ecosystem functions. Soil Biol. Biochem. 103, 327–336. https://doi.org/10.1016/j.soilbio.2016.09.005

Bonisoli, L., Galdeano-Gómez, E., Piedra-Muñoz, L., 2018. Deconstructing criteria and assessment tools to build agri-sustainability indicators and support farmers' decision-making process. J. Clean. Prod. 182, 1080–1094. https://doi.org/10.1016/j.jclepro.2018.02.055

Borland, M.E., Bailey, M., 2019. A tale of two standards: A case study of the Fair Trade USA certified Maluku handline yellowfin tuna (Thunnus albacares) fishery. Mar. Policy 100, 353–360. https://doi.org/10.1016/j.marpol.2018.12.004

Castro, L.M., Calvas, B., Knoke, T., 2015. Ecuadorian Banana Farms Should Consider Organic Banana with Low Price Risks in Their Land-Use Portfolios. PLoS One 10, e0120384. https://doi.org/10.1371/journal.pone.0120384

Chekima, B., Oswald, A.I., Wafa, S.A.W.S.K., Chekima, K., 2017. Narrowing the gap: Factors driving organic food consumption. J. Clean. Prod. 166, 1438–1447. https://doi.org/10.1016/j.jclepro.2017.08.086

Clercx, L., Huyghe, B., 2013. Towards a More Sustainable Banana - Limitations and Strengths of a Territorial Approach. Int. Ishs-Promusa Symp. Banan. Plantains Towar. Sustain. Glob. Prod. Improv. Use 986, 353–362.

Clercx, L., Zambrano, M.A., Bejarano, J.D., Espinoza, B.F., 2015. Towards biological control of red rust banana thrips in organic and conventional banana. Acta Hortic. 1105, 73–80. https://doi.org/10.17660/ActaHortic.2015.1105.11

Connor, D.J., 2008. Organic agriculture cannot feed the world. F. Crop. Res. 106, 187–190. https://doi.org/10.1016/j.fcr.2007.11.010

Dabkiene, V., 2016. the Scope of Farms Sustainability Tools Based on Fadn Data. Sci. Pap. Manag. Econ. Eng. Agric. Rural Dev. 16, 121–128.

de Olde, E.M., Bokkers, E.A.M., de Boer, I.J.M., 2017. The Choice of the Sustainability Assessment Tool Matters: Differences in Thematic Scope and Assessment Results. Ecol. Econ. 136, 77–85. https://doi.org/10.1016/j.ecolecon.2017.02.015

de Olde, E.M., Oudshoorn, F., Bokkers, E., Stubsgaard, A., Sørensen, C., de Boer, I.J.M., 2016. Assessing the Sustainability Performance of Organic Farms in Denmark. Sustainability 8, 957. https://doi.org/10.3390/su8090957

De Ponti, T., Rijk, B., Van Ittersum, M.K., 2012. The crop yield gap between organic and conventional agriculture. Agric. Syst. 108, 1–9. https://doi.org/10.1016/j.agsy.2011.12.004

Dettmann, R.L., Dimitri, C., 2010. Who's buying organic vegetables? Demographic characteristics of U.S. consumers. J. Food Prod. Mark. 16, 79–91. https://doi.org/10.1080/10454440903415709

Dietz, T., Auffenberg, J., Estrella Chong, A., Grabs, J., Kilian, B., 2018. The Voluntary Coffee Standard Index (VOCSI). Developing a Composite Index to Assess and Compare the Strength of Mainstream Voluntary Sustainability Standards in the Global Coffee Industry. Ecol. Econ. 150, 72–87. https://doi.org/10.1016/j.ecolecon.2018.03.026

Dimitri, C., Dettmann, R.L., 2012. Organic food consumers: what do we really know about them? Br. Food J. 114, 1157–1183. https://doi.org/10.1108/00070701211252101

El Telegrafo, 2017. La caja del banano se pagará en $ 6,20.

FAO, 2015. SAFA - Smallholders App. Roma. https://doi.org/10.2144/000113056

FAO, 2014. Sustainability Assessment of Food and Agriculture systems: Tool. Roma.

FAO, 2013a. SAFA Guidelines v 3.0. Roma. https://doi.org/10.2144/000113056

FAO, 2013b. Sustainability Assessment of Food and Agricultural System: indicators. Roma. https://doi.org/10.2144/000113056

Fess, T.L., Benedito, V.A., 2018. Organic versus conventional cropping sustainability: A comparative system analysis. Sustain. 10. https://doi.org/10.3390/su10010272

FLO, 2017. Annual Report 2016-17 [WWW Document]. URL https://annualreport16-17.fairtrade.net/en/ (accessed 4.17.18).

Flocert, 2018. About Us [WWW Document]. URL https://www.flocert.net/about-flocert/ (accessed 4.17.18).

Focus Economics, 2018. Economic Snapshot for Latin America [WWW Document]. URL https://www.focus-economics.com/regions/latin-america (accessed 4.8.18).

Foteinis, S., Chatzisymeon, E., 2015. Life cycle assessment of organic versus conventional agriculture . A case study of lettuce cultivation in Greece. J. Clean. Prod. 112, 2462–2471. https://doi.org/10.1016/j.jclepro.2015.09.075

Fridell, M., Hudson, I., Hudson, M., 2008. With friends like these: The corporate response to fair trade coffee. Rev. Radic. Polit. Econ. 40, 8–34. https://doi.org/10.1177/0486613407311082

Friedmann, H., McMichael, P., 1989. Agriculture and the state system: The rise and decline of national agricultures, 1870 to the present. Sociol. Ruralis 29, 93–117. https://doi.org/10.1111/j.1467-9523.1989.tb00360.x

Froehlich, A.G., Melo, A.S.S.A., Sampaio, B., 2018. Comparing the Profitability of Organic and Conventional Production in Family Farming: Empirical Evidence From Brazil. Ecol. Econ. 150, 307–314. https://doi.org/10.1016/j.ecolecon.2018.04.022

Gasso, V., Oudshoorn, F.W., de Olde, E.M., Sørensen, C.A.G., 2015. Generic sustainability assessment themes and the role of context: The case of Danish maize for German biogas. Ecol. Indic. 49, 143–153. https://doi.org/10.1016/j.ecolind.2014.10.008

Gaviglio, A., Bertocchi, M., Demartini, E., 2017. Lessons learned from a process of farm sustainability assessment: literature review, methodology and governance opportunities. Riv. Di Stud. Sulla Sostenibilita' 129–139. https://doi.org/10.3280/RISS2016-002012

Gayatri, S., Gasso-tortajada, V., Vaarst, M., 2016. Assessing Sustainability of Smallholder Beef Cattle Farming in Indonesia: A Case Study Using the FAO SAFA Framework. J. Sustain. Dev. 9, 236. https://doi.org/10.5539/jsd.v9n3p236

GlobalGap, 2018. The GLOBALG.A.P. System [WWW Document]. URL https://www.globalgap.org/uk_en/what-we-do/the-gg-system/ (accessed 4.14.18).

Goodman, M.S., Goodman, D., DuPuis, E.M., 2011. Alternative Food Networks Knowledge, Practice, and Politics. Routledge, London.

Gracia, A., de Magistris, T., 2008. The demand for organic foods in the South of Italy: A discrete choice model. Food Policy 33, 386–396. https://doi.org/10.1016/j.foodpol.2007.12.002

Haggar, J., Soto, G., Casanoves, F., Virginio, E. de M., 2017. Environmental-economic benefits and trade-offs on sustainably certified coffee farms. Ecol. Indic. 79, 330–337. https://doi.org/10.1016/j.ecolind.2017.04.023

Hellmeister, A., Richins, H., 2019. Green to gold: Beneficial impacts of sustainability certification and practice on tour enterprise performance. Sustain. 11, 1–17. https://doi.org/10.3390/su11030709

Hole, D.G., Perkins, A.J., Wilson, J.D., Alexander, I.H., Grice, P. V., Evans, A.D., 2005. Does organic farming benefit biodiversity? Biol. Conserv. 122, 113–130. https://doi.org/10.1016/j.biocon.2004.07.018

Howard, P.H., Jaffee, D., 2013. Tensions between firm size and sustainability goals: Fair trade coffee in the united states. Sustain. 5, 72–89. https://doi.org/10.3390/su5010072

Hřebíček, J., Faldík, O., Kasem, E., Trenz, O., 2015. Determinants of sustainability reporting in food and agriculture sectors. Acta Univ. Agric. Silvic. Mendelianae Brun. 63, 539–552. https://doi.org/10.11118/actaun201563020539

Hřebíček, J., Trenz, O., Vernerova, E., 2013. Optimal set of agri-environmental indicators for the agricultural sector of Czech Republic. Acta Univ. Agric. Silvic. Mendelianae Brun. 61, 2171–2181. https://doi.org/10.11118/actaun201361072171

Hwang, J., 2016. Organic food as self-presentation: The role of psychological motivation in older consumers' purchase intention of organic food. J. Retail. Consum. Serv. 28, 281–287. https://doi.org/10.1016/j.jretconser.2015.01.007

Ibanez, M., & Blackman, A., 2016. Is eco-certification a win–win for developing country agriculture? Organic coffee certification in Colombia. 82, 14-27. World Dev. 82, 14–27.

IFOAM, 2016. the Future Consolidated Annual Report of Ifoam - Organics International 2015.

Ingenbleek, P.T.M., Reinders, M.J., 2013. The Development of a Market for Sustainable Coffee in The Netherlands: Rethinking the Contribution of Fair Trade. J. Bus. Ethics 113, 461–474. https://doi.org/10.1007/s10551-012-1316-4

Jawtusch, J., Schader, C., Stolze, M., Baumgart, L., Niggli, U., 2013. Sustainability Monitoring and Assessment Routine : Results from pilot applications of the FAO SAFA Guidelines, in: Réseau – Echanges- Développement Durable (REDD) (Ed.), International Symposium on Mediterranean Organic Agriculture and Quality Signs Related to the Origin (Agadir, Morocco, 2-4 December 2013). Losanna, Svizzera, pp. 1–8.

Kassem, E., Trenz, O., Hřebíček, J., Faldík, O., 2017. Sustainability Assessment and Reporting in Agriculture Sector. Acta Univ. Agric. Silvic. Mendelianae Brun. 65, 1359–1369. https://doi.org/10.11118/actaun201765041359

Kleemann, L., Abdulai, A., 2013. Organic certification, agro-ecological practices and return on investment: Evidence from pineapple producers in Ghana. Ecol. Econ. 93, 330–341. https://doi.org/10.1016/j.ecolecon.2013.06.017

Kleemann, L., Abdulai, A., Buss, M., 2014. Certification and access to export markets: Adoption and return on investment of organic-certified pineapple farming in Ghana. World Dev. 64, 79–92. https://doi.org/10.1016/j.worlddev.2014.05.005

Krumbiegel, K., Maertens, M., Wollni, M., 2018. The Role of Fairtrade Certification for Wages and Job Satisfaction of Plantation Workers. World Dev. 102, 195–212. https://doi.org/10.1016/j.worlddev.2017.09.020

La Rosa, a. D., Siracusa, G., Cavallaro, R., 2008. Emergy evaluation of Sicilian red orange production. A comparison between organic and conventional farming. J. Clean. Prod. 16, 1907–1914. https://doi.org/10.1016/j.jclepro.2008.01.003

Lambin, E.F., Thorlakson, T., 2018. Interactions Between Private Actors, Civil Society, and Governments. Annu. Rev. Environ. Resour. 43, 1–25. https://doi.org/10.1146/annurev-environ

Landert, J., Schader, C., Moschitz, H., Stolze, M., 2017. A Holistic Sustainability Assessment Method for Urban Food System Governance. Sustainability 9, 490. https://doi.org/10.3390/su9040490

Leifeld, J., 2012. How sustainable is organic farming? Agric. Ecosyst. Environ. 150, 121–122. https://doi.org/10.1016/j.agee.2012.01.020

Lyon, S., Bezaury, J.A., Mutersbaugh, T., 2010. Gender equity in fairtrade-organic coffee producer organizations: Cases from Mesoamerica. Geoforum 41, 93–103. https://doi.org/10.1016/j.geoforum.2009.04.006

Melo, C.J., 2005. Empirical Assessment of Eco-Certification: The Case of Ecuadorian Bananas. Organ. Environ. 18, 287–317. https://doi.org/10.1177/1086026605279461

Melo, C.J., Hollander, G.M., 2013. Unsustainable development: Alternative food networks and the Ecuadorian Federation of Cocoa Producers, 1995-2010. J. Rural Stud. 32, 251–263. https://doi.org/10.1016/j.jrurstud.2013.07.004

Melo, C.J., Wolf, S. a., 2007. Ecocertification of Ecuadorian bananas: Prospects for progressive North-South linkages. Stud. Comp. Int. Dev. 42, 256–278. https://doi.org/10.1007/s12116-007-9009-1

Milder, J., Newsom, D., 2015. 2015 SAN / Rainforest Alliance Impacts Report. New York.

Minten, B., Dereje, M., Engida, E., Tamru, S., 2018. Tracking the Quality Premium of Certified Coffee: Evidence from Ethiopia. World Dev. 101, 119–132. https://doi.org/10.1016/j.worlddev.2017.08.010

Moberg, M., 2014. Certification and neoliberal governance: Moral economies of fair trade in the eastern caribbean. Am. Anthropol. 116, 8–22. https://doi.org/10.1111/aman.12073

Monier-Dilhan, S., Bergès, F., 2016. Consumers' motivations driving organic demand: Between selfinterest and sustainability. Agric. Resour. Econ. Rev. 45, 522–538. https://doi.org/10.1017/age.2016.6

Monier, S., Hassan, D., Nichèle, V., Simioni, M., 2009. Organic Food Consumption Patterns. J. Agric. Food Ind. Organ. 7. https://doi.org/10.2202/1542-0485.1269

Mutersbaugh, T., Lyon, S., 2010. Transparency and democracy in certified ethical commodity networks. Geoforum 41, 27–32. https://doi.org/10.1016/j.geoforum.2009.11.013

Niggli, U., Earley, J., Ogorzalek, K., 2007. Organic Agriculture and Stability of Food Supply, in: International Conference on Organic Agriculture and Food Security.

Oroian, C., Safirescu, C., Harun, R., Chiciudean, G., Arion, F., Muresan, I., Bordeanu, B., 2017. Consumers' Attitudes towards Organic Products and Sustainable Development: A Case Study of Romania. Sustainability 9, 1559. https://doi.org/10.3390/su9091559

Parvathi, P., Waibel, H., 2016. Organic Agriculture and Fair Trade: A Happy Marriage? A Case Study of Certified Smallholder Black Pepper Farmers in India. World Dev. 77, 206–220. https://doi.org/10.1016/j.worlddev.2015.08.027

Patil, S., Reidsma, P., Shah, P., Purushothaman, S., Wolf, J., 2014. Comparing conventional and organic agriculture in Karnataka, India: Where and when can organic farming be sustainable? Land use policy 37, 40–51. https://doi.org/10.1016/j.landusepol.2012.01.006

Peschel, A.O., Orquin, J.L., Mueller Loose, S., 2019. Increasing consumers' attention capture and food choice through bottom-up effects. Appetite 132, 1–7. https://doi.org/10.1016/j.appet.2018.09.015

Pimentel, D., Hepperly, P., Hanson, J., Douds, J., Seidel, R., 2005. Environmental, Energetic, and

Economic Comparisons of Organic and Conventional Farming Systems. Bioscience 55, 573. https://doi.org/10.1641/0006-3568(2005)055[0573:EEAECO]2.0.CO;2

Pritchett, K., Kennedy, A.C., Cogger, C.G., 2011. Management Effects on Soil Quality in Organic Vegetable Systems in Western Washington. Soil Sci. Soc. Am. J. 75, 605. https://doi.org/10.2136/sssaj2009.0294

Rainforest Alliance, 2018. Who we are [WWW Document]. URL https://www.rainforest-alliance.org/about (accessed 4.15.18).

Rana, J., Paul, J., 2017. Consumer behavior and purchase intention for organic food: A review and research agenda. J. Retail. Consum. Serv. 38, 157–165. https://doi.org/10.1016/j.jretconser.2017.06.004

Raynolds, L.T., 2008. The organic agro-export boom in the Dominican Republic. Maintaining Tradition or Fostering Transformation ? Lat. Am. Res. Rev. 43, 261–272.

Raynolds, L.T., 2000. Re-embedding global agriculture: The international organic and fair trade movements. Agric. Human Values 17, 297–309. https://doi.org/10.1023/A:1007608805843

Raynolds, L.T., Ngcwangu, S.U., 2010. Fair Trade Rooibos tea: Connecting South African producers and American consumer markets. Geoforum 41, 74–83. https://doi.org/10.1016/j.geoforum.2009.02.004

Rodrigues, D.B., Dalmarco, D. de A.S., Aoqui, C., Marinho, B. de L., 2016. The meaning of the organic certification label for the consumer: a cluster analysis. REGE - Rev. Gestão 23, 316–325. https://doi.org/10.1016/j.rege.2016.08.001

Ruben, R., Cepeda, D., de Hoop, T., 2008. Fair Trade impact of banana production in El Guabo Association, Ecuador: a production function analysis, in: Impact of Fair Trade. Wageningen Academic Publishers, Wageningen, pp. 155–167.

Santos, E., Sa, E., Hidalgo, L., Cha, T., Villao, L., Pacheco, R., Navarrete, O., 2016. Status and challenges of genetically modified crops and food in Ecuador. Acta Hortic. 1110, 229–235. https://doi.org/10.17660/ActaHortic.2016.1110.33

Schader, C., Baumgart, L., Landert, J., Muller, A., Ssebunya, B., Blockeel, J., Weisshaidinger, R., Petrasek, R., Mészáros, D., Padel, S., Gerrard, C., Smith, L., Lindenthal, T., Niggli, U., Stolze, M., 2016. Using the Sustainability Monitoring and Assessment Routine (SMART) for the systematic analysis of trade-offs and synergies between sustainability dimensions and themes at farm level. Sustain. 8. https://doi.org/10.3390/su8030274

Schader, C., Grenz, J., Meier, M.S., Stolze, M., 2014. Scope and precision of sustainability assessment approaches to food systems. Ecol. Soc. 19. https://doi.org/10.5751/ES-06866-190342

Scialabba, N.E.-H., Müller-Lindenlauf, M., 2010. Organic agriculture and climate change. Renew. Agric. Food Syst. 25, 158–169. https://doi.org/10.1017/S1742170510000116

Şen, G., Güngör, E., 2018. Local Perceptions of Forest Certification in State Based Forest Enterprises. Small-scale For. https://doi.org/10.1007/s11842-018-9404-7

SENPLADES, 2013. Plan Nacional para el Buen Vivir. Quito.

Ssebunya, B.R., Altenbuchner, C., Schmid, E., Schader, C., Landert, J., Baumgart, L., Stolze, M., 2018. Sustainability Performance of Certified and Non-certified Smallholder Coffee Farms in Uganda. Ecol. Econ. 156, 35–47. https://doi.org/10.1016/j.ecolecon.2018.09.004

Ssebunya, B.R., Schmid, E., van Asten, P., Schader, C., Altenbuchner, C., Stolze, M., 2016. Stakeholder engagement in prioritizing sustainability assessment themes for smallholder coffee production in Uganda. Renew. Agric. Food Syst. 1–18. https://doi.org/10.1017/S1742170516000363

Templer, N., Hauser, M., Owamani, A., Kamusingize, D., Ogwali, H., Mulumba, L., Onwonga, R., Adugna, B.T., Probst, L., 2018. Does certified organic agriculture increase agroecosystem health? Evidence from four farming systems in Uganda. Int. J. Agric. Sustain. 0, 1–17. https://doi.org/10.1080/14735903.2018.1440465

Theurl, M.C., Hörtenhuber, S.J., Lindenthal, T., Palme, W., 2017. Unheated soil-grown winter vegetables in Austria: Greenhouse gas emissions and socio-economic factors of diffusion potential. J. Clean. Prod. 151, 134–144. https://doi.org/10.1016/j.jclepro.2017.03.016

Thierfelder, C., Wall, P.C., 2009. Effects of conservation agriculture techniques on infiltration and soil water content in Zambia and Zimbabwe. Soil Tillage Res. 105, 217–227. https://doi.org/10.1016/j.still.2009.07.007

Torres, J., Valera, D.L., Belmonte, L.J., Herrero-sánchez, C., 2016. Economic and Social Sustainability through Organic Agriculture : Study of the Restructuring of the Citrus Sector in the " Bajo Andarax " District (Spain). Sustainability 8, 1–14. https://doi.org/10.3390/su8090918

Tröster, R., Hiete, M., 2018. Success of voluntary sustainability certification schemes – A comprehensive review. J. Clean. Prod. 196, 1034–1043. https://doi.org/10.1016/j.jclepro.2018.05.240

Tuomisto, H.L., Hodge, I.D., Riordan, P., Macdonald, D.W., 2012. Does organic farming reduce environmental impacts?--a meta-analysis of European research. J. Environ. Manage. 112, 309–20. https://doi.org/10.1016/j.jenvman.2012.08.018

Underwood, T., McCullum-Gomez, C., Harmon, A., Roberts, S., 2011. Organic Agriculture Supports Biodiversity and Sustainable Food Production. J. Hunger Environ. Nutr. 6, 398–423. https://doi.org/10.1080/19320248.2011.627301

van Calker, K.J., Berentsen, P.B.M., de Boer, I.J.M., Giesen, G.W.J., Huirne, R.B.M., 2007. Modelling worker physical health and societal sustainability at farm level: An application to conventional and organic dairy farming. Agric. Syst. 94, 205–219. https://doi.org/10.1016/j.agsy.2006.08.006

Vehapi, S., Dolićanin, E., 2016. Consumers Behavior on Organic Food : Evidence From. Econ. Agric. 3, 871–889.

Veldstra, M.D., Alexander, C.E., Marshall, M.I., 2014. To certify or not to certify? Separating the organic production and certification decisions. Food Policy 49, 429–436. https://doi.org/10.1016/j.foodpol.2014.05.010

Wibowo, A., Pratiwi, S., Giessen, L., Wibowo, A., 2018. Comparing management schemes for forest certification and timber-legality verification : Complementary or competitive in indonesia ? timber-legality veri fi cation : Complementary or competitive in. J. Sustain. For. 00, 1–17. https://doi.org/10.1080/10549811.2018.1498359

Wier, M., O'Doherty Jensen, K., Andersen, L.M., Millock, K., 2008. The character of demand in mature organic food markets: Great Britain and Denmark compared. Food Policy 33, 406–421. https://doi.org/10.1016/j.foodpol.2008.01.002

ACCEPTED MANUSCRIPT

Wilson, B.R., 2010. Indebted to Fair Trade? Coffee and crisis in Nicaragua. Geoforum 41, 84–92. https://doi.org/10.1016/j.geoforum.2009.06.008

Wilson, M., Jackson, P., 2016. Fairtrade bananas in the Caribbean: Towards a moral economy of recognition. Geoforum 70, 11–21. https://doi.org/10.1016/j.geoforum.2016.01.003

Yadav, R., 2016. Altruistic or egoistic : Which value promotes organic food consumption among young consumers ? A study in the context of a developing nation. J. Retail. Consum. Serv. 33, 92–97. https://doi.org/10.1016/j.jretconser.2016.08.008

Yadav, R., Pathak, G.S., 2016. Intention to purchase organic food among young consumers: Evidences from a developing nation. Appetite 96, 122–128. https://doi.org/10.1016/j.appet.2015.09.017

ACCEPTED MANUSCRIPT

ACCEPTED MANUSCRIPT

Highlights

- The effect of certification on agri-food system sustainability is discussed.
- Four sustainability dimensions are considered.
- An original approach that operationalise SAFA is applied to Ecuadorian banana.
- Results show how certifications promote environmental and economic sustainability.
- Conventional producers are socially more sustainable than certified ones.

ACCEPTED MANUSCRIPT