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Reviewing the Impact of Sustainability Certification on Food Security in Developing Countries

Highlights

- Article identifies the main causal mechanisms that link sustainability certification to local food security
- Existing evidence points to a positive, albeit weak and highly context-dependent, relationship between certification, farmers' income, and local food security
- Certification's impact on food security via its effects on land use, land rights, and gender equality remains poorly understood
- Article calls for an interdisciplinary research agenda on the relationships between sustainability certification and food security in developing countries

Abstract

What is the impact of sustainability certification on food security in developing countries? This article explores the issue through a systematic review of the extant scholarship on the subject, complemented by a selective review of key studies examining the wider socio-economic effects of certification that may affect food security indirectly. To guide the analysis, we identify three main causal mechanisms – economic, land use/land rights, and gender effects – that link certification to local food security. Our review finds that food security remains a blind spot in the literature on certification impacts. Existing research points to a positive, albeit weak and highly context-dependent, relationship between certification, farmers' income, and food security. However, there is only indicative evidence about the relationships that link certification to food security via its influence on land use, land rights, and gender equality.

Keywords:

Sustainability certification; voluntary standards; private governance; local food security; agriculture; developing countries

1. Introduction

The 2030 Agenda for Sustainable Development adopted by the United Nations in 2015 identifies ending hunger and malnutrition as a key policy objective (Sustainable Development Goal 2). Indeed, for many countries, food security remains a critical challenge: global statistics show that 821 million people were undernourished in 2017, and the situation is worsening in most regions in the Global South (FAO et al. 2018). To address problems with environmental and social sustainability in the global agri-food system, certification schemes have emerged as an important mode of governance in global commodity chains (Tilman & Clark, 2015; Schleifer & Sun, 2018; Springmann et al., 2018). In large numbers, these market-driven instruments are now being deployed in the agricultural sector, where the size of “sustainable markets” has grown steadily in recent years (Lernoud et al., 2018; Garrett et al., 2016).

Many of these programs focus on the certification of tropical and subtropical commodities and their production in developing countries. In the coffee sector, current estimates of the global certified production area range between 26% and 45%. This is followed by cocoa (23%-38%), tea (13%-18%), oil palm (12%), cotton (10%-11%), and bananas (5%-9%). Among the programs with the highest acreage under certification are GLOBALG.A.P, the Roundtable on Sustainable Palm Oil (RSPO), Rainforest Alliance, Fairtrade International, the Better Cotton Initiative, and ProTerra (Lernourd et al., 2018: 1-5). These figures illustrate that in many commodity sectors sustainability certification is no longer a niche phenomenon, but has reached the mainstream. And while most of these programs do not explicitly include food security in their standards, many have aligned their work with the UN’s Sustainable Development Goals or address issues of food security indirectly. But the impacts of sustainability certification on local food security in commodity producing countries remain uncertain. Whereas some analysts point to its positive potential, others warn about unintended and often unnoticed consequences (Ugarte et al., 2017; Oosterveer et al., 2014).

To gain a better understanding of these relationships, this article reviews the existing research literature on the effects of sustainability certification on food security in the Global South. There is a growing body of literature that examines the socio-economic and environmental impacts of certification in producer countries. However, this literature has not yet yielded consistent results on how certification affects the livelihood conditions of Southern producers, including their food security.¹ Moreover, to our knowledge, few existing studies have directly considered the links between certification and food security, leaving this important question largely unexplored. To advance our collective understanding of the issue, our goal in this article is to identify the causal mechanisms through which sustainability certification can affect producers' food security and to provide an overview of the existing empirical evidence on such effects. On a conceptual level, we show that by influencing the economic, environmental, and social conditions of agricultural production, sustainability certification can have both positive and negative effects on local food security. Yet, empirical research on these relationships has primarily focused on the economic effects of certification, whereas its impacts on food security via land use, land rights, and gender effects remain little understood.

The remainder of the article is divided into four sections: Section 2 introduces the concept of food security and identifies five main mechanisms through which sustainability certification is thought to affect food security in producer countries. Sections 3 and 4 discuss the methodology of our review and present the main empirical findings. Finally, Section 5 concludes by identifying avenues for future research.

¹ For meta-analyses of the impacts of agricultural certification see: Blackman & Rivera, 2010; Oya, Schaefer, & Skolidou, 2018; and DeFries et al. 2017.

2. Five mechanisms linking sustainability certification and local food security

According to the Food and Agricultural Organization of the United Nations (FAO), food security exists when “all people, at all times, have physical and economic access to sufficient safe and nutritious food to meet their dietary needs and food preferences for a healthy and active life” (Rome Declaration 1996). This definition includes four main dimensions of food security, namely *availability*, *access*, *utilization*, and *stability* (Rainer et al., 2000). In this article, we use this widely accepted concept, to assess the effects of sustainability certification on local food security. The following briefly introduces each of the four dimensions.

Food availability refers to the extent to which food is actually or potentially physically present, including aspects of production, reserves, markets and transportation, and wild foods (FAO 2018). It can therefore be influenced by new agricultural practices required by certification standards. On the positive side, if certification increases farmers’ productivity, it can increase the actual amount of food available for consumption. Meanwhile, certification may also improve environmental conditions on farms and therefore enhance potential food availability in the longer term (Thorlakson et al. 2018). Nonetheless, certification standards do not necessarily have positive effects on food availability as they may not lead to higher yields or better environmental conditions, and in some cases may even have negative impacts (DeFries et al. 2017).

The second dimension is *food access*. If food is actually or potentially present, another key question is whether or not households and individuals have sufficient access, namely whether they have adequate resources or entitlements to acquire appropriate food for a nutritional diet (Schmidhuber & Tubiello, 2007). This dimension relates to the purchasing power of consumers and the evolution of real incomes and food prices, but also includes traditional rights to land or other common resources for food production. Accordingly,

certification may impact – both positively or negatively – individuals’ or households’ access to food by changing their income or land rights.

The third dimension is *food utilization*, which refers to whether or not households are maximizing the consumption of adequate nutrition and energy (FAO et al., 2018). Sufficient energy and nutrient intake requires good care and feeding practices, food preparation, dietary diversity, and intra-household distribution of food. Hence, utilization determines the nutritional status of individuals. In this respect, sustainability certification may affect food security by changing food quality and safety. Additionally, some social effects of certification such as empowerment of women or better health care for farmers and workers can be conducive to adequate utilization of food.

The last dimension is *food stability*, which refers to a state in which a population, household, or individual is food secure at all times (Rainer et al., 2000). Conversely, food instability means that people experience insufficient access to food on a periodic basis, with negative impacts on their nutritional status. From this perspective, adverse weather conditions, political instability, or economic factors such as unemployment and rising food prices, can all be a source of food instability. In addition, sustainability certification can affect this dimension of food security. For example, on the one hand, certification can bring uncertainty to producers’ income if price premiums are not ensured; on the other hand, sustainability standards may increase climate resilience of agricultural production, and therefore increase the system’s stability.

While previous research has usually examined the four above-mentioned dimensions of food security separately, by steering production practices along the supply chain, sustainability certification often affects multiple dimensions of food security at the same time. This makes it difficult to assess its specific impacts on each dimension. The task of delineating specific effects is further complicated by the long causal chains between certification and food

security outcomes – especially, as food security is often not a direct goal of many certification schemes (Oosterveer et al., 2014). Therefore, to better understand the various impacts of sustainability certification on food security as a whole, we develop a framework which seeks to identify its “main effects” – i.e. the effects that are most frequently studied in the literature on the impacts of certification.

Against this background, our framework identifies three broad types of effects that link sustainability certification to changes in food security in developing countries – each of them related to a key pillar of sustainability standards, namely economic development, land use, and social issues (including gender equality). To keep the framework parsimonious, we do not consider the interplay between different mechanisms, although in reality, these mechanisms are likely to interact in complex ways (see Table 1).

As market-based instruments, certification programs are designed to benefit farmers economically. In this regard, many impact evaluation studies have sought to examine whether certified producers have higher incomes than non-certified ones (Blackman & Rivera, 2010; DeFries et al., 2017; Oya, Schaefer, & Skalidou, 2018). In this context, one can expect that income changes can improve the purchasing power of farmers and farm workers and enhance their food security. However, it is important to note that the effects and channels through which certification influences food security may differ among economic actors: for instance, smallholders may be negatively impacted because of difficulties in accessing sustainability certification (see Brandi et al., 2015), whereas farm workers may see their income levels and food security improve when their plantations become certified.² To simplify our framework, we do not discuss smallholder farmers and plantation workers separately here, but we will consider variation in the impacts of certification across these two types of actors in our review of empirical studies (see Section 4).

² We are grateful to an anonymous reviewer for this point.

At a very general level, two main “economic effects” can be distinguished. First, to reward certified producers, many certification schemes aim to offer farmers a price or market premium for their certified produce. A well-known example is fair trade certification, which requires buyers to pay a fixed amount of premiums for certified products regardless of market fluctuations.³ When such premiums increase farmers’ net income, it may also increase their food purchasing power. Besides price premiums, certification can also improve market access and thus improve the economic position of producers. However, the net effects of certification on producers’ household income remain uncertain as price or market premiums may be neutralized by lower yields or higher production costs (Meemken & Qaim, 2018a; DeFries et al., 2017). Additionally, fair trade certification does not necessarily lead to higher farm-gate prices because, due to a lack of demand, certified producers may be forced to sell their products on the conventional market (Lernoud et al., 2018).

Second, certification may improve farmers’ incomes and food security through productivity gains. Certification programs seek to improve farmers’ production and management processes, which can result in higher yields especially when they introduce more intensive production methods. Some studies even suggest that higher yields are more important in increasing net incomes of farmers than price and market premiums (Barham & Weber, 2012). Higher yields may also increase food availability for self-consumption. In addition, by introducing new technologies and better management practices, certification can help farmers protect their crops against severe climate conditions, and therefore stabilize food production (Auerbach et al. 2013). However, some types of certification, especially organic certification, tend to reduce yields as they restrict the use of fertilizers and pesticides (Meemken & Qaim, 2018a). This could negatively affect producers’ food security. In addition, it is important to

³ On the Fairtrade premium, see the explanation on the website of Fairtrade International, <https://www.fairtrade.net/about/fag>.

take into account that most certification schemes for tropical commodities focus on “cash crops” destined for export (e.g. coffee or cocoa). Hence, productivity gains in these sectors do not directly add to food availability. The same holds for increased food safety and quality. If certification improves the quality and safety of commodities like coffee and cocoa, this does not result in better food utilization for local farmers. Yet, there can be indirect influences. This can take the form of spillover effects as well as when productivity gains in these crops result in increased farm-household incomes and subsequent investments in food crop cultivation.⁴

In addition to economic effects, sustainability certification can influence land use decisions and farmers’ land rights, with consequences for local food security. In this respect, two main mechanisms are discussed in the literature. One mechanism concerns the influence of certification on land use decisions. More precisely, certification can incentivize local farmers to shift their production from locally-oriented polycultures to exported-oriented monocultures. This can have a negative effect on local food security (Oosterveer et al., 2014). Conversely, some certification standards like organic farming promote higher crop diversity, which, in turn, holds the potential to improve dietary quality and nutrition of producers and local consumers (Sibhatu, Krishna, & Qaim, 2015; Seufert, 2012).

Another mechanism is related to land rights. Through their standards and dispute settlement systems many certification schemes seek to promote and protect the land rights of vulnerable groups and communities (e.g. indigenous people and independent smallholders) (Byerlee & Rueda 2015; Nesadurai 2013). This can have a positive effect on their food security if it helps to solve and prevent conflicts over customary land rights and “land grabbing”. At the same time, the fact that many certification programs require farmers to hold formal land titles can create challenges – for example, by excluding certain groups (e.g. independent smallholders) from gaining access to certification in the first place (Bartley 2010).

⁴ We are grateful to an anonymous reviewer for this point.

Lastly, sustainability certification can improve household food security through empowering women. One of the arguments is that women, which in many cultures are traditionally in charge of food preparation, would give more priority to the issue than men. With gender equality being an important dimension of sustainable development, many certification schemes organize special trainings, awareness building, and other activities to promote gender equality within farming communities (Smith et al. 2018). Against this background, one can expect that gender equality has a positive effect on food security, by improving women’s influence on household and community decision-making and by increasing their economic opportunities.

Table 1. The impacts of sustainability certification on local food security

Main effects	Mechanisms	Direction of effects	Dimensions of food security
Economic effects	M1: Certification -> price premiums/market access -> food security	Positive or negative	Access, Stability
	M2: Certification -> yields/income -> food security	Positive (possibly negative for organic certification)	Availability, Access, Stability
Land use and land rights effects	M3: Certification -> land use change -> food security	Positive or negative	Availability, Utilization, Stability
	M4: Certification -> land rights -> food security	Positive (possibly negative if it leads to exclusion of vulnerable groups)	Availability, Access, Stability
Gender effects	M5: Certification -> empowerment of women -> food security	Positive	Access, Utilization

3. Note on methodology

To establish the empirical evidence base, we systematically reviewed the research literature on sustainability certification and food security. To conduct the review, we proceeded in two steps. First, we used literature search engines (e.g. Google Scholar, Web of Science) and relevant key words (e.g. food security, nutrition, certification, labelling, sustainability) to identify studies, which examine the effects of certification on food security as their main focus or part of their main focus. This search produced a limited number of 28 studies out of which 13 contained primary research (13 published in peer reviewed academic journals). The results of the systematic search confirmed our prior intuition about the paucity of research directly examining the links between sustainability certification and food security. Therefore, in a second step, we broadened the review to studies examining certification's economic, land use, and gender effects without a direct link to food security – i.e. studies that only assess parts of the causal mechanisms described in Table 1. Given the very large number of studies that assess the impacts of certification on a wide range of socio-economic and environmental indicators, a comprehensive review of this literature is beyond the scope of this article (see Blackman & Rivera 2010; Oya et al. 2018 for systematic reviews). Instead, based on existing review studies, we selectively included some key studies that examine variables of relevance to food security.⁵ This second round of review produced another 39 studies. This brings the total number of studies reviewed for this article to 67. With the help of a research assistant, all studies were systematically catalogued and reviewed based on previously specified criteria (e.g. method used, geographical scope, industry scope, type of certification).

⁵ Corresponding to the causal mechanisms identified in Table 1, these variables include household income and expenditures, soil quality, and women's assets.

4. Reviewing the evidence

Economic effects

First and somewhat unsurprising, our review found that most studies exploring the links between sustainability certification and food security focus on certification's economic effects – in particular, its ability to increase farmers' incomes. Compared to the other mechanisms discussed in Section 3, the economic effects of certification are relatively well researched. In total, we identified 37 peer reviewed empirical studies, with 12 of them having food security as their main or part of their main focus. The studies reviewed use a diverse set of methods, including household/farm surveys (most frequently used), quantitative analysis of survey data, focus group discussions, semi-structured interviews, participant observation, and mixed method research designs. Their main geographical focus is countries in Latin America and Sub-Saharan Africa. In addition, countries from North America, East Asia, and South Asia are covered. A large number of studies (25) examine certification's economic effects in the coffee sector. Other commodities included are: Corn, cotton, palm oil, farmed fish, rice, sugarcane, pineapple, and tea. Finally, different types of certification are investigated and compared (e.g. fair trade, organic, and generic sustainability certification – e.g. Rainforest Alliance).⁶

Reviewing the main empirical results of these studies, 26 find evidence for a positive effect of certification on farmers' income – with seven of them making a direct link to improved food security (Ayuya et al., 2015; Becchetti et al., 2012; Becchetti & Costantino, 2008; Chiputwa & Qaim, 2016; Chiputwa et al., 2015; Panneerselvam et al., 2010; Krumbiegel, Maertens, & Wollni, 2018). On the other hand, seven studies produced inconclusive results. For instance, research on coffee producers in Uganda finds that UTZ-Rainforest Alliance-4C certification creates substantial economic benefits whereas Fairtrade-Organic certification

⁶ Given multiple certifications are common in some regions and sectors, several studies focus on the impacts of different combinations of certifications.

reduces productivity and economic returns (Akoyi & Maertens, 2018; Vanderhaegen et al., 2018). Moreover, four studies found no or even a negative effect on farmers' income levels and food security (Bacon et al., 2008; Bacon et al., 2014; Méndez et al., 2010; Morris et al., 2013). In their assessment of the existing literature, Meemken & Qaim (2018a) even suggest that organic certification increases food prices and consequently worsen food security in developing countries where consumers have limited purchasing power. Most studies, however, point to a positive link between sustainability certification, farmers' income, and food security. A closer reading of this literature allows us to add further nuance to this relationship.

First, despite the bulk of evidence pointing to an overall positive effect, many studies find it to be low in impact and ultimately insufficient in addressing poverty and food insecurity among certified farmers (Arnould et al., 2009; Bacon et al., 2014; Beuchelt & Zeller, 2011; Jena et al., 2012; Méndez et al., 2010; Qiao et al., 2015; Ruben & Fort, 2012). The reasons for this are manifold. One important reason is that price premiums are often low and that due to a lack of demand a large proportion of the certified produce ends up being sold on conventional markets (Méndez et al., 2010; Valkila & Nygren, 2010). In addition, Vellena et al. (2015) find that certification does not necessarily lead to higher household income (and food security) as farmers often rely on multiple sources of income and participation in a certification program can incentivize farmers to shift land and labor away from these other sources of income. Moreover, Morris et al. (2013) show that market premiums are often used for expenses other than food and that certification is ineffective in addressing problems with seasonal food insecurity.

Second, from the studies reviewed it remains unclear whether yield increases or price/market premiums are more significant in increasing farmers' incomes and food security. In some cases, yield increases were found to be more important (Barham et al., 2011). However, in other cases, price premiums could compensate for lower yield associated with

organic certification (Qiao et al., 2015). Some studies also suggest a tension between the two as some certification standards like organic farming are likely to reduce yields (Vanderhaegen et al. 2018; Meemken & Qaim, 2018a). Further research is needed to investigate the relative importance and interplay of productivity gains and price premiums.

Finally, the existing research literature points to the context dependence of certification's economic effects. In this regard, income effects and yield increases have been found to vary across programs as well as forms of certification (e.g. organic vs. fair trade) (Beuchelt & Zeller, 2011; Chiputwa et al., 2015; Kleemann et al., 2014; Mitiku et al., 2017; Ruben & Zuniga, 2011), different types of producers (e.g. farmers' socio-economic status, production knowledge, and farm size) (Hansen & Trifković, 2014; Jena et al., 2012; Phillips, 2014), and market environments. In particular, the price of commodities on international markets has been found to play an important role (Valkila, 2009; Valkila & Nygren, 2010). Therefore, as indicated by the reviews of Meemken & Qaim (2018a) and Oya et al. (2018), the impact of sustainability certification on the income of producers and workers (and thus their food purchasing power) remains highly context-specific.

Effects on land use and land rights

In addition to the “economic mechanisms”, we discussed how certification can influence food security via its effects on land use and land rights. Reviewing the extant research literature, we find that these relationships remain largely underresearched. In our literature search, we only identified eight peer reviewed articles that examine certification's effects on land use and land rights – with six of them having food security as their main or part of their main focus. Given the small number of studies, we provide a more in-depth review of their main arguments and empirical findings.

One set of arguments focuses on sustainability certification and its effects on landscape-level land use changes and local food security. Two explorative studies on palm oil certification in Southeast Asia by Azhar et al. (2017) and Oosterveer et al. (2014) investigate these dynamics. In their study, Azhar et al. (2017) argue that, by focusing on industrial monocultures, sustainability certification would contribute to legitimizing these land use practices. In contrast, smallholders, which are the backbone of local food security in developing countries, would often remain excluded from existing certification programs. From a livelihoods and market access perspective, the topic of smallholder exclusion has been explored in a large number of studies (e.g., Brandi et al., 2015; Brandi, 2017; Lee et al., 2012; Ponte & Cheyns, 2013). For example, Brandi et al. (2015) find that smallholders would often lack both the information and the degree of organization that certification demands.

Another argument about the relationship between certification, land use change, and food security comes from Oosterveer et al. (2014). They provide indicative evidence that the RSPO's strict standards on new plantings and deforestation facilitates processes in which exiting cropland (used for food production) is converted into palm oil plantations. Although plausible, the literature remains highly speculative about these macro-level land use changes, and their impact on food security – presumably not least because of the great methodological challenges involved in establishing causality in this context.

Linked to the broader discussion on certification's income and yield effects, several authors have also explored its influence on farmers' micro-level land use decisions. For instance, Becchetti and Constantino (2008) observe that fair trade certified farmers had a more diverse product portfolio and enjoyed relatively higher prices and living conditions, including higher monthly food consumption. In contrast, Vellema et al. (2015) show that certification encourages specialization in coffee production. On the one hand, this increased farmers' "coffee income" (due to market premiums and yield increases). On the other hand, the study

finds that it decreased total household income as farmers converted land from non-coffee crops, thus depriving them of these other sources of income. Moreover, van der Vossen (2005) argues that the land use changes associated with organic coffee certification require large additional amounts of composted organic matter to sustain economically viable yield levels. According to the author, most smallholders will be unable to acquire such quantities and therefore face declining yields and lower incomes. By contrast, in their study on coffee producers in Uganda, Meemken, Spielman, & Qaim (2017) find that organic producers have scored better on nutritional outcomes than fair trade or non-certified producers, and this positive outcome resulted not from higher income from coffee sales, but from more diversified farm production systems.

Finally, our literature review identified two qualitative case studies that address certification's effects on land rights in relation to food security. The first case study by Nesadurai (2013) focuses on the palm oil sector. She argues that palm oil expansion undermines the food security of rural and indigenous communities when customary land rights are violated (e.g. through disappropriation without proper compensation). Analyzing the RSPO's ability to safeguard the livelihood security of these communities, her findings are mixed. On the one hand, the RSPO has been far more responsive than government actors to land rights conflicts, providing local communities with access to conflict resolution mechanisms. On the other hand, her analysis shows that the RSPO's multi-stakeholder process can be fragile and often involves significant trade-offs to find solutions. The second case study identified in the review examines the ability of biofuel certification schemes to uphold land rights in countries threatened by "land grabbing". Analyzing the design and practice of Bonsucro and the Roundtable on Sustainable Biofuels, Fortin and Richardson (2013) argue that these two schemes do not deliver on their claim to protect the land rights and livelihoods of the

rural poor, due to both flaws in their standards and shortcomings in their ability to discipline the companies they are financially dependent upon.

Gender effects

Lastly, we identified certification's ability to empower women as a third type of mechanism. In total, we found 13 studies that covered such "gender effects". Eight studies had food security as their main or part of their main focus. Nine were published in peer reviewed journals, and a total of five had conducted primary research. Most of these studies describe a positive relationship between certification, women empowerment, and food security (e.g. Jouzi et al., 2017; Lyon et al., 2010; Chiputwa & Qaim, 2016, Raynolds et al., 2004; Meemken & Qaim, 2018b). But there is also evidence for unintended consequences and mixed effects (e.g. Oosterveer et al., 2014; Smith, 2013). Below, we provide a more detailed discussion of these studies.

Drawing on Lyon et al (2010), we identify three principal ways in which sustainability certification can empower women. These are: More influence in community/household decision-making, the acquisition of formal land titles/property, and improved economic opportunities. First, with regard to influence in decision-making, Lyon et al. (2010) suggest that the organizational norms of certification programs (in their case the Fairtrade Labelling Organization) encourage women to participate in village and regional producer organizations. According to Farnworth and Hutchings (2009), this can have positive effects on food security, as women are traditionally responsible for food preparation. They are also more reliant on common resources and therefore would seek their protection. Empirical support for such arguments comes from, among others, Elders et al. (2012), who find that women's participation in cooperative decision-making had improved following certification – although, as noted by Lyon et al. (2010), women would rarely acquire leadership positions.

Second, certification can help women to acquire formal land titles. Again, this can have positive effects on food security, as women are believed to be less likely to devote land entirely to cash crops (Farnworth & Hutchings, 2009). At the same time, the requirement for formal land titles could also have unintended consequences. As observed by Oosterveer et al. (2014), it could further disempower women in countries in which they cannot legally hold such titles, thus negatively affecting household food security. However, as discussed in the previous section, certification's effects on land rights remain largely underresearched.

Third and lastly, several studies examine how certification increases women's income levels and economic opportunities, and how this may relate to food security. These studies are part of a broader body of literature on the relationship between female income or asset ownership and household expenditures (e.g. Hoddinott & Haddad, 1995). As with certification's other economic effects, this relationship is relatively well researched – with most studies finding evidence for a positive effect, suggesting gender empowerment as a key mechanism for certification to improve nutrition and food security (Bolwig & Odeke, 2007; Chiputwa et al., 2015; Qiao et al., 2015; Reynolds et al., 2004; Meemken & Qaim, 2018b; Chiputwa & Qaim, 2016). At the same time, Smith's (2013) meta-review of 20 case studies on fair trade certification, covering a wide range of countries and sectors, suggests that its impact on women's income and position in the household is highly context-specific. Impacts are also found to differ in relation to factors such as age, marital status, education, and wealth.

5. Conclusion

The review shows that research on the impacts of sustainability certification has paid insufficient attention to the problem of food security in producer countries. The extant literature mainly focuses on certification's economic effects – with much of the evidence pointing to a positive, albeit weak and highly context-dependent link between certification, income, and

food security. Moreover, the studies reviewed for this article suggests that the observed effect varies significantly across schemes, sectors, type of producers, and market environments. Conversely, the other mechanisms identified in this article remain little understood. Apart from several explorative studies in these areas, we know very little about certification's land use, land rights, and gender effects, and how they influence the food security of farmers, plantation workers and local communities in producer countries. In addition, scholars working on certification and food security often fail to specify how sustainability standards affects the different dimensions of the concept – i.e. *availability, access, utilization, and stability*.

In sum, while research on the socio-economic and environmental effects of sustainability certification has made important progress (see DeFries et al. 2017; Oya et al. 2018), the subject of food security remains a blind spot in the impacts literature. Against this background, we call for more targeted research on this important subject. To make progress on this issue, researchers should collaborate across disciplinary boundaries and leverage the power of multi-method research designs to investigate the various mechanisms identified in this article and possible interactions between them. Importantly, this research should focus more strongly on the non-economic effects of certification and more precision is needed when it comes to the different dimensions of food security. Moreover, from a policy perspective, there should be more critical reflection about the role of sustainability certification in global and local food governance. Our review shows that these programs can have important direct and indirect effects on food security, both positive and negative. As researchers and practitioners become aware of these relationships, more needs to be done to recognize the risks and opportunities for local food security and sustainable development.

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