Conceptualization of supply base continuity for suppliers in the Bottom of the Pyramid of food supply chains

Abstract

Agricultural productivity needs to increase by 70% to feed world population by 2050. This increase has to come from smallholder farmers because they account for 97% of cultivable land worldwide. Smallholder farmers operate in the Bottom of the Pyramid, which means that they have higher transaction costs to do business, and higher barriers to access technology and knowledge to improve the productivity. Buying firms in the food supply chain can contribute to enhance productivity and continuity of smallholder farmers. Previous studies suggest that firms can develop their suppliers' capabilities through knowledge transfer programs, and collaborative relationships. However, there is little research on how these programs can work in the Bottom of the pyramid context. This paper analyzes the constraints that inhibit smallholder farmers in the BoP to continue their economic activities and conceptualizes the capabilities needed by buying firms to overcome these constraints. The paper uses a nested case study from the Ecuadorian corn supply chain to inductively conceptualize these buying firms' capabilities. Implications for practitioners are also discussed.

Keywords: Supply base continuity; Bottom of the pyramid; sustainability

Introduction

Agricultural productivity needs to increase by 70% to feed world population by 2050. Smallholder farmers are mostly in developing economies, and worldwide they account for 97% of the cultivable land. This means that a high proportion of productivity increase have to come from smallholder farmers. But smallholder farmers in developing economies operate in the Bottom of the pyramid (BoP) context, which means that compared to farmers in developed economies they face higher constraints to continue and grow their business for the long term. For instance, smallholder farmers operate through contracting and product market voids, which increase the transaction cost to integrate into supply chains; they have limited access to high quality inputs and latest technology and best practices, which impose restrictions on productivity growth; and they have limited access to financial services and insurance against natural disasters, which increase the likelihood to leave the farm and migrate to cities. Then, it is critical for global food security to understand what makes smallholder farmers more likely to continue their economic activity.

Previous studies propose the concept of supply base continuity to address the buying efforts to support their suppliers to continue in business in a way that can reinvest, thrive, and innovate (Pagell et al., 2009). Supply base continuity has been conceptualized as a bundle of corporate practices that are deployed by buying firms to enhance the sustainability of their upstream supply chain. The practices include strategic, long-term relationships with commodity-suppliers, supplier development programs, supplier's risk reduction, cash flow transparency, and improvement of suppliers' operations in other chains. However, these practices were identified in case studies with firms in developed economies from several industries (e.g. food and beverage, manufacturing, and retailers), which is a different reality from smallholder farmers in the BoP. So there is a gap in the literature about supply base continuity in the BoP. Specifically, there is little knowledge of supply management capabilities to enhance the continuity of smallholder farmers in the BoP.

This paper fills this gap by analyzing the constraints that inhibit smallholder farmers in the BoP to continue their economic activities. The focus is on the dyadic and supply chain level. Additionally, the paper also conceptualizes the capabilities needed by buying firms to overcome these constraints. In this regard, the paper describes the constraints that inhibit smallholder farmers' business continuity, and conceptualizes the firms' capabilities needed to overcome such constraints. In summary, the research questions answered in this paper are the following: 1) what are the constraints, at the dyadic and supply chain level, of supply base continuity in BoP markets? 2) How do buying firms manage these constraints to enhance suppliers' business continuity?

To answer these research questions the paper inductively builds theory from a nested case study. The case study is the corn supply chain in Ecuador, and it has two units of analysis: the buyer-supplier relationship, and the supply chain perspective. We chose the corn supply chain in Ecuador because it registers high variation of approaches to farmers' constraints; it considers governmental interventions; and it has high homogeneity between smallholder farmers. This empirical context is useful because it permits the comparison between different business approaches within a prototypical BoP agricultural supply chain. This in turn facilitates the rich description of constraints, and an internally valid conceptualization of supply base continuity capabilities. Finally, this paper enhances our understanding on the constraints to sustain and grow BoP business

initiatives; it moves the field forward by conceptualizing the organizational capabilities needed to deploy embedded resources that contribute to BoP supply base continuity

Literature review

Supply base continuity

Supply base continuity (SBC) refers to the practices implemented by the buying firm to ensure that the supplier stay in business in a way that allow the supplier to reinvest, thrive, and innovate (Pagell and Wu, 2009). This concept is operationalized as a bundle of the following SSCM practices: strategic, and long-term relationship with commodities' suppliers; supplier development programs; reduction of supplier risk, supplier development to improve supplier's performance in other chains; and cash flow transparency (Pagell and Wu, 2009). Yet, previous studies discuss that more research is needed to better understand the conceptual domain, and theoretical bases of SBC.

The Global food security issue entails the study of smallholder farmers' continuity. In this regard, farmers would need to improve their access to markets, and their incorporation into supply chains (Berdegué et al., 2014; Berdegué and Fuentealba, 2014). There are some cases that suggest how farmers can be incorporated into supply chains. For instance, Nestle, Unilever, and SABMiller have incorporated smallholder farmers through supplier development and certification programs in crops such as: tea, coffee, milk, and barley (Nestle, 2015; Sabmiller, 2016; Unilever, 2017). It has been also studied how NGOs can implement supplier development programs to alleviate poverty of smallholder farmers (Rodríguez, Giménez, Arenas, et al., 2016). But there is no research that explicitly addresses how smallholder farmers can continue in their businesses. Previous research offers a conceptualization of SBC, but in a context different from smallholders farmers, and food security concerns (Pagell and Wu, 2009). Consequently, this research conceptualizes SBC grounded in the reality of smallholder farmers, build a measurement model of this construct, and validate the model with data from corn smallholder farmers in Ecuador.

Sourcing from the Bottom of the Pyramid

Most of previous studies have focused on BoP business models in which the poor population were targeted as consumers (Kolk et al., 2014). These business models follow the logic presented in the seminal work of Prahalad, which suggests that firms can make profits by selling goods and services to people who live with less than 2 USD per day (Prahalad, 2004). However, this approach has been criticized because poor people are unable to develop capabilities that improve their economic conditions by purchasing affordable products and services (Karnani, 2007). Some scholars suggest that a better mechanism is to integrate poor populations as suppliers. For instance, companies such as Nestle, Unilever, and SabMiller have successfully developed business initiatives in which poor smallholder farmers were incorporated into their supply chains (Nestle, 2015; Sabmiller, 2016; Unilever, 2017).

Previous studies about incorporating poor suppliers into the supply chains have focused on the mechanisms of governance for the buyer-supplier relationships, the cooperation with secondary stakeholders for undertaking supply management practices, and the strategies to cope with institutional voids (London et al., 2010; Parmigiani and Rivera-Santos, 2015; Rodríguez, Giménez and Arenas, 2016; Rodríguez, Giménez, Arenas, et al., 2016). Overall, existing research has focused on how traditional supply

management practices such as supplier development, supplier selection, and supplier's governance can be adapted for incorporating poor suppliers. Yet, there is little knowledge about how practices grounded in the BoP context can create the capabilities that poor suppliers need to continue with their production activities in the long term.

The common ground between the literature of BoP and sustainable supply chain management are the concepts of supply chain partner development; trustworthy, long-term relationships between multinationals, and BoP actors; and partner selection (Gold et al., 2013; Khalid et al., 2015). BoP scholars emphasize the development of capabilities that allow poor population to stay in business (Ansari et al., 2012; Kolk et al., 2014); whereas scholars in socially sustainable supply chains emphasize the implementation of practices to ensure the long-term continuity of poor suppliers (Khalid et al., 2015; Pagell and Wu, 2009). Consequently, both BoP and SSCM streams of research emphasize the need to study how buying firms can develop their suppliers' capabilities to stay in business for the long term.

Methodology

Research design

The article uses the case study methodology (Yin, 2013). It is a single case study with multiple units of analysis. The focus of the case is the corn supply chain, and it looks at the whole supply chain, and at the buyer-supplier relationship. The case gathered data from semi-structured interviews and secondary sources of data from buying firms, fertilizers' sellers, and Ecuadorian Agriculture Ministry. The case included data from 14 experts in the corn supply chain from the Agriculture Ministry, corn buying firms, fertilizer companies, NGOs, and a National Agricultural Research Institution. Additionally, it also interviewed 6 smallholder farmers (less than 10 Ha.).

The Ecuadorian corn supply chain was chosen because it is setting in which there are both collaborative, long term buyer-supplier relationships, and competitive based on spot-prices buyer-supplier relationships. In this regard, this setting has a high-variation potential of the SBC construct. For instance, there have been several initiatives in Ecuador to integrate smallholder farmers into supply chains. There has been NGO's initiatives to integrate corn farmers into firms' supply chains (Rodríguez, Giménez, Arenas, et al., 2016). Also local companies such as PRONACA have had programs for more than 20 years to support the incorporation of corn smallholder farmers into supply chains. These programs have consisted on technical assistance, credits for purchasing agricultural inputs (e.g. seeds, fertilizers, pesticides, and herbicides), and agreements for purchasing farmers' harvest (PRONACA, 2017). Additionally, the Ecuadorian government has facilitated subsidies to agricultural inputs and technical assistance to farmers so they can enhance their productivity and incomes (MAGAP, 2013). However, these programs have not attended the whole population of smallholder corn farmers, so there are still smallholder farmers operating in traditional intermediaries' channels.

The research objective of the study was to explore how smallholder farmers can be incorporated into markets, develop skills and capabilities, and achieve economic prosperity. Primary and secondary data were collected. Primary data come from semi-structured interviews to actors in the corn supply chain such as: purchasing managers, and CSR managers in livestock production firms, marketing managers in agricultural inputs dealers, government's officials of the Agriculture Ministry, and smallholder corn farmers. The interviews included the following topics: mechanisms to ingrate farmers into supply chains, the development of farmers' capabilities and skills, and challenges to

implement knowledge transfer programs. Finally, secondary data such as companies' sustainability reports, Ministry reports, and public statistics were also used.

Results

Rich description of smallholder farmers' context

The study found that the following categories are critical for the farmer to stay in business: infrastructure; business management and entrepreneurial skills; access to credit for acquiring agricultural inputs and working capital; access to agricultural technology; stable and long-term buyer-supplier relationships; and investment in the creation or strengthening of smallholder farmers' cooperatives.

Infrastructure

There are two types of infrastructure that is critical for farmer's business: roads to get the harvest out of the field, and water-irrigation systems. Roads have improved significantly in Ecuador in the last 10 years. All the farmers interviewed during the study were connected by primary or secondary road. Furthermore, the roads were available the whole year meaning that even during the raining season they could use the road and get the harvest out. However, the situation of water irrigation is different. All the famers interviewed pointed out their inability to access water for irrigation. They argue that it is feasible to access underground water, but they lack access to capital for investing in such technology. Consequently, although the climate conditions favor the crop of products the whole year, most farmers can only do it during the raining season because it is when they have availability of water. Therefore, most corn smallholder farmers only work on their crops 4 months a year, and for the remaining months of the year they search for jobs on other activities.

Business management and entrepreneurial skills

There are two main aspects that put smallholder farmers in jeopardy to stay in business: lack of business management skills, and lack of entrepreneurial skills. Most corn smallholder farmers ignore the price at which they start losing money, and the amount of interest they end paying when borrow money from informal lenders. In this regard, farmers are highly informal in the way they run their businesses. There is no budget or income-loss statement that support farmers' to project their profits or as a documentation for asking a credit. Hence, farmers acknowledge that they need training to perform break-even analysis, budgets and income-loss statements, and also to develop basic accounting and finance skills. Yet, there are scarce initiatives from buying firms in these topics. Some of the buying firms interviewed in the study were planning to offer training on these topics, and some pilot projects had been implemented. A farmer told us the following in this matter:

> "We have asked training [to the buying firm and government institutions] in the management of numbers, so we can know how much the investment is and how much the profit is, when to sell and when not to avoid losing money. In general, farmers do not know how much their profit is because they don't know how to do the numbers" *Corn Farmer interviewed*

Furthermore, since farmers do not work the whole year on their crops, they need to identify business opportunities to generate incomes for the rest of the year. In this aspect, some buying firms offer training to farmers' spouses on the creation of orchards for vegetables, and livestock farming (e.g. poultry, pigs, goats, etc.). Furthermore, the interviewed agricultural researchers suggest there are crops that with the remaining

moisture of the environment could grow. For instance, legumes (e.g. beans, sesame, lentils) could be suitable crops because they can generate incomes for the remaining period; and also when legumes plants die and decompose their nitrogen compounds enrich the soil. This type of practices are known as crop rotation, and are considered part of sustainable agriculture practices (Davis et al., 2012). Yet, the firms involved in the study have no practices in this regard.

Farmers' access to credit

The corn is a temporal crop of about 105 days. During this period, farmers buy fertilizers, pesticides, corn seeds, pay the wages for the labor they hire, and also cover the expenses of their household. Yet, since most farmers do not work the whole year, the profits from their harvest are used to cover the household expenditures for the remaining of the year. Hence, when the raining seasons starts farmers don´t have the capital to run the crops. Consequently, farmers need a short-term (120 days) loan for working capital.

Farmers have difficulties to access this type of loans. Private banks are averse to lending farmers money because they cannot properly assess the risk profile of the farmer. Smallholder farmers usually have no bank accounts, or tax declaration statements that certify their cash flow. Furthermore, few farmers own the land in which they crop. Consequently, there is no collateral to support the credit with a private bank. On the other hand, there are public banks that offer credits for agriculture. Yet, these banks usually have longer lead times to approve a credit so these credits don't suit the timing of the crops. For instance, the raining season starts in January, and after the first rain the farmer has to start cropping. So the credit has to be delivered in January in order the farmer could take advantage of the rain. Yet, interviewed farmers point out that credits are usually approved in late February or early March when it is too late to start cropping. Therefore, farmers need short-term credits but either they don't qualify for it, or they get it too late.

We observed that some buying firms supported farmers to access credit with private banks. The buying firms had agreements with local banks so the farmer could open a bank account in which their harvest payment will be transferred. This would generate a record for the farmer and would facilitate their risk analysis. Furthermore, some buying firms also give the famer a certificate with the historic deliveries of harvest. This information also facilitated the risk analysis of the farmer when asking for a credit. Additionally, other set of practices is the agreements between firms who sell agricultural inputs and firms who purchase harvest. The seller of agricultural inputs deliver the items to the farmer, and issue a receivable to the farmer which would be due at the delivering of the harvest to the buying firm. Then, the buying firm and the seller would balance accounts. Therefore, buying firms in the corn supply chain facilitate farmers the access to credits for working capital through the provision of information and agreements with banks, or through agreements with sellers of agricultural inputs.

Access to agricultural technology and farming best practices

The low productivity of smallholder farmers has been the major concern of international organizations and national governments. The IDB offers funding to projects that foster the diffusion of hybrid seeds among smallholder farmers. The Ecuadorian government had a subsidy program for corn smallholder farmers to purchase hybrid seeds, fertilizers, and pesticides (MAGAP, 2013). This program was coordinated with an association of companies selling agricultural inputs, so the government send the list of farmers that would get the subsidy, and then at the moment of the purchase the farmers get the discount from the price of the subsidies.

Additionally, there are buying firms that have their own farmers' development program. The interviewed managers assert that the main issues for improving the productivity of smallholder farmers are crop management, and proven high-yield hybrid seeds. The private sector has addressed these issues through training programs, visits to plantations, and credit purchases of agricultural inputs, which are paid with the harvest. The training programs and visit to plantations are complementary activities. The buying firm assigns regional advisors who schedule visits to farmers to assist them in technical aspects of the crop; whereas visit to plantations are events where staff of the buying firm exhibit farming practices such as: soil management, usage and application of fertilizers, correct use of pesticides, etc.

Stable, collaborative, and long-term buyer-supplier relationships

Farmers need a stable and reliable long-term buyer-supplier relationship. The farmer could have a high yield in their crops, but that does not translate into profits if the farmer does not get a suitable deal for their harvest. In this regard, the GT study finds that farmers need a buyer supplier relationship that offer them higher prices than the market, open communication relationships, and assurance that they could sell their harvest in the long term.

Pagell et al (2010) suggested that sustainable sourcing practices entailed the payment of above-market prices. In this regard, these prior studies indicated that commodities suppliers were treated like strategic suppliers. In the context of smallholder corn farmers, prices are volatile, they depend on numerous factors such as: famines, plagues, imports from neighbor countries, and the amount of rain over the year.

Additionally, farmers acknowledge as important to count on a buying firm to sell their harvest in the long-term. For instance, they sell to one buying firm their harvest in the present, but for the next harvest the deal with the same buying firm might not be beneficial anymore because the buying firm offer lower prices, or accept in periods of time different when the harvest is ready. So most farmers cannot rely on the same buying firm for the long-term. Additionally, farmers indicate to have little communication with the buying firm. They met the buyer two times during the cropping season. First, when they get the seed or the visit from the technicians; second, when they delivered the harvest. There is no coordination between the farmer and the buying firm. Farmers know little about the prices they will receive when delivering, the amount of corn the buying firm would be willing to receive, and the penalties the product might receive if it does not comply with humidity and defects parameters. Therefore, to stay in business farmers need to engage in open-communication, long-term, and reliable buyer-supplier relationships.

Transaction transparency

A reported incident by the farmers is the mechanism for delivering and weighting the harvest in the buying-firm's facilities. Farmers indicate that buying firms lack transparent and reliable mechanism to weight the harvest or assess the humidity and defects of their harvest. Farmers don't trust the accuracy of the equipment used. Furthermore, farmers point out that the assessment of the parameters for determining the price to be paid are not understandable. So farmers are told the percentage of humidity and defects of their harvest, but they are not told how those parameters are used to compute the price. Consequently, lack of transparency impedes the farmer to trust the buying firm and integrate into the supply chain.

Furthermore, the interviewed managers also acknowledge this incident and indicate that there is little regulation and control on the calibration weighting equipment. In this

regard, managers also told that everyone who put a sign of buying corn and have a weighting machine can source corn from farmers. Consequently, there are no institutional mechanisms to protect farmers against unreliable weighting equipment for the harvest.

Development and strengthening of farmer's cooperatives

Cooperatives reduce the transaction cost of doing business with smallholder farmers because they can consolidate the harvest of smallholder farmers, offer farmers services of drying and cleaning the harvested product, intermediate credits for their members, and get higher prices for the harvest. Furthermore, farmers' cooperatives can coordinate training sessions, support the adoption of technology, and follow-up the application of best practices. Therefore, farmers' cooperatives constitute an organizational form that ease the transaction costs of integrating smallholder farmers, and facilitate the diffusion knowledge, technology, and best practices diffusion.

Yet, there are difficulties in the creation or strengthening of farmers' associations. The study findings suggest the following challenges:

1) Lack of managerial skills of farmers to run a cooperative. Farmers are mostly trained to produce the land, but not to run a cooperative. Furthermore, people with the necessary managerial skills are usually in cities, and it is difficult to attract them to rural areas.

2) Institutional voids that impede farmers' cooperatives to get short-term and long-term credits. In Ecuador farmers' cooperatives have the legal form of non-for profit organizations, so they don't qualify for commercial credits or any other credit from private banks. On the other hand, if farmers' cooperatives constitute as commercial organizations, then they will lose their legitimacy with the government as a farmers' cooperative. Consequently, farmers' cooperatives can either access long-term credits through the government, or can change their legal-person form and access to credits with private banks.

3) Lack of cohesion within farmers' cooperatives. The interviewed farmers stated that farmers in general are reluctant to contribute money to the cooperative because they don´t perceive the benefits of joining cooperatives. In this regard, the benefits of the bonding social capital are not foreseen by farmers (see Table 1).

[Insert Table 1 about here]

Construct definition and theoretical domain of SBC

SBC is defined as the practices implemented by a buying firm to enhance the likelihood that smallholder farmers would stay in business in a way that allow them to integrate into markets, develop skills and capabilities, and achieve economic prosperity.

Following the results of the study, the paper proposes five dimensions for the SBC construct: development of administrative, and entrepreneurial skills; farmers' access to credit; development of farming capabilities; collaborative, long-term relationships; and harvest procedural fairness.

The development of administrative and entrepreneurial skills refers to the initiatives of the buying firm to train farmers in basic administrative topics, identification of business opportunities, and complementary economic activities to corn farming. Basic administrative topics include basic finance, budgeting, cost accounting; while complementary economic activities are farming on crop-rotation products such as beans,

lentils, or legume plants, livestock farming, and vegetable gardens for self-consumption. The objectives of these practices are to develop skills so farmers can control their expenditures, identify other sources of income, and undertake activities to generate additional revenues (see Table 2).

Farmers' access to credit refers to the initiatives of the buying firm to connect farmers with banks or any other organization to get short-term credits. This type of initiatives entails the provision of information that certify the record of harvests of farmers; agreements with local banks so farmers can open bank accounts and access financial services; and agreements with sellers of agricultural inputs so farmers can get credit to buy the inputs. This type of practices aims to facilitate the inclusion of farmers to credit and agricultural input markets. Furthermore, it also supports farmers to overcome their working capital need and enhance the likelihood to stay in business for the long term (see Table 2).

Development of farming capabilities refers to supplier development programs to enhance the skills of farmers on the technical aspects of the crop. It includes soil preparation for crops, and handling and application of fertilizers and pesticides. The supplier development programs include visits of technicians from the buying firm to the farms, talks in the buying firm's facilities, field visits to exemplar crops in which best practices are illustrated, and technology transfer through the delivery of high quality hybrid seeds (Table 2).

Collaborative, long-term relationships refer to the efforts of the buying firm to build an enduring, close, and trustworthy relationship with the farmer. These efforts entail paying higher prices than traditional channels; and establishing open-communication relationships in which the buying firm set long-term commitment to buy the harvest. The central theme of this dimension is the commitment of the buying firm to have a trustworthy relationship beyond the harvest cycle.

Harvest procedural fairness refers to the degree of procedural fairness in the reception, weighting, and quality assessment of farmers' harvest. This entails reliable and transparent procedures of the buying firm to receive the harvest. It includes the use of reliable equipment to weight the harvest; clear, and understandable mechanisms to assess quality parameters (e.g. humidity and impurities in the harvest); and transparent pricing based on those agreed quality parameters. Finally, this dimension enhances farmers' continuity because it incentivizes the participation of farmers in the buyer-supplier relationship, which in turn improves its economic prosperity because farmers get higher prices in this type of buyer-supplier relationships.

[Insert Table 2 about here]

Conclusion

The constraints to farmers' SBC lye at the buyer-supplier relationship level, and at the supply chain level. These constraints go beyond traditional supply chain aspects and include themes such as: the development of entrepreneurial, and administrative capabilities, the technical knowledge on complementary crops, and the access to credit. In this regard, buying firms operating in the BoP need to develop technical and relational capabilities to train farmers, provide information about them to local private and public banks, facilitate the access to knowledge, and develop farmers in administrative and entrepreneurial task.

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Tables and Appendixes

Table 1: Barriers for smallholder farmers to stay in business

Category	Definition	Exemplar quotes
Infrastructure	It refers to the availability of roads and water-irrigation systems that enhance farmers' productivity and facilitate harvest delivery.	"There are other crops in this region, but we don't have irrigation systems. Perhaps, there are alternatives for us, but the investment is higher. We don't have the resources for that" *Interviewed farmers* "Farmers lack infrastructure, irrigation, and production equipment. But these aspects go beyond the possibilities of the buying firm. Some investments are doable, but it has not be the case in corn or palm oil" NGO representative
Business management and entrepreneurial skills	It refers to the skills and capabilities needed to run the farming business in the long-run. It includes basic business administration and finance knowledge, and also the identification of business opportunities to diversify their incomes.	"Farmers in the coast region grow corn during the raining season. Since they have no irrigation system, corn cannot be grown with the same intensity in the dry season. Consequently, the economic dynamic of the farmer during this last season depends on their ability to find business opportunities. The most common thing is that they would invest their harvest profits on buying animals" Manager - Agricultural inputs seller "…it is important that farmers know how to invest the benefits from their gains of productivity during the dry season, which it is the period that they cannot work the land" Technician Ministry of Agriculture
Farmers' access to credits	It refers to the little access that farmers have to short-term credits. This shortage of supply is due to lack of information to assess farmers' risk profile, and lack of land property rights to support the credits.	"The farmers need timely credit. The credit has to be approved by November, so when the rain starts between December or January he already has the seeds and the agricultural inputs in his property and starts cropping" Manager - Agricultural inputs seller "Farmers need to cover their working capital. There has been high variation in the formats of inclusive business. Certain buying firms offer direct credit to farmers, others don't offer credits. In this regard, the participation of multilateral banks, private, and public banks is important for integrating smallholder farmers" NGO representative

Access to agricultural technology and farming best practices	It refers to the difficulties that farmers have to increase the productivity of their crops. The difficulties refer to little access to agricultural technology and farming best practices	"The transfer of technology usually includes a kit, and visits of experts who advice the farmers about best practices, and the application of agricultural inputs. The kit usually includes high-quality hybrid seeds, pesticides, and fertilizers" NGO representative "We receive little or no formal training from the buying firms. The ministry usually invites us for talks about the use fertilizers and pesticides for the crops. But, the training has to be in the field, in the place where we work" *Interviewed farmer*
Stable, collaborative, and long-term buyer-supplier relationship	It refers to the need of the farmer to engage in supportive, open and reliable buyer-supplier relationships so that they would reduce the transaction risk of their harvest in the long-term.	"The biggest problems of farmers are related to access to credit and obsolete production practices. In this regard, we had to work with them so they can open a bank account, we offered them credits for purchasing agricultural inputs so they can improve their productivity, and also offered them technical assistance" Manager- Food manufacturer "More important than a contract is a long-term agreement in which the farmer trust that the firm would buy the harvest…. Prices are exogenous to the inclusion of smallholder farmers. Yet the firm should pay higher prices than the traditional alternative of the farmer" NGO representative
Transaction procedural fairness	It refers to the lack of procedural fair procedures and decisions during the reception of farmers' harvest. It includes lack of reliable equipment to weight the harvest, and assess the quality parameters of the product.	"…the price was reduced because it had 23% of humidity. But I assessed it here [in his farm] and it had 18%. The difference is very high. Once you are there [in the buying firm consolidation center] it is difficult to argue with them" *Interviewed farmer* "I really don't understand what they do in there [the BF in the consolidation center]. It is not transparent. We don´t know how they determine the price. They do everything in the computer, the only thing I know is how much they pay me" *Interviewed farmer*
Farmers cooperatives	It refers to the challenges to develop or strengthen farmers' cooperatives. Three challenges were identified: lack of managerial skills to run the cooperative, institutional voids to apply for credits, and lack of bonding social capital within the cooperatives.	"Most farmers do not belong to a cooperative… The major issue is that farmers don't have the know-how to manage a cooperative. They would need to hire an outsider, someone who runs the administrative, financial, and commercial part of the cooperative." Director – Ministry of Agriculture "The main difficulty is the access to economic resources. Then, we are not prepared to run the cooperative… The cooperatives are non-for-profit organizations, so private banks won't give us credit. If we become private organizations, then we will lose the support from the government" *Interviewed farmer*

Source: Elaborated by the Authors.

Table 2: Dimensions and theoretical domains of SBC

Dimensions	Definition	Theoretical domain	Link to farmers' barriers
Development of administrative and entrepreneurial skills	Initiatives of the buying firm to train farmers on the administrative aspects of crops, the identification of business opportunities, and complementary economic activities to corn farming	Training programs on: -Administrative topics (e.g accounting, basic finance, budgeting) -Identification of business opportunities -Complementary crops or livestock farming -Vegetables garden for self-consumption	Lack of business management and entrepreneurial skills
Farmer's access to credit	Initiatives of the buying firm to connect farmers with banks or any other organization to get short-term credits	-Provision of information about harvest historical records -Agreements with local banks to open bank account and access financial services -Agreements with sellers of agricultural inputs	Farmer's access to credit
Development of farming capabilities	Supplier development programs to enhance the skills of farmers on the technical aspects of the crop. It includes soil preparation for crops, and handling and application of fertilizers and pesticides.	-Visits of technicians to farms -Talks in buying firms' facilities -Field visits to exemplar crops -Delivery of high quality seeds	Access to technology and farming best practices
Collaborative, long-term buyer-supplier relationship	Efforts of the buying firm to build an enduring, close, and trustworthy relationship with the farmer	-Higher prices than traditional buyer-supplier relationships -Buying firm's commitment to buy farmers' harvest in the long-term	Farmers' Inclusion into agribusiness supply chains, and economic prosperity
Harvest procedural fairness	Procedural fairness in the reception of farmers' harvest	-Reliable equipment, and transparent procedure to weight the harvest -Reliable and transparent procedure to assess the humidity and impurities of harvest -Fair, transparent, and agreed quality-based price	Farmers' inclusion into agribusiness supply chains, and economic prosperity

Elaborated by the author