



Benefits of public procurement from family farming in Latin-AMERICAN countries: Identification and prioritization

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ABSTRACT

In the fight against hunger and poverty eradication in Latin American and Caribbean countries, one of the principal innovations in recent strategies is known as Public Procurement from Family Farming (PP-FF), which links the public sector's demand for food products destined for school feeding programs with the supply of local family farming producers. However, the benefits of this strategy have still not been clearly identified. This study aims to identify the benefits of PP-FF relevant in a Latin-American context and prioritize them based on their relative importance. To cover the identification objective; initially, the benefits were identified through an extensive literature review and grouped into three component categories: social, economic, and environmental. Those benefits in their respective components were put into judgment by a group of PP-FF experts from nine countries and then prioritized with the AHP model and ICC analysis. Results reveal the existence of 14 benefits/variables identified as short-term, long-term, direct, and indirect benefits. Eight of them have been prioritized and could become the core guideline for impact evaluation of this type of policies in Latin America, duty that is still pending to be accomplished.

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1. Introduction

Institutional or public food procurement programs from family farming (PP-FF) are one of the principal innovations in hunger and poverty eradication strategies in Latin American and Caribbean countries (FAO, 2015). Brazil, followed by Uruguay, Paraguay, Bolivia, and some other countries across Latin-America, developed policies to sustain the strategy mainly after the 2008 world food price crisis. This strategy links the public sector's demand for food products destined for school feeding programs with the supply from local family farming¹ producers. The initiative, which is also known as Home-Growth School Feeding (HGSF), has been increasingly promoted in the context of international development (Otsuki, 2011) with experiences around the world.

Although the definition of family farming varies depending on the country, there is some agreement in describing it as producers that primarily rely on household labor, with relatively limited land

holdings, limited access to resources (financial, material, technological, human capital, infrastructural) and an income primarily derived from the land (Nehring et al., 2016). The interest in this type of strategy on one hand lays in the fact that the group of family farming in Latin-American and Caribbean countries suffers from high rates of poverty, represented by 81% of agricultural holdings. They provide between 27% and 67% of total food production and occupy an area that ranges between 12% and 67%, which generates between 57% and 77% of agricultural employment (FAO-BID et al., 2007; FAO, 2014). On the other hand, it is also of interest because in the last food crisis, the most affected countries were those that depended on importing basic agricultural products (FAO, 2014). This situation highlights the importance of this sector, making it an objective for public and international policies.

Nowadays, the Global Action Plan for Family Farming 2019–2028 (FAO and IFAD, 2019) has been defined, stressing the importance of comparing FF policies, monitoring progress, and taking political decisions with the aim of moving towards more inclusive and sustainable agri-food systems. Hence, it is important to identify and prioritize the benefits of PP-FF with objectivity, in a way that could be useful. Thus, this study aims:

O1: To identify the benefits of PP-FF reported in the literature.

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¹ Smallholder, small-scale farmer or peasants.

O2: To prioritize the identified benefits based on their relative importance in the Latin-American context.

1.1. Sustainable procurement components under SSCM framework

Public procurement constitutes a significant part of the Gross National Product (GNP) accounting in the world, representing between 9 and 16 percent on average in OECD countries (Kutlina-Dimitrova, 2018). It has a key power in the regulation (Morgan, 2008), that could influence the private sector towards more sustainable products and services (Bauer et al., 2010), and create policies to improve the benefits of the supply chain for the 'Base of the Pyramid (BoP)'² (Roman, 2016).

Different authors (Walker and Brammer, 2012; Fet et al., 2011; Sonnino, 2009; Morgan, 2006, 2008; Morgan and Morley, 2002) have studied Public procurement based on sustainable development in different countries, claiming that the policy has the power to create an 'economy of quality' that can deliver the economic, environmental, and social benefits.

Thus, procurement policies linked to sustainable development have been studied under the approach of sustainable supply chain management (SSCM) addressing the needs of key stakeholders and adopting a long-term perspective (Ahi and Searcy, 2013; De Nicolás, 2016). Therefore, around the world, and as part of an approach from the public sector to achieve sustainable development in its different components, policies are created that are based on SSCM (Roman, 2016) under different approaches. Amongst the most popular conceptual approaches are 'sustainable procurement' and 'green procurement', which several authors (Ahsan and Rahman, 2017; Bohari et al., 2017; Grandia, 2016; Pacheco-Blanco and Bastante-Ceca, 2016) agree are used to describe the same phenomenon or policy as synonymous terms, and additionally introduce others such as 'environmentally responsible procurement'; 'eco-procurement' (Ahsan and Rahman, 2017; Grandia, 2016); 'environmental purchasing' (Bohari et al., 2017), and 'green purchasing' (Grandia, 2016). All these approaches-concepts have been under discussion because of their policy-focus-dependent meaning (Brammer and Walker, 2011; McCrudden, 2004) or context-dependent meaning (Testa et al., 2016; Walker and Brammer, 2012; McCrudden, 2004; and Bohari et al., 2017).

Carter and Rogers (2008) defined SSCM as, 'the strategic, transparent integration and achievement of an organization's social, environmental, and economic goals in the systemic coordination of key interorganizational business processes for improving the long-term economic performance of the individual company and its supply chains'. The term has been operationalized considering the concept developed and coined by Elkington, 1997 as Triple Bottom Line (TBL). This concept focuses on the environmental, social, and economic benefits of supply chain management (Seuring and Müller, 2008). It has been widely adopted in both practice and research (Svensson et al., 2018), making sustainability part of the business agenda and itself has evolved into a proxy for the sustainability of economic, social, and environmental dimensions (Isil and Hernke, 2017).

However, recent studies have criticized the positive bias that exists in the discussions around the TBL as a framework (Isil and Hernke, 2017) and have also proposed to expand the scope with new components (Ganis, 2019; Ferro et al., 2019). For example, Svensson et al. (2018) suggested deeper research about the interactions among the three components. And similarly, Lehtonen

(2004) mentioned that 'the three dimensions of sustainable development are not qualitatively equal but occupy different positions in a hierarchy'. Moreover, different ways to address sustainability have conducted to the addition of new components such as the political (Bendell and Kearins, 2005; Urmee and Md, 2016; Pawłowski, 2008), cultural (Urmee and Md, 2016), moral, legal (Pawłowski, 2008), between others. And specifically in the SSCM, there is found additional components as stakeholder collaboration, health outcomes, and product/service and process quality initiatives used to analyze the health supply chain (Subramanian et al., 2020); and the nutritional and health component in the food supply chain (Filippini et al., 2018; Swensson and Tartanac, 2020).

Nonetheless, in the discourse on sustainable development and even in the SSCM, the reference to the combination of social, economic, and environmental development is widely assumed. These three components can be considered as a recognizable framework from a practical point of view to classify the benefits attributed to PP-FF, and matches the definition of sustainable procurement as 'the actions toward an organization (often in the public sector), pursues sustainable development objectives through the purchasing and supply process, incorporating social, environmental and economic aspects' (Walker and Brammer, 2012).

Not considering the disaggregation in a larger number of variables, such as those indicated above, could be considered as a limitation. In any case, the chosen approach will allow us to get a first guide and, possibly, helps to build a more complete model.

1.2. Benefits of public procurement from family farming

A literature review has been carried out to identify benefits of PP-FF. These benefits have been classified in the three components of sustainable procurement that we mentioned in the previous section: social, economic and environmental (Table 1). However, it is important to first take into account the main problems or critics that different authors report regarding PP-FF.

Thus, Roman (2016) states the argument that sustainable procurement frequently suffers from optimistic bias-portraying it as almost a guaranteed 'win-win' when the reality is often much less progressive. There are several reasons that explain why it hasn't gained status and become a fully established practice. First, it is perceived as a resource-intensive and costly practice, which could be corroborated by Mercado et al. (2016) in a study of the Bolivian Altiplan people which explains that the policy itself should be adapted to different cultures and locations. Second, the evidence regarding the tangible benefits of the environment remains unclear; Cerutti et al. (2016) measured the footprint of adopting sustainable procurement for food in Italy, showing that this reason could be managed. Third, implementing the policy could be quite challenging (technical aspects and politics of the organization), requiring strategic synchronization and authentic dedication (both managerial and in terms of resources) to the process; In their study, Mercado et al. (2016), demonstrate that family farmers have problems engaging with this policy due to their lack of knowledge that results in uncertainty. In their case study, it is shown that the locations where there is an extra actor/worker which make the link in direct ways improve communication and improve the policy's performance. Fourth, political factors, and finally organizations often approach sustainability in fragmented ways, which are disconnected from the overall organizational strategy.

It should be clarified that sustainable development benefits resulting from PP-FF are achievable in the long-term (Gold et al., 2013; Mercado et al., 2016), and should be accompanied by technical assistance with demonstrations and training, improved access to information, technology, inputs and production credit (Sumberg

² Theory of business administration that focuses on the population that has been forgotten in the supply chain, usually with low incomes, poverty, lack of productivity, etc.

Table 1
Summary of the benefits according to literature review.

Type of BENEFITS	AUTHORS
ECONOMIC	
Income increase (II)	(Gold et al., 2013); (Dos Santos et al., 2019); (Sumberg and Sabates-Wheeler, 2011); (Nehring et al., 2016) and (FAO, 2014)
Price support (PS)	(Nehring et al., 2016) and (Zavale et al., 2015)
Productivity Increase (PI)	Nehring et al. (2016)
Market inclusion (MI)	(Mercado et al., 2016); (Dos Santos et al., 2019) and (World Food Programme, 2009)
Cost reduction (CR)	(Morgan and Morley, 2002); (Roman, 2016) and (Seuring and Müller, 2008)
SOCIAL	
Transparency (T)	(Kleine and das Graças Brightwell, 2015); (Morgan and Morley, 2002); (Preuss, 2009) and (Walker and Brammer, 2012)
Social Capital (SC)	(Morgan, 2008); (Sumberg and Sabates-Wheeler, 2011); (Dos Santos et al., 2019) and (Morgan and Adrian Morley, 2009)
Human capital (HC)	(Sumberg and Sabates-Wheeler, 2011) and (Morgan and Morley, 2002)
Social inclusion (SI)	(Morgan, 2006); (Dos Santos et al., 2019); (World Food Programme, 2009) and (Sumberg and Sabates-Wheeler, 2011)
Food security (FS)	(Nehring et al., 2016); (Bocchi et al., 2019); (Gold et al., 2013); (Kleine and das Graças Brightwell, 2015); (Morgan and Morley, 2002); (Sumberg and Sabates-Wheeler, 2011) and (Preuss, 2009)
Living conditions (LC)	Gold et al. (2013)
ENVIRONMENTAL	
More organic production (OP)	(Kleine and das Graças Brightwell, 2015); (Morgan and Morley, 2002) and (Borsatto et al., 2019)
CO2 reduction (CO2)	(Bauer et al., 2010) and (Cerutti et al., 2016)
Crop diversification (CD)	(Altieri et al., 2012); (Morgan and Morley, 2002) and (Valencia et al., 2019)

and Sabates-Wheeler, 2011). This should be adapted differently depending on the context, culture or ethnicity; relying on the fact that the potential contribution of the public-sector is influenced by the volume of expenditure (Bauer et al., 2010; Preuss, 2009).

1.2.1. Economic benefits

Income Increase: FAO (2014) states that it is possible to increase household incomes through PP, and also stimulate the economy thanks to the purchasing power of this increased income. Gold et al. (2013) also affirm the same, as in their case study in three international corporations there was an increase in income. Sumberg and Sabates-Wheeler (2011) supported this benefit due to the increased amount of food sold in Africa. Nehring et al. (2016) affirm that PP-FF generates increased income with examples such as Brazil, in which the income of participants increases three times more than non-participants. El Salvador, Tanzania, and Ethiopia showed increases in average household incomes, food consumption, and productive assets. Again, in the case of PP-FF of Brazil, the economic effect was verified with the increase of income (Dos Santos et al., 2019).

Price support (PS): Although the effect on the price differs based on the market's elasticity or inelasticity and the purchasing power of the public state. (Nehring et al. (2016) affirm that PP acts as a stabilizer in terms of price. Zavale, Myers & Tschirley (2015) also demonstrate that in the context of some African countries with high inelasticity, PP-FF increased the market price.

Productivity Increase (PI): Nehring et al. (2016) affirm that the policy brings productivity growth stimulated by Institutional Demand for local and regional food. Increased productivity is essential to increase rural incomes, and a great part of it depends on technical assistance.

Market inclusion (MI) In their study on the Bolivian Altiplano, Mercado et al. (2016) affirm that PP enables market inclusion of smallholders via direct and active support from decision-makers, gate openers at the municipalities, and community embeddedness that supports trust-building and reduces uncertainty. World Food Programme (2009) affirms that access to the market is guaranteed by the family farming contract with the buyer institution, which provides protection from market price fluctuations, and the ability to plan in the long-term. And, Dos Santos et al. (2019) refer also to increased access to new markets in PP-FF in Brazil.

Cost reduction (CR) On one hand, Morgan and Adrian Morley (2009) show the case of Dalarna Sweden, where there was a 7%

reduction in the total cost of food procurement, as a direct result of a more efficient transport system. On the other hand, Roman (2016) and Seuring and Müller (2008) added that these types of procurement are considered expensive.

1.2.2. Social benefits

Transparency (T): On one hand, authors such as Kleine and das Graças Brightwell (2015), Morgan and Morley (2002), and Preuss (2009) evidence transparency and its relation with Public Procurement. For example, Kleine and das Graças Brightwell (2015) stated that decentralization is the key to achieve transparency in the PP process. Morgan and Morley (2002) affirmed that PP brings transparency due to the amount of information on the customer's hands, accessing on producer's information and their production processes. Preuss (2009) also affirms that transparency emerges through public SSCM as a key support aspect in the dissemination of sustainability information within and beyond the local authority and particularly in initiatives to encourage a broader supply base.

On the other hand, Walker & Brammer (2012) argue that there is a negative relationship between access to information through e-procurement and minority-owned small and local businesses because they can not access the information.

Social capital (SC): Morgan (2008) stated that PP allows assuming a collaborative form rather than a competition. Morgan and Adrian Morley (2009) emphasized social capital, which is understood in the context of local collaboration, mutuality, and cooperative processing. Sumberg and Sabates-Wheeler (2011) linked social capital to the experience of working together to fulfill contracts. And, Dos Santos et al. (2019) found local evidence of the public purchase's stimulation on the strengthening of farmer's organizations.

Human capital (HC): Morgan and Adrian Morley (2009) highlighted as a positive outcome the improvement in the skills and abilities among professional procurement workers and family farmers from their participation in the new PP process. Sumberg and Sabates-Wheeler (2011) also associated HC with the adoption of experience, training, and capacity building activities as a direct benefit of HGSP in Africa. Those affirmations assume that the PP-FF projects or programs are accompanied by training programs.

Social inclusion (SI): Morgan (2006) states that the regionalization of the PP food product would be conducive to a more socially inclusive system. World Food Programme (2009) also affirm through many case studies that PP creates more jobs throughout

the supply chain. [Sumberg and Sabates-Wheeler \(2011\)](#) identify the mechanism of additional jobs/wages (via multiplier effects) as an indirect benefit of increased income. Which later was corroborated by [Dos Santos et al. \(2019\)](#) in the PP-FF of Brazil, the economic effect was verified with the expansion of family-based jobs in the agricultural sector which lead to the participation of family members, such as women and young people.

Food security (FS): [Nehring et al. \(2016\)](#) state the benefit of food security in its four-dimensions, but the extent these dimensions are also considered in the other variables proposed in this study. That is why the definition of food security is only going to be understood by the term 'Utilization', which occurs when food assistance programs can procure nontraditional crops that have high nutritional value such as legumes, fresh vegetables, and fruits, contributing to nutritional diversity. This definition is also supported by other researchers, highlighting the benefits of nutrition on solving the problem of overweight children thanks to a better diet ([Bocchi et al., 2019](#); [Gold et al., 2013](#); [Kleine and das Graças Brightwell, 2015](#); [Morgan and Adrian Morley, 2009](#); [Sumberg and Sabates-Wheeler, 2011](#); [Preuss, 2009](#)).

Living conditions (LC): [Gold et al. \(2013\)](#) state that PP provides improvements in living conditions directed to safeguarding a minimum livelihood.

1.2.3. Environmental benefits

More organic production (OP): [Kleine and das Graças Brightwell \(2015\)](#) highlight that in Brazil, the adoption of PP-FF favors the procurement of organic products. [Morgan and Adrian Morley \(2009\)](#) also show examples of European countries in which PP demand is also based on organic products and is an incentive to produce organically. However, [Borsatto et al. \(2019\)](#) studying the PP-FF in Brazil, found evidence in the adoption of good agricultural practices among the participant peasant and family farmers; but claimed that the program offered insufficient incentives to adopt organic practices, since scaling the organic production is a multi-level process that depends on different, but interrelated drivers.

CO2 reduction (CO2): [Bauer et al. \(2010\)](#) adduced that buying in the local market reduces CO2 emissions thanks to the reduction of long-distance transportation. And [Cerutti et al. \(2016\)](#) calculated the benefits of CO2 reduction in the production, commercialization, and distribution phases of the food produced using the footprint methodology.

Crop diversification (CD): [Altieri et al. \(2012\)](#) affirm that traditional small-scale agriculture is characterized by a tremendous diversity of domesticated crops. The demand for local products in their respective seasons is the fundamental operational key to PP. [Morgan and Adrian Morley \(2009\)](#) highlighted the virtuous circle between regions which value local food and procure locally sourced food; in this context, PP demand increases crop diversification. Also, [Valencia et al., 2019](#) made a comparative study among family farmers who participate and do not participate in the PP-FF in the region of the Santa Catarina Plateau in southern Brazil, the evidence suggests that the program participants have a significant increase in their cultivated land under diversified farming systems, thus increasing the potential to improve the resilience of the food system at the farm level.

1.3. Initiatives of public procurement from family farming in Latin American and Caribbean Countries

As shown in [Fig. 1](#), the first country in Latin-America and the Caribbean that officially implemented the PP-FF policy was Brazil in 2003, with the so-called 'O Programa de aquisição de Alimentos-PAA' ([Ministério do Desenvolvimento Social e Combate à Fome do Brasil, 2014](#)). Later, in 2009 the Law 11.947 established that at

least 30% of the resources destined to the Program should be expended in the acquisition of family farming products. This policy is based in two important guidelines, the first one supported by a school feeding law under the strategy of zero hunger ('Fome zero') and the second with the recognition of the family farming role in food production ([Hentz and De Medeiros, 2019](#); [Campos, 2011](#)).

Not being so specific as Brazil, but very soon in the timeline, Bolivia settled in 2004 the 'Compro Boliviano Act' that establishes that municipalities' public procurement for the School Breakfast programs must source national products from small producers. This policy was followed by the 4 Caribbean Countries (Guatemala, El Salvador, Honduras, and Nicaragua) with World Food Program pilot projects called Purchase for Progress (P4P). But after the end of the programs, only Guatemala has continued this policy under the School Feeding Act approved in 2007 ([FAO, 2015](#)). Both Paraguay (2013) and Perú (2012) approved pilot programs linked to School Feeding, but they finished after four years. Uruguay adopted in 2015 a new Act to buy from family farmers similar to Brazil ([Machado and Pizzolon, 2018](#)) that is still active. Colombia in 2016 initiated a regional pilot experience in Antioquia with a plan called 'Plan de mejoramiento alimentario y nutricional de Antioquia (MANA)' ([Giraldo and Grisa, 2019](#)). This regional pilot is similar to Ecuador's Food Provision Program, established in 2015 to buy from family farmers ([FAO, 2015](#)). Chile in 2017 is the last country that had adopted the National Policy on Local Procurement, associated with the National School Feeding Program ([Pizarro Muñoz, 2019](#)).

As demonstrated, the policy of PP-FF supported by a law (which is the ideal goal to achieve) has been extensively worked by the leader Brazil and the followers Uruguay, Bolivia and Ecuador that try to move toward more inclusive and sustainable Agri-food systems. However, some other countries in Latin American and Caribbean Countries begin the adoption with programs or pilot projects as a first step.

The PP-FF needs to be sustained by a law and become a policy in the country that adopts the sustainability framework because this kind of procurement is not just based on price, quality, quantity, time, and location; but on the pursuit of sustainable development goals in its different components, which contradicts the usual procurement process. As the study tries to make a broader analysis of all the countries that had adopted PP-FF to a certain level, there is not going to be a differentiation in the level of advances (policy, program and project) considering all the experiences as equal, and as a result, from this point onwards the PP-FF are going to be referred to as policies.

2. Methodology

The methodology followed four steps to address the proposed objectives. First, the benefits of PP-FF were identified by an extensive literature review with the keywords 'SSCM', 'Sustainable procurement', and 'Green procurement' which were filtered in the framework of family farming on the websites Science Direct, Microsoft academic research, and Google scholar. In the second step, the collected benefits in the literature review were put into judgment by a panel of experts on PP-FF from different countries in Latin America and the Caribbean. These first two steps covered the first objective of identification and enabled the comparison between literature and expert opinions.

For the objective of prioritization, the following two steps work together to achieve better results. The individual weighting and ranking of benefits by experts resulting from the AHP model were complemented with the ICC analysis to provide a general weighting and ranking of the expert's opinion based on their absolute agreement.

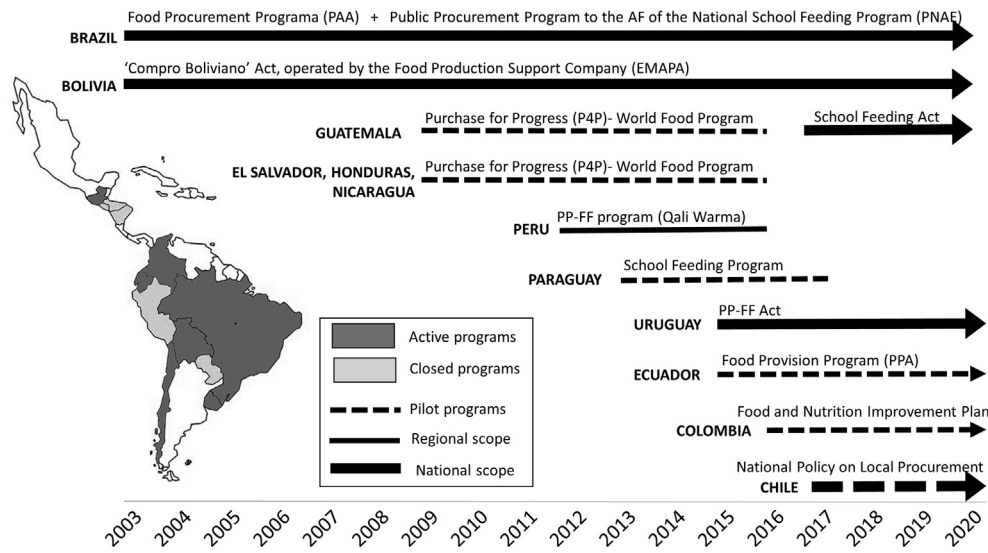


Fig. 1. Main initiatives of PP-FF in Latin America.

2.1. The AHP method

The Analytic Hierarchy Process (AHP) introduced by Thomas Saaty in 1980, is an effective tool to deal with complex decision making, which converts it on a useful tool for analysis and decision making in complex social and political problems (Saaty, 1986). Most of the studies on SSCM and procurement used the AHP methodology to make decisions related to providers, distributors, etc. However, studies, such as Govindan et al. (2014) used the AHP model to identify the essential key barriers of using Green SCM; Kabra et al. (2015) used a fuzzy AHP to prioritize the coordination barriers in humanitarian SCM; and Brandenburg et al. (2014) identified the use of the AHP method in SSCM as an analytical model.

The method is based on three basic steps: (1) Identification of challenges and construction of the AHP hierarchy, (2) Implementation of the AHP, and (3) Determination of critical challenges and validation for consistency. In the second step, the implementation of the AHP was carried out with a different scale, because many studies concede that the scale proposed by Saaty is too large, the interpretation of the verbal expressions varies from one person to another (Liang et al., 2008) and the scale is not transitive (Dong et al., 2008). Therefore, in order to achieve better results, the following scale (Table 2) was used:

In the third step, as usual, the study tolerates an inconsistency of 10% excluding all the decision-makers that do not pass through this first filter.

2.2. Selection of interview respondents

There is no standard on the minimum number of experts necessary when addressing an AHP model (Ikram et al., 2020). The AHP studies are usually conducted with a small number of people who are knowledgeable about the issue being researched (Ahsan

and Rahman, 2017). The number of people differs between investigations (Lavalle and de Nicolas, 2017), studies like Barker and Zabinsky (2011) used three experts to determine the best network design for reverse logistics (a term related to green SCM) (Veisi et al., 2016), used 45 experts (15 farmers, 15 agricultural specialists and managers and 15 board members of environmental movements) in order to determine the strategies and ethics of sustainability in agriculture and food systems in Iran. And Govindan et al. (2014) used 103 experts which represented 28% of the total experts identified. Although these studies show divergence in the size of the sample, the rate of responses should be greater than 8 to be significant (Levy and Lemeshow, 2008).

For the aims of the study, the experts were identified with the help of the FAO Regional Office for Latin America and the Caribbean based on their career path, with a minimum of 5 years' work experience in these programs and especially for their link with the PP-FF programs. The profile of the experts that work in the Cooperation Agency sector is characterized by work positions such as PP-FF projects and programs coordinators in many countries at the same time, as well as experts involved in projects in a specific territory. The profile of the Public-sector experts is characterized by people involved in the design and execution of PP-FF programs; and the NGO sector with head members or directors that work in the PP-FF framework with NGOs. Therefore, the survey was sent to 40 experts that were identified with those characteristics, from 12 Latin American countries: Bolivia, Brazil, Chile, Colombia, Ecuador, El Salvador, Guatemala, Honduras, Nicaragua, Paraguay, Peru and Uruguay. All of them are currently working or had previously been linked to the policy in five sectors (public, investigation, cooperation agency, NGO and agriculture organization).

The survey was sent in 2020 and was opened for one month receiving a total of 32 responses from nine countries (Brazil, Chile, Colombia, Ecuador, Nicaragua, Perú, El Salvador, Honduras, and Paraguay). On average, the experts have 18 years of working experience, 56% of them work in cooperation agencies, 22% in the public sector; 9% in NGOs; 9% in Agricultural Organizations; and 3% on Investigation. Thus, we receive information from 80% of the total experts contacted from 75% of the countries. Based on the consistency ratio (CR) of the AHP method, 4 of them were rejected leaving 28 surveys ready for analysis. This response rate makes the sample significant according to Levy and Lemeshow (2008).

Table 2
Relative scores.

Value of X_{AB}	Interpretation
1	A and B are equally important
2	A is more important than B
3	A is absolutely more important than B

Table 3
ICC interpretation.

Measure	Interpretation
Less than 0.40	Poor
Between 0.40 and 0.59	Fair
Between 0.60 and 0.74	Good
Between 0.75 and 1.00	Excellent

ICC eliminates raters that present 0 variances, converting it in the second filter, this filter added to the first one provided by the AHP ($CR \leq 10\%$) constitutes the two filters used in the methodology.

2.3. Data collection

The collection of data through an online survey was designed in 2 phases, in order to achieve steps 2 and 3 of the methodology respectively. The survey was developed in Spanish for been the dominant language of communication in the countries that have applied PP-FF (11 countries out of 12) in Latin America, and considering that even the Brazilian experts communicate fluently in spanish language.

2.3.1. PHASE 1: Initial survey to identify the common benefits

The 14 benefits grouped in their components, summarized in Table 1 were put in judgment by the experts asking them to indicate if the variables cited as benefits were product of PP - FF, with the choice of 'Yes' or 'No' for each variable. In this phase, the variables were introduced in their respective components and how which they are interpreted in the study, this phase also had the option to include other benefits or extension of their meanings.

2.3.2. PHASE 2: Pairwise comparison using the AHP model

With the three components –social (S), economic (E), and environmental (Ev)- and their respective variables, 4 matrices were formed for comparison based on the previously mentioned scale. The first matrix was conformed with the pairwise comparison of the components, forming 3 pairs (E vs S, E vs Ev, S vs Ev); the second matrix with the comparison of 6 variables from the social component, forming 15 pairs; the third with 5 variables of the economic component forming 10 pairs, and the fourth with 3 variables of the environmental component forming 3 pairs.

2.4. Intra-class correlation coefficient (ICC) analysis

The Inter-rater reliability tool was used to establish a general agreement of the raters/experts in the prioritization for the PP-FF benefits. This tool is generally used in psychiatry and psychological tests but was also used as an assessment tool for reliability and agreement of students in Morley (2009) study, proving to be useful for different fields.

The tool has different types of statistics to use depending on the number of raters. For this study, it is used the Intra-class correlation coefficient (ICC), which 'quantifies the closeness of the scores assigned from a pool of raters to the same study participants' (Gwet, 2008). The ICC value range varies between 0 and 1 depending on the amount of variance between the raters' opinions. Cicchetti (1994) offers a guideline for the interpretation of ICC shown in Table 3.

The ICC has three types of models to address the error, the study used the ICC model known as 'two-way mixed' because the study took the same evaluators (experts in PP-FF) to classify the components and variables, and 'absolute agreement' because it was wanted to measure the agreement between raters.

Table 4
Percentage of agreement by variable of each component.

Social	TOTAL	YES%	NO%
Transparency	32	78%	22%
Social Capital	32	97%	3%
Human Capital	32	88%	13%
Social Inclusion	32	84%	16%
Food Security	32	94%	6%
Living Condition	32	78%	22%
Economic			
Income Increase	32	94%	6%
Price Support	32	56%	44%
Productivity increase	32	47%	53%
Market inclusion	32	91%	9%
Cost reduction	32	94%	6%
Environmental			
More organic production	32	78%	22%
CO2 reduction	32	84%	16%
Crop diversification	32	84%	16%

3. Results

3.1. Benefits accepted by experts on PP-FF in Latin American and Caribbean Countries

The experts' opinions contrasted with the literature review in terms of the best approach to the identification objective shows that the experts think similarly to the authors who have researched in the field (see Table 4). It is evident that in the Social Component the most accepted variable/benefit is 'Social Capital' with 97%, and the least accepted are 'Transparency' with 78% and 'Living Condition' with also 78%. In the economic component, the most accepted variables are 'Income Increase' with 94% and 'Cost reduction' with also 94%; and the least accepted is 'Productivity increase' with 47%. And finally, in the Environmental component, the most accepted are 'Crop Diversification' with 84%, same as 'CO2 reduction' and the least accepted is 'More organic production' with 78%.

In the 'Others' option, the raters/experts added new benefits to consider in the analysis, also expand and emphasized the benefits already presented. In Table 5, it is summarized all the benefits added and the number of raters that agreed on these benefits.

In the **social component**, one of the most mentioned benefits was food security, the experts not just expanded the definition but also emphasized it.

Two experts expand the understanding of food security in terms of food culture³ and health, claiming that PP-FF promotes the preservation of food cultures and disease prevention. This way of seen food security has been already addressed by studies like Briones Alonso et al., 2018 that analyzes how culture affects food security positively or negatively; and Loring and Gerlach (2009) that with a case study illustrate how food security is understood as a matter of human health, where the food security solutions must not just target short term solution as hunger mitigation, but also a long term objective about the food-health relationship.

It was also emphasized Food Security in terms of utilization, adducing the benefits of better eating habits, recovery of cultural relevance, food quality, and greater dietary diversity rich in vitamins and minerals.

Same, the benefit of Social Inclusion was expanded with the

³ 'Uses, traditions, practices, artifacts, structure, norms, situations, and symbols, as well as the context and the environment in which food is formed, evolving, becoming and being' (Amilien and Notaker, 2018).

Table 5
Added benefits.

Social	Economic	Environmental
1. Overcoming poverty and income inequality	1. Technical and economic planning of family farmers, due to the certainty of a contract which buys at a known price (X2)	1. Revaluation of the forgotten local crops, looking at the territory as a bank of native species in situ
2. Decentralization with citizen oversight	2. Strengthens link with other organizations and major possibilities of participation in technical assistance programs	
3. Formalization of Family Farming Associations (X2)	3. Dynamization of the local economy, eliminating intermediation	
4. Decent work.	4. Added value	

terms of gender equality and generational replacement. Gender equality and social inclusion also known as GESI had been broadly promoter by UN Agencies to support sustained peace and inclusive development. And the increase of generational replacement sustained by two raters is also linked to the social inclusion of young people by the market incentives.

The other benefit emphasized was Market Inclusion, that it is also understood like the entailment of family farming organizations to marketing channels with fair prices. Not denying, that purposefully market opening to family farming organization does not guarantee successful engagement to the market; to achieve the goal it is needed technical assistance.

In the **economic component**; on one hand, it was remarked the benefits of Income Increase through the profitability increase. And in the other hand, it was emphasized that the cost reduction is relative, adducing that trading with untraditional products that come from the agroecology are costly and that all the benefits object of the study are only possible if there is a policy to support it.

In the **environmental component**; most of the commentaries were in the way of the 'more organic production' benefit, adding reduction of pesticide use, clean production, better agroecological practices, good agricultural practices, and recovery of ancestral agricultural practices. There was also mentioned that PP-FF maintains the variety of species in the crop field (Crop diversification) and that all the benefits object of the study could only be achieved with technical assistance.

3.2. The AHP method and ICC analysis

From the total responses, 4 surveys were excluded because they showed inconsistency in their answers above 10% in all the components, leaving 28 surveys ready to analyze. Among the 28 surveys, some experts presented specific inconsistencies in one or two components, which excludes them of ICC-analysis carried out in these specific components. Expert number 25 (EXP25) from Honduras had an inconsistency of 13% in the component categories and 14% in the environmental component which excludes it from the ICC-analysis on these components. The same happened with EXP2 from Brazil that has an inconsistency of 20% in the social component, and EXP16 from Colombia with an inconsistency of 11% in the economic component and 17% in the environmental component.

To proceed with the AHP method, there was taken all the variables identified in the first part of the methodology, because the expert's acceptance of the benefits is above 50%. Table 6 shows the Priority weighting and consistency index for each respondent.

The ICC statistic (see Table 7) removes all the raters that do not have variability in their answers, that is why of a total of 28 raters/experts that pass the first filter ($RC \leq 10\%$) just 18 were accepted. These 18 raters have an ICC-average statistic ($ICC = 0.937$) interpreted as 'excellent', ranking the economic component of benefits as first (weighting = 0.388), the Social component second (weighting = 0.376), and the Environmental component third

(weighting = 0.236).

3.2.1. Economic component

The ICC statistic (see Table 8) worked with 27 raters because the first filter excluded EXP11 from Colombia. Those 27 raters have an ICC-average ($ICC = 0.886$) interpreted as 'excellent'. 'Income increase' (weighting = 0.2339) is ranked first, 'Price Support' is ranked second (weighting = 0.2154), 'Market Inclusion' third (weighting = 0.2151), 'Productivity increase' fourth (weighting = 0.1692), and finally, 'Cost reduction' is in fifth place (weighting = 0.1644).

3.2.2. Social component

The ICC statistic (see Table 9) removed 3 raters (EXP17, EXP20, and EXP27), which left a total of 24 raters, whose ICC-average ($ICC = 0.822$) shows a score interpreted as 'excellent'. 'Food security' (weighting = 0.192) is ranked first, 'Living Conditions' is ranked second (weighting = 0.189), 'Social Inclusion' (weighting = 0.171) in third place, 'Social Capital' (weighting = 0.159) fourth, 'Human Capital' fifth (weighting = 0.153), and finally, 'Transparency' (weighting = 0.135) sixth.

3.2.3. Environmental component

The ICC statistic (see Table 10) removed 3 raters (EXP1, EXP17, and EXP20), which left a total of 23 raters, whose ICC-average ($ICC = 0.859$) shows a score interpreted as 'excellent'. 'Crop diversification' is ranked in first place (weighting = 0.374), 'More organic production' second (weighting = 0.352), and 'CO2 reduction' (weighting = 0.274) in third place.

4. Discussion and final considerations

It is observed that the place of work or sector does not influence the raters' agreement; Instead, the groups formed within the ICC collected opinions from most countries and sectors. Therefore, the variables presented for evaluation are not judged or rejected by the territory or sector, but rather accepted as a representative sample of the raters' analysis.

The ranking based on the ICC-average showed that the experts ranked the Economic component in the first place, the Social component second, and the Environmental component third. However, based on the literature review, the social component formed by 6 variables/benefits (5 directly related and one that makes an assumption) seems to be where are the most valued benefits of PP-FF, and the main reason why the Public state should work. Gold et al. (2013) stated that the forgotten component in the SSCM was the social one, which certainly could not be addressed easily by the private sector, and thus the public sector should create policies to improve benefits in the BoP.

In contrast, the economic component with 5 variables/benefits is the main reason for which Family Farmers engage in these types of policies, because if they do not see economic benefits (especially 'income increase') the other ones seem less attractive. This result

Table 6
Priority weighting and consistency index for each respondent.

Priority weighting assigned by individual respondent																												
Job sector	Cp. Ag.	Inv.	Cp. Ag.	NGO	Cp. Ag.	Cp. Ag.	Cp. Ag.	Publ.	Publ.	NGO	Agr.	Cp. Ag.	Cp. Ag.	Publ.	Cp. Ag.	Cp. Ag.	Cp. Ag.	Cp. Ag.	Publ.	Cp. Ag.	Publ.	Cp. Ag.	Publ.	NGO	Cp. Ag.	Publ.	Agr.	
Country	Brazil					Chile					Colombia					Ecuador					El Salvador	Honduras	Nicaragua	Peru	Uruguay			
	EXP1	EXP2	EXP3	EXP4	EXP5	EXP6	EXP7	EXP8	EXP9	EXP10	EXP11	EXP12	EXP13	EXP14	EXP15	EXP16	EXP17	EXP18	EXP19	EXP20	EXP21	EXP22	EXP23	EXP24	EXP25	EXP26	EXP27	EXP28
Component categories	weighting																											
Economic	0,33	0,50	0,49	0,33	0,49	0,31	0,33	0,31	0,25	0,40	0,39	0,40	0,40	0,33	0,31	0,33	0,33	0,40	0,40	0,33	0,33	0,40	0,40	0,41	0,29	0,41	0,33	0,31
Social	0,33	0,25	0,31	0,33	0,31	0,49	0,33	0,49	0,59	0,40	0,44	0,40	0,40	0,33	0,20	0,33	0,33	0,40	0,20	0,33	0,33	0,40	0,40	0,26	0,57	0,33	0,33	0,49
Environmental	0,33	0,25	0,20	0,33	0,20	0,20	0,33	0,20	0,16	0,20	0,17	0,20	0,20	0,33	0,49	0,33	0,33	0,20	0,40	0,33	0,33	0,20	0,20	0,33	0,14	0,26	0,33	0,20
CR	0%	0%	5%	0%	5%	5%	0%	5%	5%	0%	2%	0%	0%	0%	5%	0%	0%	0%	0%	0%	0%	0%	0%	4%	13%	4%	0%	5%
Social	weighting																											
Transparency	0,08	0,09	0,09	0,12	0,10	0,10	0,14	0,13	0,09	0,17	0,28	0,15	0,18	0,12	0,12	0,18	0,17	0,25	0,08	0,17	0,17	0,15	0,13	0,12	0,06	0,14	0,17	0,10
Social Capital	0,18	0,16	0,16	0,11	0,18	0,12	0,17	0,18	0,16	0,16	0,24	0,15	0,13	0,16	0,12	0,15	0,17	0,14	0,14	0,17	0,19	0,12	0,15	0,12	0,27	0,20	0,17	0,11
Human Capital	0,18	0,14	0,13	0,15	0,18	0,11	0,17	0,20	0,22	0,13	0,11	0,16	0,15	0,18	0,12	0,18	0,17	0,14	0,26	0,17	0,15	0,18	0,12	0,09	0,14	0,09	0,17	0,13
Social Inclusion	0,18	0,17	0,16	0,16	0,18	0,17	0,16	0,23	0,18	0,13	0,14	0,19	0,16	0,16	0,17	0,23	0,17	0,21	0,10	0,17	0,17	0,13	0,17	0,15	0,18	0,17	0,17	0,22
Food Security	0,19	0,24	0,16	0,27	0,21	0,27	0,17	0,10	0,15	0,27	0,11	0,15	0,21	0,18	0,24	0,15	0,17	0,12	0,21	0,17	0,17	0,25	0,15	0,28	0,15	0,22	0,17	0,22
Living Condition	0,18	0,21	0,31	0,19	0,15	0,22	0,16	0,16	0,20	0,14	0,11	0,21	0,16	0,18	0,23	0,11	0,17	0,14	0,21	0,17	0,17	0,17	0,28	0,24	0,20	0,17	0,17	0,22
CR	0%	20%	5%	8%	1%	4%	2%	3%	3%	7%	2%	2%	2%	1%	5%	7%	0%	3%	2%	0%	1%	5%	10%	7%	4%	7%	0%	1%
Economic	weighting																											
Income	0,22	0,26	0,35	0,17	0,24	0,29	0,20	0,32	0,34	0,22	0,26	0,22	0,25	0,17	0,16	0,18	0,23	0,33	0,16	0,19	0,29	0,32	0,22	0,09	0,16	0,22	0,20	0,22
Increase																												
Price Support	0,19	0,28	0,23	0,22	0,17	0,11	0,20	0,31	0,20	0,26	0,28	0,25	0,18	0,19	0,32	0,25	0,13	0,20	0,12	0,20	0,22	0,25	0,15	0,22	0,19	0,28	0,22	0,22
Productivity increase	0,13	0,11	0,08	0,11	0,17	0,22	0,15	0,13	0,13	0,22	0,08	0,11	0,17	0,13	0,16	0,16	0,22	0,17	0,32	0,25	0,17	0,14	0,22	0,24	0,19	0,20	0,22	0,13
Market inclusion	0,29	0,26	0,23	0,26	0,23	0,19	0,18	0,13	0,16	0,19	0,26	0,25	0,22	0,25	0,25	0,29	0,26	0,21	0,15	0,18	0,19	0,16	0,25	0,22	0,25	0,17	0,22	0,22
Cost reduction	0,17	0,09	0,11	0,25	0,19	0,19	0,22	0,13	0,17	0,11	0,13	0,17	0,17	0,25	0,11	0,12	0,17	0,09	0,24	0,18	0,13	0,12	0,16	0,24	0,19	0,13	0,13	0,20
CR	2%	1%	3%	4%	5%	2%	2%	4%	6%	1%	1%	2%	7%	7%	3%	11%	4%	6%	5%	8%	4%	3%	5%	1%	3%	7%	1%	1%
Environmental	weighting																											
More organic production	0,33	0,26	0,33	0,40	0,41	0,40	0,26	0,33	0,33	0,31	0,40	0,41	0,49	0,33	0,31	0,26	0,33	0,33	0,30	0,33	0,20	0,31	0,49	0,20	0,27	0,49	0,41	0,40
CO2 reduction	0,33	0,41	0,14	0,20	0,33	0,20	0,33	0,41	0,26	0,20	0,20	0,33	0,20	0,41	0,20	0,41	0,33	0,26	0,16	0,33	0,40	0,20	0,20	0,49	0,13	0,31	0,26	0,20
Crop diversification	0,33	0,33	0,52	0,40	0,26	0,40	0,41	0,26	0,41	0,49	0,40	0,26	0,31	0,26	0,49	0,33	0,33	0,41	0,54	0,33	0,40	0,49	0,31	0,31	0,60	0,20	0,33	0,40
CR	0%	4%	5%	0%	4%	0%	4%	4%	4%	5%	0%	4%	5%	4%	5%	17%	0%	4%	1%	0%	0%	5%	5%	5%	14%	5%	4%	0%

*Cp. Ag: Cooperation Agencies; Inv: Investigation; NGO: Non-Governmental Organization; Publ: Public; Agr: Agricultural Organization.

Table 7
ICC statistics for group of raters/experts- Component Categories.

Component categories	Weighting	Ranking
	TOTAL	TOTAL
	EXP2,3,5,6,8,9,10,11,12,13,15,18,19,22,23,24,26,28	EXP2,3,5,6,8,9,10,11,12,13,15,18,19,22,23,24,26,28
Economic	0,388	1
Social	0,376	2
Environmental	0,236	3
N elements	18	18
ICC-average	0,937	0937
Significance	0%	0%

Table 8
ICC statistics for group of raters/experts- Economic component.

Economic	Weighting	Ranking
	TOTAL	TOTAL
	EXP1,2,3,4,5,6,7,8,9,10,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28	EXP1,2,3,4,5,6,7,8,9,10,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28
Income Increase	0,2339	1
Price Support	0,2154	2
Productivity increase	0,1692	4
Market inclusion	0,2151	3
Cost reduction	0,1644	5
N elements	27	27
ICC-average	0,886	0886
Significance	0%	0%

Table 9
ICC statistics for group of raters/experts- Social component.

Social	Weighting	Ranking
	TOTAL	TOTAL
	EXP1,3,4,5,6,7,8,9,10,11,12,13,14,15,16,18,19,21,22,23,24,25,26,28	EXP1,3,4,5,6,7,8,9,10,11,12,13,14,15,16,18,19,21,22,23,24,25,26,28
Transparency	0,135	6
Social Capital	0,159	4
Human Capital	0,153	5
Social Inclusion	0,171	3
Food Security	0,192	1
Living Condition	0,189	2
N elements	24	24
ICC-average	0,822	0822
Significance	0%	0%

Table 10
ICC statistics for group of raters/experts- Environmental component.

Environmental	Weighting	Ranking
	TOTAL	TOTAL
	EXP2,3,4,5,6,7,8,9,10,11,12,13,14,15,18,19,21,22,23,24,26,27,28	EXP2,3,4,5,6,7,8,9,10,11,12,13,14,15,18,19,21,22,23,24,26,27,28
More organic production	0,352	2
CO2 reduction	0,274	3
Crop diversification	0,374	1
N elements	23	23
ICC-average	0,859	0859
Significance	1%	1%

also showed that the economic component could show improvements in the short-term, rather than the social component which is seen as longer-term (Ahi and Searcy, 2013).

Anyway, focusing on the analysis of the 14 identified benefits, there is found that 8 benefits prioritized more significantly than the rest, considering both the ICC and the weights of AHP. Following

this order from highest to lowest: Income Increase (Economic), Price Support (Economic), Market Inclusion (Economic), Food Security (Social), Living Condition (Social), Social Inclusion (Social), Crop diversification (environmental), and More organic production (Environmental).

4.1. Economic component analysis

'Income increase' is the most important benefit of PP-FF in the economic component, which is also supported by many authors (Dos Santos et al., 2019; Gold et al., 2013; Sumberg and Sabates-Wheeler, 2011; Nehring et al., 2016; FAO, 2014). With 94% agreement in the experts' opinions, there is no doubt that this is the main benefit of the program whose effects are shown in the short-term.

'Price Support' is ranked second and supported by Nehring et al. (2016) and Zavale et al. (2015), although the variable does not have a high acceptance by the raters (56%) the power of the PP toward the market is expressed in this variable working also in the short-term. 'Market Inclusion' is ranked in third place, with 91% of acceptance. This benefit, supported by authors as Dos Santos et al. (2019); Mercado et al. (2016) and World Food Programme (2009), assumes that PP-FF allows small farmers to link with a more formal market channel, but at the end, their effect is in the medium-long term.

'Productivity increase' is in fourth place and is accepted as a benefit by almost half of the experts. It was stated by Nehring et al. (2016), who related the PP-FF with other programs to enhance productivity for better results in the SSCM. There is no doubt that to achieve this benefit in the short-term, it should be supported with technical assistance, but it is also an essential variable to achieve other benefits.

And finally, 'Cost reduction' is ranked fifth, supported by Morgan and Morley (2002) this variable behaved interestingly. In the first phase of the survey there was 94% of experts accepting the cost reduction through a more efficient transport system. But in general, all the PP programs that are looking to achieve sustainable development goals are considered expensive (Roman, 2016; Seuring and Müller, 2008), but this increase in the budget is very well supported by the other benefits generated. That is why the raters ranked this variable as the least important, suggesting that they perceive it as a long-term benefit.

4.2. Social component analysis

Benefits included in the social component have quite similar AHP coefficients. This may be due to the somewhat subjective and long-term character of all of them. Despite the six variables analyzed, we observe how 'food security' and 'living condition' have slightly minimum AHP differences. 'Food security' is ranked first, and is understood as the most important benefit of PP-FF which is also the most supported by authors (Bocchi et al., 2019; Nehring et al., 2016; Gold et al., 2013; Kleine and das Graças Brightwell, 2015; Morgan and Morley, 2002; Sumberg and Sabates-Wheeler, 2011; Preuss, 2009). 'Living condition' is ranked second, which is supported by Gold et al. (2013). It was accepted by 78% of the experts and clearly is a long-term benefit directly related to the economic component.

'Social Inclusion' is ranked in third place, highlighting the benefit by creating jobs (Dos Santos et al., 2019; Morgan, 2006; Sumberg and Sabates-Wheeler, 2011; and World Food Programme, 2009). This benefit is achievable in the short-term depending on the supply chain and the procurement budget because even the functioning of the program requires additional managerial resources (Roman, 2016; Mercado et al., 2016).

It is interesting to see how 'Social Capital' and 'Human Capital' are almost at the end of the ranking because they are sustained under the assumption that PP-FF programs bring technical assistance as part of the package. These less prioritized benefits may have a relationship with the context of Latin American countries. Cooperation, networking, and training is an asset which is difficult to encourage and depends on the cultural and contextual

characteristics of the population (Mercado et al., 2016).

And finally, 'Transparency' ranked sixth, although this benefit is supported by many authors (Kleine and das Graças Brightwell, 2015) (Morgan and Morley, 2002); and (Preuss, 2009). In their studies of e-procurement and communication with suppliers, Walker and Brammer (2012), state that there is a negative relationship between e-procurement practices and minority-owned small and local businesses. This minority could not access the information, or easily access the procurement process because it is online.

4.3. Environmental component analysis

'Crop diversification' is ranked first, this variable is the operationalization key to PP which is based on the demand of local products in their respective season. However, it is not a direct benefit of PP, since their achievement depends on technical assistance and some other assumptions, showing its long-term effects. But were ranked in the first place because they are important in the sustainability aspect of the family farming sector.

'More organic production' was ranked in second place, because there should be incentives for the public sector to buy organic products, which are expressed in the cases presented by (Morgan and Morley, 2002) and (Qadir et al., 2003) and of course also Technical Assistance. Although Altieri et al. (2012) said that family farmers are characterized by organic production, in which case family farmers could take greater care with their production because their children and family are going to ingest the output. And finally, 'CO2 reduction' whose benefits were demonstrated and calculated by (Bauer et al., 2010) and (Cerutti et al., 2016) and others with the methodologies called Footprint and Life Cycle Analysis (LCA) but is seen as least important in comparison with the other variables.

At the same time some other benefits directly related to Technical assistance could be introduced, amongst which the following could be highlighted 'More efficient water management' and 'Improvement of soil conservation'. These variables are essential for agricultural sustainability and are within the framework of sustainable procurement. Enhancing PP-FF with technical assistance could make this new form of procurement sustainable over time. At the same time, Qadir et al. (2003) said that 'water management' is an essential component of sustainable agriculture, and 'soil conservation' is directly related to efficient water management.

4.4. Final considerations

In general, PP-FF based on the literature of SSCM has uncountable opportunities to improve the BoP (Family farming producers) in Latin-American countries, due to its benefits shown in the social, economic and environmental components of sustainable development. This first approach to identify and prioritize the PP-FF's benefits with a structure of components and their variables attempted to present a benchmarking framework to compare and monitor PP-FF advances with objectivity, whilst avoiding positive bias.

All the variables of the social component are stated as long-term variables, although it is possible that some of them could show effects in the short or medium-term. The variables from the economic component were ranked with a short-term perspective and take into consideration the indirect variables putting them at the end. This is in contrast with the environmental component in which the perspective of the evaluation was taken, considering sustainability, thus valuing indirect variables with long-term results.

It is important to clarify that all these benefits are not presented

as a rule or pattern that all the programs implemented under this framework should take, but as a guideline to focus on when talking about them. Their potential contribution is influenced by the volume of expenditure in the public sector. Short-term, long-term, direct and indirect variables are also identified which helps to achieve a better understanding of the ranked benefits. The indirect variables are related to technical assistance, which should be an essential component of PP-FF policies, programs, and projects.

However, there is more work for future researchers, who are open to proposing indicators for each variable, looking for their measurement in each specific area. It is also possible to work in proposing a compound index to monitor and compare advances and evolution of PP-FF programs between geographical areas. In this sense, weights of components and variables provided by the AHP model could guide in the implementation of such an index. Finally, it would be interesting to broaden the spectrum of variables -social, environmental, and economic-, segregating them or adding new ones. Cultural, political and legal, or even nutritional aspects, could lead to the identification of new indicators and adjust the model presented here. In any case, the study provides a set of prioritized variables that could become the core guideline for the evaluation of PP-FF in Latin America.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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