

Organic Coffee Supply Chain Source Process Integration: A Peruvian Case

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Abstract – This research analyzes the Peruvian organic production coffee industry, the relationship between Supply Chain Management (SCM) and Supply Chain Integration (SCI) concerning the performance of the Cooperatives and the Coffee Associations in Junín Region of Peru. It also analyzes the current scenario of the Coffee Sector and the participation of the Supply Chain (SC) in the processing and distribution of Organic Coffee in Junín, Peru. A diagnosis was made to the certified organizations from the market. The diagnosis and the surveys indicated that they do not have a correct flow of information, shared goals and objectives, strategic decisions, and sourcing materials among the different parties demonstrating the lack of interrelationship among the members. The final objective of this research is to improve the competitiveness of these organizations through the increase in the performance of the SC, for which a model of supply chain integration is proposed.

Keywords - Supply Chain, Supply Chain Management, Supply Chain Integration, Supply Chain Performance, Organic Coffee, Food supply chain, Peru

1. Introduction

Over the years, Supply Chain Management (SCM) has been widely accepted within organizations, and with this, Supply Chain Integration (SCI) has become a vital issue for specialists and professionals ending up being analyzed from different angles [5]. SCM has been positioned as a driver of business performance for sustainable production due to the emergence of new SC strategies, tools, and techniques that work in tandem with increasing environmental and ethical concerns. The inclination of companies to manage

their processes in a much more integrated way comes from the beginning of SCM development [24]. However, there is still a need to explore the variables that define the relationship between SCI and operational performance [63].

SCI includes collaboration and interaction between organizations oriented to fulfill the needs of the clients and the companies [2], where adequate management of relations between these and other SC actors are the source of great competitive advantage within an organization [45]. Interaction systems between organizations act as facilitators for the integration and development of unique processes within the SC that will characterize their operations to differentiate them from their competitors, generating a great competitive advantage [52].

SCI has two major divisions: i) Internal Integration (II) of the company's processes and; ii) External Integration (EI) of the relationships between buyers and suppliers [64]. It should be noted that the success of a company depends on the external management of the relations between the customer, the company and the supplier, because this affect positively the internal contextual factors of organizations [12]. However, internal integration also has great importance because it's the base of the Integration of a complete SC, acting as the first step before integrating customers and suppliers [17]. An important driver between the Internal Integration and External Integration is the Integration of Information because throughout a whole SC it is necessary to share quality information, to provide it to all the parties at the right time [35].

An integrated SC will be efficient, and at the same time create sustainable competitive advantages. [36] In order to be implemented it must be adapted

and designed always having as main objective to generate value for the customer in each segment because, the success of an organization depends on the satisfaction perceived by the customer [30], [17] and other SCM specialists have shown in their publications the impact of SCI on organizations' performance and capabilities.

For this study, we will approach the organic coffee business, being that this is one of the most important sectors of agriculture in Perú. Product flows grew 23.93% from 2015 to 2016. Companies involved in this business have a potential capacity to grow, and this study fills the gap in this aspect providing tools to improve the interaction between the parts of the SC.

2. Background

In recent years, the concern and focus on the SCM study field has increased significantly. There has also been an increase in the amount of research and literature reviews related to this subject [37]. A systematic literature review method [39] will be used to structure and synthesize the existing knowledge about SCM, which is important to support the research findings to ensure its validity and reliability [37].

2.1 Supply Chain Management

It is necessary to define SCM because without an accurate and clear understanding of the logistics strategy and SC, investing in any practice to improve them will have no positive effects [38]. The chief purpose of the SCM is to provide support to suppliers, producers, customers, and personnel responsible for transportation and flow of information; this is achieved through support in the management to reach an interconnected business network [51]. SCM also encourages information sharing between all levels of an organization and promotes the optimization of processes focused on the overall objective of a company [40]. Revised authors argue that the implementation of SCM in addition to being reflected in improvements in operational and financial performance, also have a direct impact on customer satisfaction [12] and efficiency. [53] It is also reflected in suppliers and buyers in company strategies. This process will create advantages and boost the competitiveness of a company because it will create inherent behaviors to the organization [47].

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It is also necessary to note the importance of framing the organizational strategy with the need for integration. Although the benefits of integrating both internally and externally have been widely tested, companies still have problems in achieving these benefits because there is a common inconsistency in the expected results [48].

Currently, consumers are concerned about knowing where their products come from and how they are made. For this reason, a mistake in agribusiness products SC can be impacted causing interruptions in the firm. As an example, product contamination along the SC can impact not only the SC but the reputation of the organization. Another example is the waste produced when quality is not acceptable, and high rejections occur causing economic losses due to the waste of resources affecting the sustainability of an entire production line [32].

Experts point out that the main cause of these interruptions is the poor performance of SCM due to low interaction, poor coordination among the parties involved, and the member's performance [25]. Because of this, coordination within the SC is considered a great solution method [26].

2.2 Processes Standard of Council of Supply Chain Management Professionals (CSCMP)

There are many methodologies used for establishing efficient and effective quality system within companies. At the top of the flows of methodologies or strategies for quality management are the three main ones: Lean Manufacturing, Six Sigma and Total Quality Management [4].

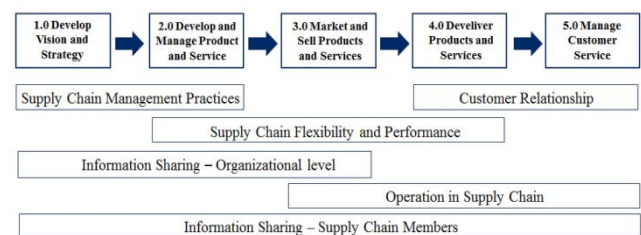


Figure 1. Process of Supply Chain Management, Source: Adapted from [13]

2.3 Supply Chain Integration (SCI)

Often, developing innovative proposals for SCI involves continually varying the degree of interrelation and coordination, making this rarely an isolated process [56]. This demonstrates the strength of the links in SC processes where Information Integration, Operative Integration, and Relationship Management act as facilitating entities [35]. Integration has two perspectives: internal and external which is focused on the business process that contributes to improving SCM results and guarantees the success of a company [27]. The effects of strategic planning focused on SC affects the different organization levels positively [43].

SCI is considered a design phenomenon and as such its results depend on a mixture of elements [70]. For successful integration, it is necessary to restructure activities involved in connecting and simplifying processes [6], diffusion of technical knowledge, alignment of objectives, efficient and effective

coordination between members [69] and synchronized flow [67]. Collaboration is also one important factor in SCI and shows a positive relationship with business performance and logistics services competitiveness [66].

This will help companies to allocate, align and use internal and external resources. Thus, indicators such as response time and operating costs will improve its performance. [9] This is expected to generate an inter-organizational trust that will be beneficial for two reasons: i) Will discourage any opportunistic behavior of the parties because participants will value the long-term benefits more than the short-term ones [55] and ii) Will replace any hierarchical behavior to achieve organizational goals that benefit the entire chain. [9]. It is important to mention that a complete SCI is not necessary in all cases to obtain performance benefits [68] but this is a factor that needs to be analyzed in each organization.

a) External Integration

External Integration (EI) includes: i) Supplier Integration, which is used to improve SC performance between an organization and its supplier through a correct information and product flow; ii) Distribution Integration, which refers to the detailed management of resources and information through the outbound logistics network with the aim of reducing logistics and distribution costs; and iii) Customer Integration, which refers to customer and companies relationships to achieve value on both sides [24]. For this research, the proposed model will be the best adaptation of an integration focused on customers and suppliers.

b) Internal Integration

Internal Integration (II) seeks to improve the relationship within a company and between its strategic and operational processes to impact quality, service level, and operational costs [24] and is often seen as a consequence of a successful EI, [64]. Internal Integration approach seems to have a greater impact when it is executed in companies that have highly developed production and transformation processes [60]. For this reason, the research focuses mainly on EI considering II as basic support integrating customers (information) and suppliers [17].

2.4 Success in SCI

The organizations that realized a supply chain integration have provide more values in cost area, high quality, better cycle time [57], and demonstrated that it possible to achieve a good flow of goods and information, create competitive advantage, increase the profit margin by more competitive prices [58], improve operational performance [20], [12] and generate greater customer satisfaction. Finally, all these results mentioned improve financial performance in the organizations [3].

2.5 Supply Chain Integration Performance

SCI can be defined as the strategic resource that generates sustainable competitive advantages in the creation of value which is reflected in the performance of a company [4]. The advantages of a focus on improving SC efficiency and performance through SCI are defined by the capacity of a system to coordinate its activities and resources to achieve a competitive advantage, improve service levels and reduce operational costs [1].

[35] in one of his publications divides the effects of SCI into three phases: Financial performance, Customer oriented performance, and Operational performance, which includes improvements in competitive capabilities where it considers four outcomes, which are efficiency in delivery, production costs, quality and flexibility of production, and is considered multidimensional together with SCI[61].

Literature confirms that supplier development is one of the factors that have a positive impact on SC performance, as a customer focus [44] and in the information flow [11]. Companies can improve their performance through facilitators of integration, despite the barriers that may exist; thus, organizations may be able to maintain a certain level of internal focus, a degree of incongruity, individualism, while still exploiting and understanding interdependencies [50].

3. Proposed Integration Model for the Organic Supply Chain of Coffee in Junín-Peru

Based on an analysis performed at the Junín area three research questions are addressed for the SCI Model and its impact on the organizations, Cooperatives or Associations in the area under study. These questions pretend to respond as to how the SCI will have a positive or negative impact on the operational results from coffee supply chain.

3.1 Research Question

RQ1: How will the SC performance impact the Organic coffee production if the SC Model is adopted and focused on integration?

RQ2: How does the performance of the involved SC parties positively impact the operational results of the organic coffee crop in the Junín region?

RQ3: What are the factors that negatively impact the performance of the SC and what are the significances on the SC?

3.2 Conceptual Framework

In this investigation, several research models were reviewed and based on these; a Conceptual Model was adapted (See Fig. 2) which shows all the organized information that will be handled throughout this research. Initially, four levels were considered: i) Background; ii) Priorities; iii) SC Capabilities, and iv) Outcomes.

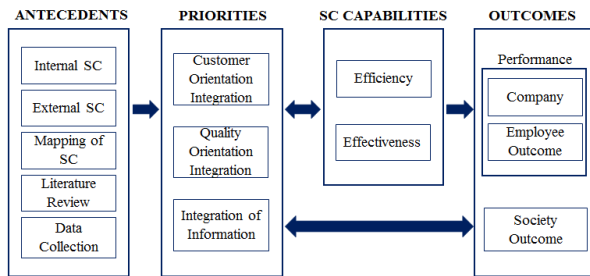


Figure 2. Detailed Conceptual Framework, Source: Based on [9]

Detailed Conceptual Framework

- Antecedents:** As a preliminary step to the proposal, a background and a series of tools and information were needed; without it, an examination cannot be assembled. It was necessary to understand the current situation of the Organic Coffee SC, internally and externally to map the operation process. For this, a systematic process reference of literature review and theories proposed by Hoffman were also used.
- Priorities:** Based on the data collected, a diagnosis of the operation was made, recognizing the relevant points most need for focus and those that would have the best cost-benefit ratio when proposing integration initiatives.
- SC Capabilities:** These indicators are identified within the SC and will be used in the future to measure the influence of the initiatives proposed by the Integration Model. The effectiveness indicator will reflect a positive impact as long as companies orient their administrative and operational decisions to improve SCM [43]. On the other hand, the effectiveness indicator is strongly related to company sustainability and its ability to use resources [5].
- Outcomes:** Conceptual Framework results will be the alternatives in which the operation initiatives proposed throughout the study should be measured. The outputs will be three: i) Organizational performance of the company; ii) Performance of employees in organizations, and iii) Social Impact. The objective is to make SC participants aware of the global solutions, together, and to achieve excellence distribution as the functions and sub-

functions of the SC must be specifically linked to outputs or expected performance [22].

3.3 Methodology

This research uses a systematic review of the literature and an empirical study as the primary methodology. The objective of the first one is to obtain appropriate and transparent information regarding the subject under study, and the second one has the purpose of describing the current situation of the SC in the production of Organic Coffee in the Region of Junin in Peru to present an Integration Model appropriate to the reality.

Relevant Literature Search

The collection of literature is a systematic gathering of information to perform the analysis, and a reflective interpretation of the findings specifically focused on answering the research questions (See Fig. 3). The intention is to collect information relevant to the SC.



Figure 3. Literature Review Steps, Source: Based on [28]

- Key words:** The three research questions revolve around the following keywords that guided the collection of literature for this study: Integration, SC, Food Supply, SC Chain Performance and Agriculture SC.
- Locating of research articles:** To compile the research literature, the search was carried out with the insertion of keywords to the digital academic databases; they easily allow to filter information according to the year of publication, interest, and source. The databases consulted were Science Direct, EBSCO host, Emerald Insight, ProQuest, etc. The journals consulted were top journals specialized in SCM and food SC. It is essential to indicate that literature of the last five years was considered in 95% of the cases.
- Selection and evaluation of research articles:** An examination of articles were done according to the area of impact and source; the primary sources were articles from the first quartile of the last six years, in some cases, literature from previous years were found to demonstrate its impact and the relevant importance of in SCM logistics and research [62].
- Synthesis of structural literature review:** The articles that proved to contribute to the investigation, passing the filters of importance and validity, were reviewed and the information was extracted and summarized. The information was then organized in a way that it could be easily accessible.

Table 1, shows a summary of the topics, contributions, and names of some of the authors of the literature reviewed.

| KEY TERMS | EXAMPLE OF DEFINITIONS | SOURCE |
|---------------------------|--|--------------------------|
| Supply Chain Management | Customer focus, financial performance | Chin and Others; 2010 |
| | SC improve any initiative outcome | Mellat - Parast; 2014 |
| | Create internal process that drive the firm to future integrations | Prajogo; 2016 |
| Supply Chain Integration | SC involve vary the degree of interrelation | Storer and Others; 2014 |
| | Long term goals. | Stank; 2011 |
| Agricultural Supply Chain | Line up goals, thus improve operational coast and response time | Chen and Daugherty; 2009 |
| | Food SC, adapt strategy and reconfigure sources | Beske; 2016 |
| | Improve coordination efficiency and traceability of flow | Garcia - Cáceres; 2014 |
| | Waste in food supply, poor performance, lack of coordination | Gustavsson y Otros; 2011 |

Table 1. Relevant Literature
Source: Adapted from [7]

3.4 Data Collection

The exploratory analysis began with a field visit to map the area, evaluate actual performance, and establish relationships with those who were going to be interviewed. The questionnaire was created based on the Likert Scale and validated through a reliability analysis to find the Cronbach's alpha (See Table 2) and validated for reliability (See Table 3).

Nineteen out of thirty-five Cooperatives responded to the written questioner, and ten responded to oral interviews done by the researchers. The oral interviews were performed in the coffee fields in the middle of the mountains. The interviews helped to understand how the organic coffee organizations were performing. The target respondents were those in charge of the day-to-day operations. Respondents were asked to provide information based on their experiences regarding the current SC, performance, practices, and shortcomings. The data collection took eight weeks during the harvest season.

| CRONBACH'S ALPHA | LEVEL |
|------------------------------|--------------|
| Greater than 0.9 | Great |
| Greater than 0.8 | Good |
| Greater than or equal to 0.7 | Acceptable |
| Less than 0.7 | Questionable |

Table 2. Cronbach's Alpha Rating, Source: **Error!**
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| CRONBACH'S ALPHA | RESULTS |
|-----------------------------------|---------|
| Supply Chain | 0.715 |
| Supply Chain Management Practices | 0.748 |
| SC flexibility and performance | 0.834 |
| Customer Relationship | 0.730 |
| Internal Information Sharing | 0.738 |
| External Information Sharing | 0.740 |

Table 3. Results of Cronbach's Analysis, Source: **Error!**
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3.5 Metrics

Metrics help to recognize the underlying reality of the SC by measuring the operation performance. The measurements are: i) Tactical Metrics, ii) Strategic Metrics, and iii) Operational Metrics. The metrics also have different objectives dependent what is measured, operational excellence and or maximum satisfaction. However, it should be noted that in establishing the metrics, one must consider having the necessary information to measure each of them. Metrics not only evaluate the proper development and efficiency of organization's internal processes but also consider the impact on end-users and their effectiveness[8].

As mentioned above, the objectives of implementing an integrated SC approach are meant to impact the performance of the chain. Then, the variables were measured, considering what [49] described in his article "the impact of risk management on the frequency of SC disruptions" is the size of the organization, role within of the SC, and sources of disturbance. The performance of the SC will be measured about its capacity to meet the highest percentage of perfect orders (Complete, on time and without errors) and available information. (See Table 4).

| Metric | Calculation | Junin mean | Best Practices Junin |
|-------------------------------------|---|------------|----------------------|
| Total Order Cycle Time | $= \frac{Nr. orders shipped}{Time order received - Time order placed}$ | 67 hours | 63 hours |
| Perfect Order Index | $= \frac{Perfect orders}{Total orders}$ | 87.18% | >=94% |
| On time Shipments | $= \frac{Nr. of orders shipped on time}{Total orders shipped}$ | 84.61% | >=90% |
| Shipped Complete per customer order | $= \frac{Nr. of orders shipped with all lines and units}{Total orders shipped}$ | 81.30% | >=90% |

Table 4. Metrics - Fulfillment Performance
Source: Own Study based on exploratory WERC report of metrics (2014)

The total order cycle time is measured from the production of organic coffee until it is delivered to the cooperative. A comparison was done with best practices previously captured in the region of Junín. The following matrices were selected: Perfect Order Index, On Time Shipments, and Shipment Completed per Customer order

(See Table 4). It can be noticed that the current measurements are below the best practices previously captured in Junín.

4. Integrating the Supply Chain of Organic Coffee in Junín

This section describes the current situation in Peru regarding the production and export of coffee, the mapping of the SC, the main findings of the problem, an adapted model of integration, and the appreciation of the current and desirable scenario.

4.1 Current Scenario

Peru ranks among the top 10 global locations in coffee production since 2014. The export volumes of Peruvian coffee have always been significant. It shows a 27.51% increase in demand from 2015 to 2016. However, it should be noted that in the years 2012, 2013, and 2014, production was significantly affected by the presence of "Yellow Rust". Coffee is the main agricultural export product compared to cotton, sugar, and other products. Coffee represents more than 80% of the total exported Traditional Agricultural Products.

In 2015, Peru was ratified as the second largest producer among 50 countries of exporter of organic coffee in the world, with the list headed by Germany and USA. However, there is a migration of organic coffee producers to products such as mandarins, bananas, and others; it was caused by the fall in the "Premium" international price and the difficult to obtain organic fertilizers.

On the other hand, the Agriculture Ministry of Peru, report in 2016 that the internal consumption of coffee is approximately 650 grams per year, which is below the average of other producing countries of the same product as is the case of Brazil that consumes about 4 kg of coffee on average per person per year. These indexes explain why the export of organic coffee marks 95% while domestic consumption in Peru is a minimum of 5%.

During 2015, the National Organic Production took place in 22 departments of Peru with a total area of 607,872.39 hectares where the departments of Junin and San Martin have the highest organic certified areas with 38,298 and 33,945 hectares respectively. Peru is divided into three productive coffee clusters: i) North: Amazonas, Cajamarca, and Chachapoyas, ii) Junin, and iii) Cusco. Junin has about 5.81% of coffee producers focused on organic production and is considered the most important region for national coffee production volumes with more than 17% regarding weight. It should be noted that Junin is the region with the highest number of hectares devoted to the cultivation of Organic Coffee.

4.2 Mapping of the Organic Coffee Supply Chain in Junín

The SC map model that describes the organic coffee routes of the Junín Region, specifically in the areas of Chanchamayo and Satipo has three levels in which this research is focused; these are Tier 1, Suppliers, Tier 2, Initial Suppliers, and Focal Firms (See Fig. 4). These levels correspond to the processes that are located from the supply to the placement of the final product in the firm or coffee cooperatives. The structure of the SC begins with the process of purchasing raw materials, additional supplies, and supplies, and then continues with sowing and harvesting of the coffee by farmers in the area and ends with the collection by cooperatives that are responsible for processing the grains for export. These are exported in the form of "gold" grains, dehydrated and completely peeled.

Tier 1 – Suppliers: The farmers are located in this tier. They are the producing partners work in the field to produce a better coffee plantation and exchange or acquired inputs. They are responsible for the processes of cultivation, harvesting, and postharvest alone in groups. The product is always transported in trucks from the field to the place of collection. The time varies depending on the distance; transport can vary from 2 to 14 hours. It is also important to mention that the partners, not in all cases, provide their organization with the total or partial production. However, this depends on the price they are willing to pay for it and where the companies have the most significant advantage.

Tier 2 to - Initial Suppliers: Tier 2 refers to suppliers who provide their inputs, materials or services. Within this tier, there are those who provide organic fertilizers (island guano), equipment and machinery, tools, seeds and seedlings, and containers. This tier also includes the financial institutions, certification and accreditation bodies, technical assistance staff, processing plants, grinding and roasting services, laboratories, legal advisers and agencies responsible for the promotion of coffee, where each one plays a significant role. It should be noted that the exporter is a supplier, and is part of the SC since in 90% of cases they are responsible for the threshing and polishing of coffee. On the other hand, it is important to recognize that the suppliers of greater relevance in this tier are those who provide the island guano and the personnel in charge of training because they are responsible for the quality production.

Focal Firms: This tier includes, Cooperatives and Associations coffee farms that are organic certified. In 10% of the cases, these organizations provide the seeds and fertilizers to the producing partners. In all cases they comply with the training provided to the farmers by their technical staff on issues related to good agricultural practices, management of the coffee plantation, and organic certifications. However, it should be noted that these organizations do not have the adequate number of staff for training which effects the quality of the

marketable and exportable production of the organization. On the other hand, the cooperatives or associations do not collect coffee, instead, the partners transfer it to the collection centers where they are received by personnel trained in handling coffee; In some cases, pollution problems arise during the transfer from the field to the collection centers and during the handling by the personnel in collection center.

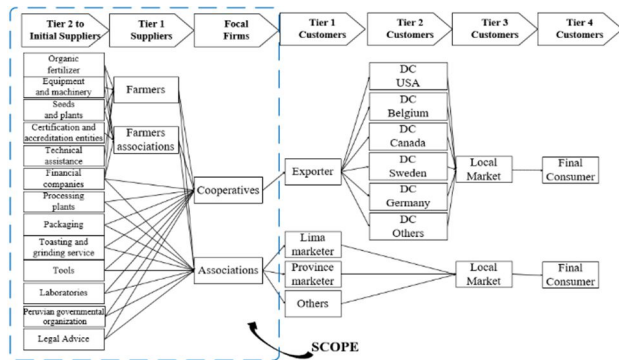


Figure 4. Organic Coffee Supply Chain Mapping in Junín

4.3 Findings

During discussions with farmers, it was clear they preferred purely organic production, but they are concerned about the decline in organic coffee prices globally. The concern is because the cost of producing organic coffee is higher than the cost of producing conventional coffee in the Arabian condition; however, the sale price per quintal (See Table 4), offered today worldwide is very close to the price of conventional coffee. These differences have caused some of the cooperative partners to migrate to the production of bananas, mandarins, and others, or choose to sell their production to companies that pay more than the previous ones. However, they do not provide a holistic quality assurance system without which the organic business will eventually disappear.

| Variety of Coffee | Productivity (QQ/ha) | Sale Price (\$/QQ) | Prod. Cost (\$/QQ) | Fair Trade (\$/QQ) | Profit (\$/QQ) |
|---------------------|----------------------|--------------------|--------------------|--------------------|----------------|
| Conventional Coffee | 14.50 | 76.67 | 36.00 | 0.00 | 40.67 |
| Organic Coffee | 10.00 | 94.79 | 45.00 | 20.00 | 49.79 |

Table 4. Organic Coffee vs. Conventional Coffee Average amounts in Junín-Peru, Source: Own Study

It is important to mention that the prices indicated vary daily depending on the stock exchange and the factors shown in the above table. It is observed that within an organization the offered average of one partner per hectare is 10 QQ / hectare of conventional coffee while organic coffee is offered about 14.5% less than that.

4.4 Problems affecting Organic Coffee Quality

Currently, the production of organic coffee is very attractive to the producing partners who must prepare their production three years earlier if they wish to be organically certified. However, there are problems in the production of organic coffee that were identified during the field visits and meeting with the Associations and Cooperatives of the Junín region. After having evaluated the current situation, a diagnosis was developed with the information collected where some of the mentioned problems were recognized. Visits and interviews were conducted in 75% of the Pichanaki area, 15% in the La Merced area and 10% in Satipo. All these lands have suitable and ideal soil for the production of organic coffee, but Pichanaki is the area with the greatest number of hectares dedicated to this crop throughout the region. Some of the identified factors that caused the decrease in the quality and price of organic coffee are humidity, yield, cup quality, and product contamination among others.

According to the Sustainable Commodity Assistance Network (SCAN) and the results of interviews with producers and administrative staff, the main physical characteristics evaluated in the production of coffee are sizes, humidity, color, odor, and defects. However, as these standards are not met, these variables become factors that negatively impact the price of organic coffee because its quality diminishes.

During cultivation, it is important to perform fertilization without chemical fertilizers for organic production, pruning, sprout selection, pest management and shade management in a timely manner; During the harvest and post-harvest, the processes of pulping, washing, fermentation, drying and storage must be carefully carried out, according to SCAN, to avoid this type of problem. However, lack of knowledge in some of the partners concerning proper handling, and transfers are the causes of these negative factors.

One of the main problems is product contamination. This occurs during the transfer from the field to the collection center by pouring liquids into the sacks which contaminates via ambiance odors as well as contamination during the reception at the collection centers. Defects in the production of coffee are also observed in the quality of its grains. Tasters and laboratories perform these analyses to find what the product needs. Some of the defects observed are black grain, fermented grain, and immature grain, among others.

In 90% of cases, these problems are due to the poor performance of the human factor. However, the origin of these problems can be linked back to deficiencies in the procedures taken during SC. Some of the problems and negative factors are being addressed both by producers and by organizations, according to the results of the analysis carried out. The results of the surveys conducted

showed that the most important topics were Information Flow, Training for Farmers and Customer Focus.

a) Information Flow

It was found that 42.11% do not have compatible communication and information sharing among the farmers. For this reason, it is difficult for both the trainers and the administrative members of the organizations to reach them and share required information. However, the scarce management of information technologies is a limitation for the development of adequate communication and information systems. Concerning the technology, they use cell phones, emails, Excel program, and some accounting software. In addition to the training provided in the field, some of the organizations are developing education programs for their partners, thus showing social concern and contributing to their personal development as well as creating a better understanding the flow of information in its production chain.

b) Customer focus

During the interview, 68.42% of respondents conveyed that in their organizations there is no method of evaluating customer satisfaction, indicating that within the SC there is no customer focus. However, it is important to emphasize that although there is no measurement and evaluation of customer satisfaction, organizations do care about the customer opinion, but only negative feedback are received. The lack of an adequate format also supports the incorrect flow of information from the customer and makes it impossible to use it in the elaboration of continuous improvement plans.

c) Field Trainings

Trainers are one of the main components of the Organic Coffee SC, and the quality of their services will depend to a large extent on the quality of production. At this point, 10.5% of the farmers interviewed, indicated that they are dissatisfied with the number of training received and the number of trainers that are available at the Associations or Cooperatives to which they belong. It should be noted that during the study, it was identified that among 400 producers, only three received training last year. The trainers indicated that due to the lower number of trainers they cannot afford to carry out the training to all cooperatives. Due to the lack of it, some production errors are not fixed, consequently diminishing the quality of the final product.

Another factor that affects the training is the remoteness of some producers whose plantations are located up to 14 hours away. Usually, an invitation is sent to these remote producers to tag along with other trainers, but due to the distance, they cannot participate.

4.5 Proposed Model

a) Common problems that make the integration a challenge

As a result of the supply chain diagnosis, it is necessary to mention that focusing the integration on a horizontal level won't be possible because of the nature of this kind of integration. Thus, the coffee supply chain solution would be focused on developing own capacities to compete on large market demands; however, as this is not the case for the region of Junín, the efforts must be focused on strengthening the alliances for each company to feel secure and thus reach for joint development of the market over-focus on competing with each other [19].

b) A Supply Chain Model proposed

Based on the revised theory and considering the current scenario of Junín Organic Coffee SC, a supply chain model of integration was proposed (See Fig. 5) this approach is a simple way to integrate depending on their own needs and characteristics. It was kept as simple as possible since it has been shown that high levels of complexity affect performance and generate negative results. Hence reducing complexity will improve the performance of operating costs and improve supplier response; Besides, it should be noted that the complexity of an SC can be measured regarding the number of claims filed with a supplier or customer [22].

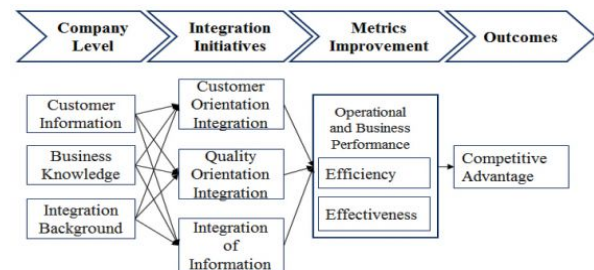


Figure 5. A Supply Chain model proposed for the integrated organic coffee SC, Source: Based on [18], [42]

Based on the revised theory and considering the current scenario of Junín Organic Coffee, several SC models were analyzed. Due to the natural constraints in the amazon jungle of Peru, the proposed model in Figure 5 was selected as the one that fits better with the current processes.

It has been demonstrated that planning and full understanding of the SC within an organization is an important catalyst for investments in integration and technology in order to produce a better operational performance. Information-focused integration will improve company performance [54]. To establish the standards of management and storage of information, the company will be more readily available at the moment of the decision-making process.

It is important to note that when working with information technologies, the technology involved in the SC cannot be sought only when there is an opportunity for innovation, new, or advanced technological solutions. Managers must acquire technology that fits into particular SC strategies and tactics that help foster operational knowledge necessary for employees to use this technology more efficiently [1].

[18] recognize the existence of three optimal outputs, as it was seen earlier. Companies should always seek efficiency, effectiveness, and differentiation from competitors. These can affect each other, meaning improving one will affect the performance of the other ones. However, any modeling or integration proposal should seek to improve both effectiveness and efficiency. This will create innovative managers who will succeed in creating solutions to overcome these concessions.

c) Integration of training

Regarding the quality of the people in charge of leading the integration process, it is imperative to mention that organizations only change when the people within the organization change. It is important to mention that the person in charge must be capable of interpreting the processes of the company to establish goals, information processes, perceive the environment, and actively solve the problems that arise when the company implements integration initiatives [41].

The objective is always to make the producers aware that they should work together to reach global standards in order to achieve optimal distribution networks [29]. However, the cost of implementing organic initiatives, sustainable, and environmental processes is different in each level of the SC, i.e., between the producer and the marketers there must be a joint effort [59], [13] to avoid falling into the underestimation of quality [21]. This will be supported by continuous feedback from the people involved to understand how people interpret or build corresponding quality models [41].

An improved process will be implemented to carry out the necessary training to meet the quality requirements demanded by organic and fair-trade certifications. This will consider the best practices in information flow and quality control. The indicators to measure the performance of this initiative will be the number of trained farmers.

d) Customer focused integration

Products placed on hold negatively affect the quality of them; many times, it is done to have better bargaining power by speculating the price. For this reason, it is necessary to map the average and expected quality demanded by the customer, which makes it possible to model the flow according to the expected quality. This will only be achieved if the customer quality requirement information passes through the chain until it reaches the

producers [29] this improved flow of information will assure the health of the SC [45].

An administrative process will be implemented, which will be in charge of an existing staff that will attend to customer inquiries regarding complaints and follow-up consultation. To ensure customer satisfaction and good traceability of orders, the indicator that will allow monitoring of the calls if the claims are not resolved in the first call.

e) Comparison: Actual vs. Expected Results

The proposed SC integration model was validated with the Cooperative managers, and they agreed that the new model would improve the productivity standard and efficiencies in the Junín area. The desirable output was estimated (See Table 5) based on the revised literature, and a proposal from the Councils of Supply Chain Management Professionals (CSCMP). In the case of the quantity orders delivered correctly, it has been verified in the literature that good order management oriented to the integration of SC would achieve a fulfillment of up to 99% of correctly delivered orders [31] training costs will reduce transportation costs, increase delivery frequencies, reduce cycle order times [33], and improve orders availability in the system.

| | Inadequate | Poor | Common | Good | Best Practice |
|--------------------------------------|------------|------|--------|------|---------------|
| Customer oriented integration | | | | | |
| Materials and services procurement | | | ◆ | → | ★ |
| Strategic orientation | | | | | |
| Quality oriented integration | | | | | |
| Manage customer service | | | | ◆ | → |
| Measurement and quality control | | | | | |
| Integration of information | | | | | |
| Measurement of customer satisfaction | | | | ◆ | → |
| Information storage management | | | | | |

Table 5. Expected outcomes from the study, Source: Based on [15]

5. Research Objectives

The main objective of this study was to provide a first comprehensive and quantitative review of the organic coffee supply chain in the Junín region. At the same time, an attempt was made to construct a framework for the current situation of the agroindustry.

Then, based on this and the proposals tested by experts on issues related to SCI, it was a specific model was proposed on modeling the relationships of all members within an SC with a focus on the increase in the performance and bargaining power of the coffee companies dedicated to organic production in the province of Junín.

6. Conclusions

In this research, a conceptual model has been presented with the objective of analyzing the relationship between all flows, relations, and SCI with the performance of the Integrated SC. The model proposed is of interest on both at the academic and at the corporate level, since it allows a focused view of those weak points that need to be reinforced in order to improve the performance within the SC. The SCI is a route to obtain the strategies to improve the use of resources with a company. The strengths of the proposed model are the following:

The model achieves a specific approach, easy assimilation, and rapid execution, as part of the specific needs of the area, considering the characteristics of the company, regarding capacities and limitations.

The proposal has essential roots in the revised theory of organic food, sustainable production, with a focus on environmental conservation; this enhances the impact of the model since the nature of the organic coffee business demands strong controls on the quality and cultivation methodologies.

Based on the literature review and the expert input, it is reaffirmed that SCI has a positive impact on the performance. The implementation of supplier management activities in an integrated way contributes to the improvement of its results regarding the success of a company [27] and the improvement in performance [65]. On the other hand, it validated that the exchange of information between the partners of an SC is necessary, but not enough if it is desired to generate high performance at the organizational level [8]. In the same way, the need for feedback and exchange of market information, agility in processes, and an adequate level of communication are confirmed if a Customer Integration [8] is required, and it is recognized that an SC will be efficient. In turn, this will create sustainable competitive advantages [36] if it is aimed at generating value for the customer in each segment since the success of an organization depends on the satisfaction perceived by it [30].

The authors reinforce the idea that there is a need to analyze the processes of an SC to understand its internal and external relations with each of its members and accept the positive effects of the SCI in the operational performance of a company, which validates our proposed model.

6.1 Future Research

As a result of this study, some areas were identified that need further attention. Due to the scope of this research, some resource constraints were recognized such as time and information. Thus, future research is

needed on the topic of supply chain integration focused on the food sector. At the same time, different methodological approaches would be used for others products, to present adequate integration models.

The current supply chain integration study showed great opportunities for extending this kind of approach on integration to other industries not only in the coffee supply chain industry. Another possible researches applied could be relations between SCI and quality and/or information on the supply chain. It is imperative to extend this study to other industries to obtain positive impacts and provide more understanding of supply. This research can be seen as the first step in future investigations.

As a side result of this research, several theories and new tendencies were encountered that may have a strong impact on the efficiency and improvement of coffee supply chain and other similar products. It is recommended to incorporate supply chain technology or Internet of Things (IoT) for traceability and control of material movement. In other words, how integrative IT within supply chain networks leads to higher level of SCI [34]. This study provides the foundation for supply chain integration in the food industry within emerging countries.

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