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Analysing learning in producer capabilities of San Francisco Produce/Peninsula Organics

[DOCUMENT SUBTITLE]

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[Abstract]

This paper examines how smallholder farmers in San Francisco Produce/Peninsula Organics (SFP/PO) value chain learn the skills for producer capabilities, concretely, the skills for producing organic crops. Drawing on my PhD project *"Global value chains and social learning. Developing producer capabilities in smallholder farmers"*, this paper discusses the research question of *how do smallholder farmers in SFP/PO learn skills for developing producer capabilities to become part of the Value Chain?* To analyse the learning of Producer Capabilities (PC) in smallholder farmers, I use the *Knowing in Action framework*, particularly, the analytical elements of the typology considering organisational dynamics, types of knowledge, and nature of social interaction. The typology sheds light on the context, process, social interaction, material practices, ambiguity and disagreement, idiosyncratic, and natural elements of learning to enable a learning environment for smallholder farmers to learn the organic farming principles and apply them into their farming operation.

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Introduction

I examine how smallholder farmers in San Francisco Produce/Peninsula Organics (SFP/PO) learn the skills for production capabilities, concretely, the skills for producing organic crops. González (2012), argues that in the Mexican context, the reasons for the low growth in agricultural production activities in smallholder farmers is the low level of technical skills for production, in addition to limited access to markets.

I argue that in SFP/PO, actors learn production capabilities through social learning, characterised by social interactions with the support of the experiences of farmers in organic agriculture, and the experiential knowledge of smallholder farmers. The analysis points towards CoP having the potential to serve as loci for social learning and innovation (Wenger and Trayner-Wenger 2015)(Wenger-Trayner, Fenton-O'Creevy, Hutchinson, Kubiak, & Wenger-Trayner, 2015). Social learning is a constructive exchange of experiences within a social structure, for which that experience is meaningful. The social structure is the context of people, their relationships and the interactions that occur between them. Through this social structure, knowledge is constructed rather than transferred (Wenger 2010). Social learning ultimately enables the development of production skills.

In this paper, I address the research question *how do smallholder farmers in SFP/PO learn skills for production capabilities to become part of the Global Value Chain?* It aims to understand the development of production capabilities of participating farmers in Global Value Chains. To analyse the learning of Production Capabilities (TC) in smallholder farmers, I use the *Knowing in Action* framework by Amin & Roberts (2008). I examine and explain the social elements of learning in smallholder farmers participating in Global Value Chains. In line with the argument of Blackmore (2007), the analysis of learning within SFP/PO is about understanding how smallholder farmers learn collectively, in groups. The analytical elements of Knowing in Action are relevant to this analysis because they capture learning *in situ* skills for production capabilities in smallholder farmers. Particularly, the analytical

elements of the typology consider organisational dynamics, types of knowledge, and nature of social interaction (Amin and Roberts 2008). Hence, the typology focuses on the context, process, social interaction, material practices, ambiguity and disagreement, idiosyncratic, and natural elements of learning, which are often overlooked in Communities of Practice (Amin and Roberts 2008).

Firstly, I will explore the organisational dynamics of SFP/PO to examine the transfer of external inputs, and its coordination, as well as the coordination of a group of smallholder farmers that enables learning. Secondly, I will analyse the type of knowledge smallholder farmers use and produce when learning organic agriculture practices. I pay attention to how experiential knowledge is developed, and how this knowledge works as a base from which new knowledge is built by farmers. Thirdly, I look at the social interactions that affect the way in which farmers learn. I examine the nature of the communications, the type of interactions which happen between smallholder farmers, the temporal aspects of those interactions, meaning the length of time in which those interactions took place, and the nature of social ties that emerged as result of the interactions. And, finally, I present a summary of the paper and address the research question.

Organisational dynamics

The relationship between learning and governance structures in Global Value Chains has been widely studied, especially related to upgrading opportunities, e.g. product, process and organisation (Humphrey and Schmitz 2002; Kaplinsky et al., 2003 in Moyer-lee & Prowse (2015). In value chains studies, empirical evidence shows that governance structures play a role in determining to which extent suppliers upgrade their production capabilities. However, value chains analysis has been criticised for focusing too much on governance structures and, therefore, on the structural elements of production (Lowitt et al. 2015). In this analysis, governance means the rules and decisions related to which, and how agricultural produce should be produced. These rules and decisions determine the directionality of the

authority and the power relationships to control and coordinate exchanges in capital, technology, and standards, between Global Buyers and suppliers.

I argue that, while governance is important to explain production, learning in this value chain takes place in the form of social participation, with organisational dynamics which capture complex social interactions and relations (Ibid). Therefore, I am taking organisational dynamics to examine communications between the Global Buyer and competent farmers and space for negotiation between them with regards to rules and decisions related to production.

The data collected for this research indicates that in SFP/PO, learning occurs in juxtaposition with two organisational dynamics. One that is driven by the Global Value Chain (GVC) where farmers are immersed, and the second dynamic takes place within the Community of Practice (CoP) of farmers, Coordinators and technicians.

As a Global Value Chain, SFP/PO has a governance structure which coordinates the activities between participating firms (e.g. co-operatives of farmers as well as individual farmers), the Global Buyer (GB) and Area co-ordinators. The GB exerts power by engaging with farmers, establishing a set of responsibilities for both GB and participating farmers. The Area co-ordinator of southern Baja peninsula reflected on this issue saying:

> *"The broker is responsible for providing all technical advice, organic inputs and seeds, as well as financial resources for farmers to start their farming operation. He [GB] is committed to selling the organic produce of farmers at the best price possible. The commitment of farmers is to fulfil the season's programme as given to them and grow to produce under the organic farming system [standards]."* [SFPS02COOR01]

Contracts are the mechanism used to formalise coordination of production, and define responsibilities of participating farmers, whether co-operatives or single farmers. The Global Buyer is obliged to provide inputs for production such as seeds, fertilisers and financial resources, along with packaging material. The Global Buyer also provides technical advice

through the Area co-ordinators. The Area co-ordinators communicate to farmers the requirements of US organic standards and provide manuals which contain basic agronomic information on how to produce specific produce. In this way, all smallholder farmers can have access to inputs for production and the basic information necessary to comply with the requirements of the Global Buyer.

Smallholder farmers are obliged to produce exclusively for the Global Buyer, excluding the possibility of growing for other buyers. In addition, they are responsible for their own farming operation and the proper use of organic inputs to supply satisfactory quality organic produce. Although not stated in the contract, on an informal basis, farmers can sell produce in Mexico, as long as smallholder farmers label the produce as conventionally produced, not organic. The governance structure illustrates how coordination for production is exerted for production activities by the Global Buyer and Area co-ordinators towards participating farmers.

As for coordinating production, SFP/PO as Global Value Chain, has a *modular* type of governance according to Gereffi's (2005) classification of governance. I present the four elements of its governance in Table 1**.** In this type of governance, there are three key aspects directly related to the transfer of information to the producers, which allowed them to develop the capabilities to produce the products according to the Global Buyer requirements: i) complexity of transaction, the requirements of how products must be produced in accordance with the Global Buyer requirements and farmers must comply with, ii) codificability of information, that is the extent to which information is codified and transmitted efficiently for producing the product or carry out a service and iii) capability of suppliers, which is the ability of actual or potential suppliers to comply with requirements of the transaction (Gereffi, Humphrey, and Sturgeon 2005).

Table 1. **Governance Structure in SFP/PO**

Type of Governance	Level of Complexity of transaction	Level of Ability to codify information	Level of Capability in suppliers	Degree of explicit coordination and power asymmetry
Modular	Complexity of transaction is high due to fulfilment of organic specifications for cultural labours and certification	High: Information on organic certification, food safety and cultural labours is codified in manuals and standards	Low production capabilities. Developed in communities of practice based on social learning based on social interactions	Power is exerted by Global buyer through contracts that coordinate the supply of inputs, financial resources, commercialisation channels opportunities.

Source: Adapted from Gereffi (2005)

In the SFP/PO case, modular governance arose as the *complexities of transactions* were met by famers. In this GVC, the complexity of transactions consists of growing modules of speciality herbs (e.g. basil, chives, mint, sage, and tarragon) and cherry tomatoes. The modules specify the size, quality and specific handling aspects of every crop. In addition, specific packaging rules for every crop that are to be followed. Therefore, the modules are the complexities which are set by the Global Buyer. There is *codified information* contained in documents, for example, standards and manuals which have directions and instructions on how to carry out production activities, cultivation, pest control management, and fertilisation to produce the modules of organic produce. This Modular governance structure helps coordinate the information transfers involved in fulfilling the requirements of producing organic crops of a sufficient quality.

Within the modular governance structure and further elaborating on the responsibilities of farmers, there was a sense of commitment among smallholder farmers regarding their relationship with the Global Buyer. One farmer said that *"you will not be able to find another broker like SFP/PO, that supports you year by year, with the information and resources you need"* [SFPS02IVG]. Farmers saw their relationship as an advantage, given the availability of information, inputs and financial resources in SFP/PO, compared to the lack of support perceived by farmers in the context of the agricultural sectors in Mexico, and Baja Peninsula in particular. Another view was the possibility of accessing the American market. Having a broker [Global Buyer] which commercialises their produce was most appreciated by farmers, especially if it was a foreign market.

However, the developmental learning of production capabilities specifically links farmers and Area co-ordinators as Communities of Practice. Farmers needed to generate competence as they are required to comply with the complexities of producing organic crops for the American market set by the Global Buyer. While the governance structure allowed the availability and transfer of *codified information* such as organic standards and manual, social learning appeared to be the way smallholder farmers develop knowledge to comply with the requirements of the production activities. Social learning enabled farmers to develop tacit knowledge of organic farming technology and broaden their agricultural experience. Through social learning, interactions between competent farmers and novice farmers allow the sharing of practices with meaning and context. Consequently, social learning creates meaningful interactions among farmers, as well as opportunities and the basis for social learning, because of such interactions take place in the field, the context of farmers. In this way, organic agronomic practices are linked with farmers' experience and meaningful Social learning enables farmer' skills to be modified to fulfil the organic standards of the SFP/PO.

Social learning seems to be fundamental in SFP/PO for farmers' production capabilities development. SFP/PO integrates farmers into production activities due to its social purpose.

Novice farmers developed skills of production capabilities through their participation in the community of SFP/PO farmers. Learning by novice farmers occurs with their co-location with competent farmers. Competent farmers are identified by the Area co-ordinator[1], which is the person responsible for the supervision of all farming operations in a specific geographic location. The Area co-ordinators are identified by the effectiveness and reliability of their farming techniques and teachings. Effectiveness and reliability in performing organic farming practices are the criteria every farmer must comply with to be identified as competent.

The co-locations with competent farmers facilitated novice farmers to transit from conventional to organic farming. The co-locations vary in time and intensity, depending on the ability of farmers to internalise the organic farming practices. For example, in the case of one of the single farmers, co-location lasted around 6 months, whereas for another single farmer, co-location lasted approximately 10 months. Co-operatives particularly are different cases due to the number of partners. With the first and largest co-operative, co-location lasted three years, given there were only three competent farmers who could work with novice farmers, who were dispersed all over the southern tip of Southern Baja Peninsula. The co-location with another co-operative has been repetitive for the past ten years, given the mixed results in their production quality.

Within the community in SFP/PO there is no strict hierarchy among the structure in farmers, making it flexible to participate. Farmers developed skills for carrying out organic farming practices, moving from peripheral participation to medium and full participation, depending on the level of competence they displayed. Competent farmers such as the area co-ordinator, assess the level of competence. One objective way to assess this is through the attainment of organic certifications. As farmers learn and follow organic farming practices, they master

[1] At the same time, the area-coordinator was identified by the GB. The GB trained him. He demonstrated effectiveness and reliability in his practices.

these practices and are even able to improve their own production activities. These improvements are acknowledged and spread throughout the community by competent farmers. The Area co-ordinator of southern Baja Peninsula said: *"I am a conveyor of knowledge. Whenever I see something farmers do is useful to others, I ask them how they did it and tell other farmers how to do it as well"*. [SFP02COOR01]

In addition, the Area co-ordinator of southern Baja Peninsula said: "*We all work like a machine. A machine has gears, and every farmer is a gear. If we all are well tuned, then everything will go normally*" [SFPS01COOR01]. This view and analogy of farmers as a machine is consistent with the common view shared by them, in which many of the improvements they have implemented have been devised by other farmers. Their own ideas were considered and carried out by farmers in the community.

These views surfaced mainly in respect to improving the growth of cherry tomatoes (including germination), pest control, and crop management. For example, one farmer described how he experimented new agronomic techniques based on the experience of another farmer in the Global Value Chain:

> *"For example, when the Area co-ordinator taught us that we should put three plants per meter, which you have to prune the first tomatoes for the plant (of tomatoes) grow. That was the idea we (farmers) had. Then, one day, a farmer said that he let plants grow without pruning them. I followed up on that. That previous technique we had, we changed it, and we had incredible results" [SFPS06IR02].*

Another farmer said:

> *"We were told to transplant three plants per meter. We tried something different; instead, we transplanted six plants per meter in zig-zag in a double line. With that, we realised we saved seeds and wood sticks. In 1/8 of the same space we planted more plants, and therefore we also saved water" [SFPS06IR01].*

These accounts from participating farmers revealed the teaching of organic practices mainly by the Area co-ordinator. In fact, these practices are the result of teachings of the area co-ordinator that inspired or worked as basis to further develop such practices that other farmers learned later. For example, as their mastering of their practices went further, they decided to try different approaches to improve them. These improvements were acknowledged by competent farmers, meaning they saw their effectiveness and reliability. With regards to acknowledgement, a competent farmer, when asked about acknowledging the improvements of farmers said: "*the majority of these improvements come from farmers themselves. We just need to give them the technical aspects*" [SFPS06IR01]. These improvements draw on farmers' experience. The juxtaposition of organisational dynamics shows that as Global Value Chain, SFP/PO has a modular mode of governance which coordinates the relationship between participating farmers and the GB to transfer the information to recreate the production activities. However, it also shows how this production activity drives the dynamics of an active part of learning which takes place within the CoP among farmers. SFP/PO seems to have an interest in developing farmers' production capabilities in that there is a social learning that takes place among participating farmers, where, competent and novice farmers engage in co-colocation to gain the implicitness of organic farming techniques.

Experiential knowledge in learning organic farming practices

Farmers know their agricultural activities based on tacit or experiential [2] knowledge. Experiential knowledge requires looking much more closely at the relationship between farmers and their environments (Krzywoszynska 2016). To become a competent farmer means that farmers must become attuned to the specific ways in which the environment unfolds, understand and interact the environment, and the context they are in (Ibid). SFP/PO claims to teach organic farming practices to their participating smallholder farmers. These farming practices are Soil building, Fertilisation and Biological Control, and are the core activities for growing organic crops.

In the analysis of interviews with participating farmers and the Area co-ordinator, two themes emerged related to knowledge when learning farming practices: i) the requirements of organic agriculture is information codified in standards and manuals and ii) farmers value their experience as knowledge. Although organic standards are important, because they contain information on the requirements for organic certification, their codified nature placed them in a secondary role for farmers.

A common narrative from most participating farmers was that their previous experiences were all related to conventional agriculture before joining SFP/PO. They only grew crops for home consumption, and occasionally for sale in local markets. When asked about how they learned about conventional agriculture, farmers described how they had been engaged in agriculture ever since they were small children, helping their parents on the farm before and after going to school. One said *"I grow crops since I was a little kid, I started with cotton and then grains. I helped my dad on the farm"* [SFS03CEO].

[2] It is not the purpose of the analyses to unpick all discussions on the classification of knowledges. I acknowledge there is extensive research on this topic. However, for the purpose of this analysis, experiential knowledge is considered as a type of tacit knowledge.

In most cases, this knowledge was built over a period of years, in direct relationship with a specific piece of land, crops and environment. This way of knowing was valued by them and was their main source of reference and learning when carrying out farming activities. This knowledge is embedded in and embodied by a specific location, social, and historical context. Farmers in the locality of San José Del Cabo described how they worked their small pieces of land, and helped their parents and grandparents to grow mangos, corn, and watermelons. Typically, families in this area have a small piece of land, like a type of backyard or garden, in which they grow crops for their own consumption.

Tacit knowledge of agricultural activities was even clearer in their explanation of their activities, which allowed them to learn organic practices more naturally. During the interviews, farmers even demonstrated a certain level of frustration, because they could not express their experience in words. Given the nature of my question about how they learned agriculture, it was evident for them that I was not a farmer, nor had any knowledge about agriculture. This question took them out of their context. They highlighted their view of agriculture as a common activity, arguing that there was no need for studying technicalities, but rather action and interaction with fields and crops. Therefore, to reply with an answer that could connect with my context and experience, they contrasted formal education with their own experience, illustrating that doing agricultural activities was a very easy thing, something that does not require a university degree or to read books. One farmer said:

> *"Agriculture is something like say [farmer cursed], you make a grove, then you transplant chives, which is like small onion, and that is all. Then when it grows up to 40 cm, I know it's time to prune them. Then, I would make bunches of chives and then ship them to the USA" [SFPS02PAN].*

In this explanation, evidently experiential knowledge has a tacit component necessary for growing crops and the interpersonal dimension that influences how farmers know. The farmer expressed in his cursing, a sense of frustration in finding the words to pass on to me his experience with agriculture. As perceived by the farmer, because of my lack of experience

in agriculture, he had to try to verbally transmit his experience, and connect with my own experience so that I could make sense of the explanation. The farmer felt I needed to know the relationship between him, his environment, and the practices. To do that, he explained how to make a grove using his hands to illustrate it; then he pointed towards one grove on the field for me to have an idea of what a grove looked like in the field. This way it would be easier for me to make sense of the message. He also used an analogy to explain what type of crop chives was, given that it is not consumed in Mexico. To help me understand, he compared it to an onion, which is close to what I know. He went on to explain how tall it should be before removing the side shoots. To help me understand this, he used both hands to exemplify 40 cm height and how he would make bunches of them to be shipped to the USA.

Table 2. Type of Knowledge in SFP/PO

Type of Knowledge	***Use***
Experiential Knowledge	· For carrying out conventional agriculture · As references to draw on to guide their decisions on how to do things
Codified Information	Use for knowing what to do on specific procedures such as certifications

Source: Data collected in fieldwork

The use of codified information played a secondary role, only for reference, as presented in Table 2. It was apparent that farmers were aware of the importance of manuals and that information on organic farming contained standards. Farmers knew that organic standards provided information on fertilisation, preparation, and use of green manure. However, farmers did not use these manuals as their primary source of information; farmers did not

consult organic standards, nor made any reference that their activities followed these guidelines. Instead, their experience worked as a source of reference to connect with the organic farming practices they learned through their own experience. One farmer illustrated the links he made between organic practices and the experiences of his grandparents:

> *"I remembered how my grandfather used to grow crops back in Guadalajara. He never used chemicals for pest control nor bought seeds from them [seed companies]. I remember he would put herbs for my grandmother in between the lines of corn plants. He would never grow the same crop on the same piece of land. […] he would keep part of the harvested corn to have seeds to plant for next season" [SFPS02VP].*

Another farmer said:

> *"As I said to you: our ancestors grew crops with the help of the moon. It was purely empirical knowledge, they knew what they had to do. The technical terms they did not know. They only knew that this was the way it worked, see" [SFPS04PMB]*

Farmers were also aware of the inputs and chemicals they can use and those which are prohibited. One specific topic that emerged was how to make land eligible to be certified organic. Farmers were very conscious of the requirements land must fulfil to be certified e.g. they pointed out that pieces of land that were used to grow conventional produce, (with chemicals), would have to start a transition period of three years with organic treatment. Idle land could be certified right away, so long as the soil was tested, and neighbouring crops were within certain distance to prevent cross contamination.

These two accounts shed light on the relevance of farmers´ experience for learning, and how the interpersonal dimension acts as the vehicle to transfer the information, placing standards as a source of secondary reference. Codified information was used to know what they needed to do. However, it was not used to learn how to carry out the organic practices. What farmers knew from their grandparents' and ancestors experience provided judgement to realise that

such practices were doable and meaningful as their grandparents had done the same and obtained effective and reliable results for their crops. Some explained to me how their grandparents used to plant different kinds of crops in between groves of corn and others said that their grandparents never grew the same crops on the same piece of land. As they provided these examples, they themselves realised that what their ancestors did was biological control and crop rotation. These experiences helped them foresee that carrying out organic farming was practical and a situation they could deal with.

To make sense of these standards (codified information), the experience of other farmers played an important role. This is because farmers value the effort of going through the process of learning, which reassures them what they need to know comes from someone who knows how to do it also. The comments below show how important it was for farmers to give and receive advice:

> *Q1: Obviously, if you make no recommendation, it will not benefit the farmer, right? The farmer will not be able to comply with the organic standard. [SFPS01COOR2]*
>
> *Q2: The Area co-ordinator gave me the manual for organic certification, but it was his experience which really helped me understand. [SFPS05CM01]*
>
> *Q3: when I started, the Area co-ordinator gave me a book to know about organics- [but I think I lost it-. What really was useful to me was his experience. [SFPS05PM01]*

In Q1, the Area co-ordinator expressed that for him, it is important to give advice to farmers. As a competent farmer and technician, the Area co-ordinator knows farmers' context, and understands how to pass on knowledge with advice, knowledge through his own experience. On the other hand, Q2 and Q3 clearly show that farmers value the experience of the Area co-ordinator as a farmer who knows how to deal with manuals, organic standards, and technical books. Through interactions, farmers receive the verbal advice of the Area co-ordinator on how to carry out organic practices for them to comply with the standards.

While some farmers valued the experience of other farmers and used that experience to reshape their knowledge, other farmers were resistant to learning from others. One farmer described how his 30 years of experience on conventional tomatoes had created certain barriers about organic agriculture that took time to disassemble. In contrast with other farmers, this farmer went to university to study agronomy. In his narrative, he had no prior experience of agriculture before university. On the contrary, his experience was built up on his university education. Up until 2010, his university education was his source of reference for managing organic agriculture. He stated that he learned how to grow organic crops after a year of being part of the SPO, saying *"in conventional agriculture what you do is feed the crop, whereas in organic agriculture you feed the soil, this took time to understand"* [SFPS08PM]. He thought that it would only be necessary to use organic inputs and treat the crop as conventional. He explained that the Area co-ordinator insisted that he should feed the soil. His experience in conventional agriculture dictated otherwise:

> *"Then I would take the organic fertilizers; I wanted to measure how much I would need for it per million parts. I started thinking that it was possible. What I did was to stock the dripping system because I wanted to fertilise the plants as much as anyone would do in conventional agriculture and the truth is it didn't work. The tomatoes would go yellow and decay". [SFPS08PM]*

As a result, he thought he would strengthen the tomatoes, but instead he weakened the plants and negatively affected the yield and availability of produce. Another counter-effect was the projections of future availability of produce, thinking the tomatoes would behave the same as conventional ones. The experience of other farmers made him realise that the crops would not yield product much longer than six months if he did not feed the soil sufficiently to sustain the crop. He said that the following year he still insisted on the same management because his 30 years of experience on conventional tomatoes meant that he resisted the new practices. Eventually, he had to reframe his whole agricultural experience.

In summary, as it has been discussed in this section, farmers' experiential knowledge is the base for learning, and to develop an understanding of the technology they were engaged with; the production of organic products. This experiential knowledge is applied to make sense of, and act in new situations. Learning in SFP/PO farmers consists of changing their own views and previous experiences of what it was for them to carry out agricultural practices. As they entered a new set of practices, which they had not done previously, for them to go through learning, they needed to make sense of the new way of doing agriculture for them. By receiving advice and drawing on the informality of SFP/PO, farmers make sense of the information contained in the organic standard using experiential learning, from the advice of competent farmers. Within their level of participation, farmers generate knowledge, shape existing one, and with interactions with other farmers in the periphery, disseminate it.

Social Interaction

It has been suggested that social interactions among actors enhance the ability to innovate and capture greater value on consciously pursued joint actions (Schmitz and Knorringa 2000). Further, a growing body of research has suggested that organisations able to successfully transfer knowledge are more productive (Inkpen and Tang, 2005, Saliola and Zanfei, 2009 in Lowitt et al. 2015). Learning by participating farmers in SFP/PO was characterised by interactions between competent farmers and novice farmers. These interactions were regarded as the main vehicle for a) knowledge sharing, and b) expanding experiential learning of novice farmers. These interactions shed light on the social learning, specifically who, how, and with whom learns, and the purpose of that learning. Social learning places the focus on knowing, that is, interactions with the things of the social and physical world, where knowledge is socially constructed (Blackmore 2007)

In this section, I argue that the interactions involved in the learning are explained by the combination of three elements i) the Nature of communications ii) temporal aspects and iii)

the nature of social ties (Amin and Roberts 2008). These interactions are linked to the context in which farmers conduct their agricultural activities. One farmer said it *"it was a natural learning […] it was a situation of waking up early morning together and carry out the cultivation activities [preparing the land, soil fertilization]"* [SFPS01COOR1].

This view surfaced mainly with respect to the lack of experience they felt they had regarding organic agriculture they needed to know, as they had no actual practical experience, neither their neighbours, nor relatives. Co-location in farmers learning was important, as the former Area co-ordinator said *"everybody wanted attention. You must show them that you're one of them. You must be their friend even a father or a brother. You have to get into their minds because that is the way they learn"* [SFPS04IT01]. Therefore, understanding the nature of their communications, how long those communications lasted, and type of ties they developed with one another throughout the interactions, explains their experiential learning of SFP/PO's farmers to develop the skills for growing organic crops and certify them.

Nature of Communications

Based on the data collected, I have identified two types of social interactions; face -to -face interactions and interactions by phone. Farmers interviewed explained how they learned to prepare compost, how to fertilise the soil and use biological control methods. A recurrent theme in the interviews was that farmers needed to know about preparing and using compost, fertilization and biological control to obtain organic certification. The nature of communication was Face -to -face interactions and co-location of experienced farmers with novice farmers. Face -to -face interactions enhanced farmer learning and fulfilled their perceived need for experience in organic agriculture. Knowledge was shared through *in situ* examples which illustrated organic farming methods in the context of the farmer's own land, environment and with the use of local inputs. The experience gave farmers the opportunity to understand the meaning of new practices, and thus expand their experiential learning.

A common view amongst farmers was that they were learning from the best farmers and they received complete information. One farmer said:

> *"they [competent farmers] explained to us what that was [organic farming practices], the correct way of how to do it […] there were many small tips that you received directly from them [competent famers] without a third party, and that it's how you learn a lot" [SFPS04IT02].*

Talking about compost preparation, a farmer said:

> *"Imagine that on the floor we would use dried cactus sticks, and with that, we would make a sort of bed. On top, Marcos [competent farmer] would put a layer of manure, and then we would follow him. Then on top of the manure, he would put a layer of straws and then would do the same until the "cake" reaches one meter high. They would be ready in three months. Before the three months would do checks on them and move the layers to air it [cake]". [SFPS02PJJ]*

Another example of Face -to -face interaction regarded biological control. A farmer stated:

> *"The entomologist came twice a month to carry out inspections with all of us [farmers]. We were with him in the fields identifying insects that were natural enemies of the crops we grew. He taught us that yellow sticky traps were appealing to insects. We changed the traps together. He told us to take pictures of insects and send them to him via email." [SFPS02IV].*

By describing the steps of compost preparation, novice farmers unveiled what they learned from Face -to -face interactions. The narrative illustrates how competent farmers would use local materials to show novice farmers what, and how to use those materials to prepare compost. In the narrative of the participating farmers, the word *imagine* was the form they found for me to visualise the interactions between competent and novice farmers.

Furthermore, face -to -face interactions and practical examples allowed novice farmers to gain an understanding of the principles and importance of organic farming practices. Farmers understood that all the organic matter in compost would help enrich the soil,

making the relationship that exists with microorganisms in the soil clearer, ultimately benefit the plants. The development of an understanding of novice farmers is also supported when they compared compost with salt-based fertiliser[3] and exclaimed that in the short term it would help the plant but eventually, in the long term, destroy soil fertility.

With respect to biological control, for example, novice farmers learned from the entomologist in the fields, the relationship between insects, differentiating between pest insects and natural enemies. Farmers saw the importance of creating conditions to encourage host insects (beneficial insects) and control their populations to grow organic crops. One farmer put it this way: *"we follow the mission of the SFP/PO, having healthy soil, for healthy crops for healthy customers"* [SFPS02PAN]. By learning biological control methods there would be no need to use insecticides. The example of trapping insects in the field, farmers narrated their understanding of what pests are, stating that such term (pests) was wrong. Co-location and Face -to -face interaction allowed this knowledge exchange. They saw the importance of creating conditions to host them and control their population to grow organic crops. There would be no need for insecticides by learning biological control.

While co-location and Face -to -face interactions enhanced learning, there were some farmers located in very remote areas that made Face -to -face interactions difficult or impossible, e.g. Sonora and the Northern Baja Peninsula. Here, knowledge sharing required a different nature of communication and interactions were carried out by cell-phone calls. Novice farmers that interacted by cell phone with competent farmers had a distinctive learning. They drew substantially from their own conventional agriculture experience, as they did not have the examples to contrast their experience and understand the meaning of the organic farming practices.

[3] Artificial fertiliser

A common view amongst these distant farmers, with a conventional agriculture background, was their lack of understanding of the philosophy underlying organic farming practices. Farmers assumed that they would only need to apply organic inputs instead of inorganic inputs, without realising the importance of the interaction among the soil, plant, and environment. For farmers, trial and error and constant checks by phone, enabled them to understand the new concepts, and expand their experiential learning. One farmer explained his interaction based on phone calls with the Area co-ordinator regarding fertilisation:

> *"During the first three years, I called the Area co-ordinator every day. In the daily phone calls, he [Area co-ordinator] insisted much on the principle of providing nutrients to the soil. I told him how I would use the [organic] inputs. He said I would have many difficulties, e.g. the cherry tomatoes would decay because he warned me I was treating the crop as conventional with organic inputs. I told him I had experience and it would work. Every day he asked me to describe to him how the cherry tomatoes looked. My responses were that they are turning yellow. He daily made me recommendations to look at the soil focus the nutrition to it". [SFPS08PJA].*

Interactions by phone only allowed novice farmers to express their reflexions on their difficulties to the Area co-ordinator. Taking the example of fertilisation, phone interactions only allowed one-way transmission of knowledge, without any in-field examples to show how the practice should have been carried out. However, the lack of co-location took novice farmers out of their context, hindering the understanding of the meaning of the practice and the benefits for the crop.

Despite the lack of practical examples and co-location, failures served as means to realise the importance and meaning of organic farming practices. The Area co-ordinator told the above novice farmer that if tomatoes do not have enough nutrients to sustain them, productivity will suffer. The farmer said:

> *"I struggled a lot, the leaves of cherry tomatoes plants would turn yellow because I was treating these organic tomatoes as conventional, and the truth*

> *is I was wrong. The tomatoes were not assimilating the nutrients and they got weak" [SFPS08JCE01].*

In another example, a group of women argued that given the distance and difficulties for establishing phone call communications, they had to look for other sources of knowledge to learn how to produce organically. They interacted with a biologist who taught them some organic farming practices. As one female farmer put it: "*we began being advised by the biologists who learned organic agriculture in Cuba. He spent some time here with us to teach how to prepare compost. He used formulas [recipes], he guided us every step of the way and got for the inputs for compost"* [SFPN02WF01].

The biologist even taught them how to prepare compost from bone powder. They said:

> *"We were in the wilderness looking for cows' bones, we grind them with mills and that is how we made it powder and then we mixed with manure and cow milk, yeast and straw. With that we kept them in barrels and prepare bio-compost. It all took us 70 days" [SFPN02WF01]*

However, the learning stopped because the biologist lived in a locality three hours away. After this, the women experienced problems with many pests which could not be controlled due to their lack of knowledge of biological control methods. Another woman farmer said *"We had a very strong pest, we were literally invaded [insect infestation]. As we had spinach, apparently this appealed to the insects. In one of the visits, the Area co-ordinator told us to introduce beneficial insects"* [SFPN02WF01]. This case clearly highlights the importance of co-location and Face -to -face interactions between new farmers and competent farmers. In this way, practices are seen, replicated, and assimilated easily by learners, so the learning curve is faster.

Nature of Social Ties

In face-to-face interactions, two *social ties* which influenced learning by farmers were identified. The first one, is the trust on technicians, competent farmers and area co-ordinator. The second one, is the negotiation made between competent and novice farmers to implement new activities. These social ties were important when novice farmers were sceptical about how knowledgeable the competent farmers were.

Sometimes, in the view of novice farmers, competent farmers had no knowledge about the local environment, its materials or temperature. However, novice farmers trusted the competent farmer and considered that they had enough experience to learn from. So, within this context of trust, farmers negotiated the best way to implement the practice locally as one farmer said:

> *"Marcos [competent farmer] set the example, saying: do it this way. At the beginning, we all were opinionated [had different opinions] about it, we were not totally convinced this was right, even though we never did it before. We had many difficulties getting it right. Before we learned, we burned it [compost]. After many attempts Marcos and we found out that with too much water you burn it, too little and it won't decompose". [SFPS02PAU]*

As this quote illustrates, a negotiation process took place and although they trusted the Area co-ordinator, they also contributed to the implementation of the activity locally, suggesting to Marcos the use of more water and to air the cakes more frequently so that decomposition would work quickly and properly. This did not mean that the competent farmers had lost the trust of the novice farmer. In a way this example reflected the creation of a close relationship based on trust between the parties. This relationship allowed the two-way flow of information and knowledge to adapt a technology locally.

Negotiation and trust between novice and competent farmers was also evident with respect to biological control. One farmer said: *"Because we had to monitor the insects, and send him*

[entomologist] pictures, he told us not to use alfalfa as a natural barrier because it attracts a lot of non-beneficial insects" [SFPS06IR]. Instead, they negotiated with the entomologist that alfalfa was the crop they always grew and therefore, they knew it would create conditions to host the beneficial insects they needed. Farmers perceived the entomologist's lack of experience in the area. However, as this was their first time doing biological control, they trusted the entomologist.

There were also cases where farmers did not trust the competent farmer. Farmers located in very remote areas had sporadic visits and poor infrastructure to establish phone communications with their assessor, so this created a distance between them. One case is the group of farming women. They said that they *"were not happy with SFP/PO"* because they had had weak guidance. Under these circumstances, the farmers used the manuals on quality and organic standards to guide them, but with low success. These novice farmers were not able to develop any social ties with their peers or competent farmers. As a result, one of the farmer women said: *I don't trust any information nor reports SFP/PO is giving us*. They received reports about the poor quality of their produce resulting in the dumping of their produce. Because they were not receiving close guidance, this made them doubt the criteria employed to evaluate their produce. The criteria they were following was based on the operations as stated in the manuals. The lack of social ties was due to scarce interaction of any kind, neither Face -to -face or via cell phones. This scarce interaction did not allow any constructive feedback on how to improve quality. On the contrary, only receiving information on poor quality in the form of reports, de-contextualised the knowledge, and unlinked these women farmers from further improving their skills on improving quality.

Another aspect that broke the relationship between the women farmers and the SFP/PO was the fact that for some time, the product's price dropped significantly, and as a result the farmers had to dump produce in the field. It is important to note that market prices vary throughout the season year. In this case, the price was so low that harvesting would have

meant a loss of money. Consequently, these farmers ended up owing the money that was invested in them to the Global Buyer, which took another season to pay back. Although some farmers agree with the way relationships are set with the Global Buyer, it is evident that for others, such as this group of farming women, their relationship with SFP/PO represents an economic disadvantage beyond the benefits of availability of information, access to US markets, availability of inputs, and financial resources. The specific circumstances of this group of farmers, i.e. incipient telecommunications, remote and long-distance location and therefore sporadic Face -to -face interaction and lack of constructive feedback from the Area co-ordinator placed them in a position with fewer learning opportunities.

Temporal Aspects

The time that took for novice farmers to learn organic farming practices (soil fertilisation and biological control), was between one to three years. During this time, the communication between competent farmers and novice farmers was constant in those cases where they had established social ties to transfer information. For example, one farmer said that when learning, the Area co-ordinator was teaching him and his family all they needed to know: *"he was here with us during the first year*[4]*. He literally lived here with us, waking up early morning with us and teaching here in the land"*. During this time, the farmers built their competence as they expanded their learning of the new practices, establishing a link with their own agricultural experience, and developing an understanding of those practices in relation with their own environment. However, there were follow-up meetings that took place after farmers were initially trained in soil fertilisation and biological control. One farmer said:

> *"They [competent farmers] were visiting us around nine years*[5]*. They came to see how we were doing and then, little by little they came less often, trust that*

[4] In this context, a year means the season year. The period goes from eight to nine months, time in which farmers grow, harvest and ship their produce to the GB. This time periods often goes between Septembers of one year to April-May of the following year.

[5] For a period of nine years.

> *we were producing as they wanted and simply ship produce to San Francisco" [SFPS02PGR]*

In this frame-lapse, the farmers learning allowed them to increase in confidence and become attuned to the requirements of the global buyer. In phone call interactions the *temporal aspects* could last three years in the most intense part of novice farmers' learning. One farmer said:

> *"We're still learning, even today, after three years. Maybe before, during the first year, I was calling the Area co-ordinator three to four times a day at least. Afterwards, time passed, and I called him one or two times a week. Then it was only one call a month" [SFP08CEO].*

Interactions via phone call took longer, as opposed to face- to- face interactions. Phone calls did not substitute the absence of co-location with competent farmers. However, phone calls made it possible for verbal communication to facilitate learning. Phone calls gradually replaced situated knowing by trial and error, as novice farmers gradually tried to gain the skills on their own. As previously discussed, farmers tended to treat crops as conventional, taking longer for them to developing an understanding of organic practices in relation to their own environment.

Furthermore, when considering looking at the group of farming women, where they have faced limitations of communications, the temporal aspects of learning has no time lapse. On the contrary, it is a slow and ongoing process. One farming woman in the group said explained why:

> *"See, we are so far away from Maneadero locality. The Area co-ordinator needs at least eight hours driving. Because of this, he only comes once a month if we are lucky. He comes approximately once every two months. To make things worse, if I need to talk to him for any reason, I need to claim a mountain to catch signal in my cell phone to talk to him" [SFPN02WF01]*

The difficulties of establishing a proper connection to use cell phones slowed down their learning. In this case, learning has been insufficient. As previously discussed (section 7.4.1)

co-location with examples had to be procured from people outside SFP/PO. The distance and difficulties in communication allowed only little understanding of the practices. These circumstances have not allowed them to fully develop an understanding of practices in relation to their own environment. This is clear, as they have been experiencing pests, which they have not been able to properly manage, negatively affecting the quality of their produce and their income.

In summary, social interactions affect the learning in SFP/PO farmers. In Table 3 I present a summary of the Social Interactions. Face-to-face interactions enabled farmers to develop a sense of the practices and facilitated an understanding of the importance of carrying out those practices, especially the relationship with their land, and the positive effects on their crops. In addition, with face-to- face interactions, trust develops among competent and novice farmers, which opens space for negotiation between the experiential knowledge of both, ultimately enabling the co-production of new knowledge.

In contrast, interactions by phone are less effective, in that farmers' lack practical experience within their own situations, created conditions for slower learning. The slow pace of learning also had less certain social ties. In one case, despite the lack of practical exemplars and co-location with competent farmers, trust was still developed. However, in other cases, relationships of distrust prevailed. The temporal aspects also affect learning, as farmers need to develop skills, the time it takes for developing the sensing and understanding of the practices is one to three years.

Table 3. Social Interactions in SFP/PO

Nature of communications	Nature of social ties	Temporal Aspects
Face -to -face	Trust and co-production of knowledge	One year to three years
Phone Calls	Distrust with transition towards full trust	One year in the most intense part of the learning and ongoing process

Source: Data Collected in fieldwork

Summary

This paper addressed the research question *how do smallholder farmers in SFP/PO learn skills for production capabilities to become part of the Global Value Chain?* The analytical categories of a *knowing in action* framework were used in this analysis for understanding how smallholder farmers in SFO/PO learn. Despite SFP/PO being a value chain, where smallholder farmers are integrated in agricultural activities for producing organic produce, SFP/PO has organisational dynamics in which social interactions enable learning as Communities of Practice, for developing skills for producing organic crops, which are reflected in production capabilities.

The analysis of learning in SPF/PO is pertinent to understand that production activities (such as organic practices) contribute to the development of production skills, leverage power, and strong market linkages in the agricultural sector. SFP/PO sheds light on social interactions and engaging with novice and competent farmers in value chains, contributes to this argument by identifying and explaining how social interactions among farmers enable learning for production capability development. In this case study, farmers learn in *social interactions* by engaging competent and novice farmers to gain the implicitness of organic farming technology. The nature of communications expands farmers' experiential knowledge. This type of knowledge helps novice farmers understand and act when learning to deal with new situations such as organic farming practices. Social interactions also create *social ties* of trust and co-production of knowledge among farmers. Table 4 the analysis of learning in SFP/PO. The case study also shows that the lack of social interactions can slow down the expansion of experiential knowledge negatively impacting the learning for some farmers and thus generating untrustworthy social ties.

Table 4. Learning in Farmers in SFP/PO

Activity			***Social Interactions***

	Organisational dynamics	***Type of Knowledge***	***Nature of Communication***	***Temporal Aspects***	***Nature of Social Ties***
Organic Agriculture	Juxtaposition of modular governance with communities of practice for learning with flexible movement from periphery to full participation	Experiential Codified Information	Face -to -face interactions for organic practice Phone call interactions for organic practice	one to three years Three years and ongoing process	Trust and co-production of knowledge as well as and untrusty

Source: adaptation from Amin & Roberts (2008)

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