Policy Recommendations to Improve the Competitiveness of Small Scale Farmers in Colombia through Information and Communication Technologies

by

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Abstract

Half of the Colombian population lives in regions dependent on primary activities such as agriculture, livestock, and fishing. This sector is characterized for being a mix of two kinds of productive systems: large-scale commercial enterprises and small-scale peasant farms. It is estimated that peasants comprise around a third of Colombia's population, contribute more than 60% of the agricultural production and around 30% of the livestock production. The amount of direct consumption goods that come from small scale producers goes from 22% to 65%, depending on the product. Despite its economic and social relevance, small-scale agriculture receives less attention from the government than the large-scale agriculture. This is reflected in the lack of policies aimed to help improve the competitiveness of small-scale farmers.

Over the last decade, Information and Communication Technologies (ICT) have been recognized by their impact in the development of countries, and their incorporation in strategies to help the agriculture sector is considered essential. Unfortunately, just large-scale production systems have been able to take advantage of the advantages of an ICT-supported development paradigm.

The goal of this thesis is to make policy recommendations as to how ICT could effectively stimulate the development of small-scale agriculture. In order to do this an analysis of the food market supply chain is conducted, including learnings from two detailed cased studies in major markets in Colombia (Bazurto and Corabastos). This thesis argues that, in order to overcome some of the current challenges of small-scale agriculture, a systemic view of the food supply chain system is needed. Traditional approaches like local regulation, infrastructure "modernization" and disintermediation, tend to be myopic and are unable to achieve long-term impact. A description of the multiple actors and stakeholders of the small-scale agricultural supply chain is presented, alongside with learnings of successful (and failed) ICT strategies. Specific policy recommendations are made that aim, through the use of mobile technologies, to improve the coordination among the different supply chain agents.

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1. PEASANTS AND FOOD MARKETS IN COLOMBIA

1.1. Peasant Farming or Large-Scale Agriculture?

It is estimated the 52% of Colombian population lives in regions dependent on primary activities such as agriculture, livestock, and fishing. The primary sector in Colombia is characterized for being a mix of two kinds of productive systems: large-scale commercial enterprises (also referred as large-scale agriculture) and small-scale peasant farms (also called peasant agriculture). In most of the cases the production in Colombia combines both systems. The first one, is commercial and technical, where the investment by hectare is high, irrigation systems are used, and specialized providers supply seeds and other materials. Besides, it is directly linked to industry and commercial channels both in domestic and international markets. The other kind of productive system is the traditional one, which is based on smallholdings and targeted to local markets and in a less extend to industries. This is the kind of productivity system this thesis is focused on [Universidad Nacional de Colombia, 2008].

It is estimated that peasants comprise around a third of Colombia's population and contribute more than 60% of the agricultural production, and around 30% of the livestock production [Guarín, 2009]. The amount of direct consumption goods that come from small scale producers goes from 22% to 65%, depending on the product [Forero, Vega, et al, 2006].

Table 1 shows the magnitude of peasant production in Colombia (with and without illicit crops) both in terms of area and of value.

		Including coca and poppy	Excluding coca and poppy
Planted Surface	Predominantly peasant	68.1%	67.3%
	Predominantly large-scale	31.9%	32.7%
Value of Production	Predominantly peasant	69.1%	62.9%
	Predominantly large-scale	30.9%	37.1%

Table 1 Distribution of agrarian production in Colombia: large-scale versus peasant
Source: Forero, 2002

It is worth it to mention that there are few systematic studies that try to determine the percentage of the total agricultural activity peasants account for in Colombia.

In spite of the differences there are some characteristics that are common to all of them. First, in the farms, the family work is essential, and in some cases, women play a leader role. Second, the agriculture activity is characterized because the production is at small scale and therefore the income is low. Third, the motivation for most peasants to do farm is twofold: self-consumption (family self-subsistence) and selling of the product in markets [Universidad Nacional de Colombia, 2008]. In addition, peasant agriculture is geographically dispersed and there is no specialization [Guarín, 2009].

These characteristics of the peasant agriculture along with the fact that there is no information about the participation of the peasants in the national production has lead some people to argue that this sector and this kind of production does not have a central role in the agricultural production and the economic growth of the country. These people

claim that the peasant agriculture will inevitable disappear to give room to modern business-based systems of production that incorporate more efficient technologies.

On the other hand, those authors who have tackled the peasant agriculture issue consider that it has a central role, not only because of their contribution to the production but also because their contribution in terms of labor force for the large scale agriculture and for the urban centers.

The lack of data that shows the key role of peasant production in the national production, more than a statistical problem, is also a policy problem. In Colombia the agricultural production targeted to external markets have been privileged over the others. This is reflected in several facts: i) the public budget allocated to the agriculture sector has dropped drastically; ii) the reduction of institutions that serve rural communities and the agricultural productions. An example of this is the closing of National Program for Agriculture Technology Transfer (PRONATTA by its abbreviation in Spanish), which was in charge of facilitating the access to technology by the small scale producers; ii) the parafiscal funds[1] have been bureaucratized, and the budget targeted to the agriculture sector has been allocated based on a seek-renting rationale. The Finagro Credit case is a clear evidence of this fact. [Noticias RCN, 2010]; iii) Actions to control the concentration of land due to illegal appropriation of farms by guerillas have not been effective enough, and there is an unequal distribution of land that favors civil and military elites; iv) Policies designed to help the competitiveness of rural small producers have been limited and their impact has been reduced. The "Alianzas Productivas" initiative illustrates this fact; v) lack of credit access alternatives for low income population [Forero, Vega, et al, 2006].

Peasant products face obstacles in the fulfillment of international standards. In most of the cases rural communities are not prepared and do not have the resources to start a process of access to international markets at the scale that is required. Their productions

[1] Parafiscal charges are charges levied by public or private agencies on the production of marketing of agricultural products, which are aimed to finance activities for the benefit of the sector as a whole.

are still at a craft level, their standardization and quality controls processes are in a very early stage (if any), and they do not have product traceability, which are important (and mandatory) requirements to export. Usually, the produce gathered comes from different farms without any quality tests.

The small scale agriculture, on the other hand, provides with food the domestic market and it is less likely to receive attention, in spite of the fact that it has been historically the main food source of employment in the agriculture sector and of food for the urban centers. [Jaramillo, 2002]

The significance of peasant production in Colombia is even more evident when data of the Bogota's food market, Corabastos, are considered. Bogotá is the city that concentrates the biggest number of consumers, 7,185,889, which account for the 16% of the total population of the country [Forero, Vega, et al, 2006]. In spite of being landlocked, Bogota is the place where production from all around the country gets together, either for direct consumption or redistribution [Guarín, 2009]. Recently it was calculated that around 80% of the food that enters the city comes from a less than 100 kilometer radius around it. A substantial part of the city's provisioning depends on the many peasant farms that form an agricultural belt around the city. Peasant production contributed nearly half of the five million tons of food that entered Bogotá in 2001 [Rodríguez, 2006]. According to other studies used by the Government, the small scale producers contribute more than 70% of the agricultural production that get into the city [PMAAB, 2004].

This production is distributed to mini-stores and mom and pops or re-distributed by itinerant or resident vendors or food markets around the city. This production goes mainly to the low income population, who has unique cultural preferences and economic constraints that are matched by the peasant agriculture, the local food market, and the mom and pops located close to their places. Given low average incomes and unequal income distribution, it is not surprising that major segments of the population have very

limited purchasing power, and can afford few nonessential marketing services. Thus, the importance of the peasants in the food production is not in the amounts produced, as it is in the low cost products they can provide.

1.2. Is it a problem of efficient production or effective linkage to consumption?

In spite of the important role that small-scale farming plays in Colombia, peasant's quality of life continues to be low. Some consider that the problem is that most farm workers have been unable to take advantage of their full potential and in many cases their production is still reduced and inefficient. Added value is very low or does not exist at all. These aspects have relegated producers to local, reduced, and poorly remunerated markets. From this perspective, efforts should be done to improve the capacity of farmers to produce high quality and differentiated products that can reach more markets where higher prices are paid. Following this line of thought many policy makers have focused heavily on projects designed to increase industrial and agricultural capabilities such as the Alianzas Productivas initiative. Under this approach the problems that small farmers face arise from and affect one linkage in the whole food supply chain, the production one.

Others consider that the problem of farmers is not limited to issues in the production linkage. Many of the challenges they face today are a direct or indirect consequence of how the products circulate within the economy, or in other words, of how the traditional food supply systems work, which to the eyes of many are full of inefficiencies [Guarin, 2009]. Thus, production and distribution of farm inputs, farm production, and food distribution are viewed as a system because they are interdependent. Small increases in productivity in one part of the system may greatly improve the potential for the whole system. Similarly, failure at any functional level may cause stagnation in the entire system [Harrison, Henley 1987]. From this perspective, it is of critical importance to understand how production is linked to consumption in order to identify problems of market organization that eventually connect back to the farmers in rural areas.

In this thesis, the second view has been adopted, not only because it is believed that many problems peasants face have actually their root in other linkages of the distribution and marketing food system, but also because the peasant farming issue is not only about rural families and their level of incomes, but also about urban families and their food security. In order to know how the peasant economy works is necessary to recognize the complex network of relationships in which the peasant production is embedded, and that make possible to have a domestic market to provide Colombian families with food. Thus, specific actions must be taken both at production and distribution/commercialization level.

It is often ignored that the low competitiveness of producers is a problem that impact negatively the whole society. Since urban consumers can seldom produce their own food supply, demand for food has expanded in direct proportion to urban population growth. In Latin American countries the population growth has varied between 5% and 7% in the last decade. A population growth rate of 3% produces a doubling of the population every 24 years. In addition, there is a rapid migration from rural to urban zones due to factors like poverty and conflict. These conditions are obviously producing great pressures on the food marketing system. In Colombia population growth rates have been about 3% annually over the past decade. Consequently, food production and distribution are under extreme pressure, and the food security threatened [CIAT, 2000].

In addition, there is a relatively high concentration of wealth, income, and political power in most Latin American countries. Poor people (both rural and urban) make up the bulk of the population. Besides, the percentage of family incomes devoted to food purchases is very high compared to that in developed countries. It is estimated that in urban areas 50 to 70% of the income is expended on food. In Colombia specifically over half the families are spending more than 60% of their incomes just for food, and many of the lowest income families spend 80% or more for food. The income elasticity of demand for food is

relatively high; therefore if the prices of food go down low income people can buy more food than those who have high income [Guarin, 2009].

Thus, the goal of helping rural agro-production goes beyond increase the quality of life of peasants. The goal is to improve the efficiency of the whole food distribution system, so that farmers have fair prices for their produce, and stimulate food production and distribution to guarantee reliable food supply at affordable prices, especially for low income people. The problem of small scale producers cannot analyzed without taking into account the socioeconomic environment of a country like Colombia, where most of population have a low average per capita income and population growth rates are relatively high, especially in the major urban areas.

1.3. How production is linked to consumption in Colombia?

The cultural and political heritage of Latin America has left a predominantly market exchange system in most countries. In Colombia, the open market to which peasants are articulated is constituted by rural-urban middlemen, which include wholesalers and retailers [MIT, UTB, 2010].

Wholesalers are in charge of the selling and distribution of commodities in big quantities. The main wholesalers are wholesalers of food markets, distributors[2], and exporters. Retailers include all the agents that reach final consumers such as retailers in food markets, supermarkets, mom n pops, minimarkets, etc.

The commercialization stage has basically two channels. The modern one, which includes supermarkets, specialized distributors, and market agents (for exports), and the

[2] For some products like rice and panela, distributors buy produce and distribute to other commercialization agents or other wholesalers [Takemoto, et al, 2010][Castellanos et al, 2009]

traditional one, which takes place in the food markets and is sustained by gatherers and a series of middlemen.

The structure of traditional food markets has been described as having an "hour glass" shape [Guarín, 2009]: many small producers, few wholesalers (some very powerful) in the assembly and distribution stage, and a multitude of small retailers. In these markets, the price of goods is determined at the time of sale, based on current conditions of demand and supply.

Within a relatively short time period, supermarkets have emerged as the only real competition to traditional markets. Supermarkets have established direct links with producers and setting the terms of quality standards, quantities, and prices through contract farming.

Although the modern channel is used by large scale farming, and direct contract farming arrangements to supply supermarkets are now increasingly common, still a substantial part of what is produced in large commercial farms also makes its way into the wholesale market in food markets. For this reason the attention is centered in this commercialization channel.

A more detailed description of the supply chain is presented in Chapter 3.

1.4. How to get food markets efficient?

1.4.1. Existing approaches

It is almost generally agreed that improvements in production and marketing efficiency should bring reductions in food production and marketing costs. The greatest relative benefit would go to the lowest income consumers, since, as it was said before, they spend

the highest percentage of their incomes in food. Hence, if food costs were reduced, they could buy more food, purchase more nutritious-foods, and considerably increase non-food expenditures (clothes, transportation, housing, personal items, etc.).

These changes would have a multiplier effect. The expansions in food demand would cause farmers to buy more seeds, fertilizer, insecticides, etc., which in turn would increase sales and employment opportunities in food production and marketing activities.

How to achieve these results is where much disagreement exists. There are different approaches as to how an efficient food distribution system should operate. At one extreme are those who claim that efficiency is achieved through a "modern" channel that is represented by a completely integrated channel that would consist of a firm that produces, processes, transports, and distributes products from the farm to the consumer under single ownership [PMAAB, 2004]. At the other extreme are those who defend the idea of a distribution channel formed by a variety of independently owned firms that produce, process, assemble, transport, and distribute products from the farm to the consumer. These independent firms coordinate their activity through different formal and informal arrangements [Guarín, 2009].

The ones who advocate for a "modern" (integrated or closely coordinated) channel argue that the higher coordination levels can be reached in these systems given that each member is a provider and recipient of information flows, the management techniques, the credit arrangements, and physical distribution practices. They claim that the fact that food markets are open spaces where many stakeholders get together make these places hectic and chaotic where hygiene, security and public space invasion problems arise. In addition, they say, physical handling costs are high as a result of the lack of coordination, individual negotiations, handling and transportation of small quantities of product throughout the marketing system, inefficient inventory management, and inefficient product packaging

and high levels of product theft and spoilage. From this perspective the small scale marketing firms may have higher unit cost than larger scale retailers.

It is also argued that this complex and uncoordinated network of stakeholders favor price manipulation. The intermediaries or trader associations speculate with prices, increasing food cost for consumers, and use their privileged access to local and regional markets to increase marketing margins at the expense of farmer's income. Thus, middlemen are seen as stakeholders that increase the transaction cost and add no value.

Under this perspective the solution is to provide easy access to physical "marketing" facilities for small-scale farmers (i.e. storage/processing facilities in rural areas, logistic platforms in the outskirts of the cities, and supermarkets in urban areas,). It is claimed that appropriate physical facilities can have a significant effect on market performance because physical changes forces management improvements and can reduce labor requirements. Ideally, current stakeholders should be replaced by operators like the ones found in supermarkets and specialized stores. With these changes it is expected that food prices reduce.

Also, the creation of public laws and programs to regulate or control middlemen are proposed as solution. The more common are price and margin controls, anti-speculation laws and, in some cases, nationalization.

Those who support the traditional channel argue that those who promote "modernization" of food systems are thinking from the perspective of the private enterprises and are only focused on increasing efficiency in food retailing from a logistics perspective and are ignoring the social dimensions of the problem. Policy markers considering marketing improvements must take into account external effects of these kinds of reforms and weight them against potential benefits. For example, food marketing

activities employ many low income people, therefore proposed improvements in marketing food systems must take into account their effects on employment

They claim that increased scale of operations should not be sought at all stages of the channel. For example, small farmers in labor abundant developing economies are just as efficient or more than large scale farms. Furthermore, the institution of large scale retailers on the order of magnitude of supermarkets in developed countries is not appropriate in many situations.

The peasant agriculture is an important component of the food markets because of factors related to the localization. Given that farmers are distributed around the country and close to medium and big cities, the transportation is not that complicated and expensive. Besides, there are additional advantages related to the continuous production given that producers are located in different regions with different weather conditions, which allow the provision of foods during the whole year, in small quantities. This reduces the need of processing and storage.

Middlemen's activities, on the other hand, should not be only seen as sources of revenue, but as being vital to the supply of food to urban populations. It is not always true that traders take advantage to the detriment of the farmer and the final consumer; in fact, in some cases their revenues are low [Forero, 2006]. Dispute resolution, supply control, provision of market information, and organization of transport for members can all be seen as ways in which associations assist their members to reduce transaction costs. This, in turn, can lead to more efficient marketing to the benefit of farmers and consumers, as well as the traders themselves [Shepherd, 2005]. When middlemen actually are exerting monopolistic power, the solution is not their elimination (as it is often proposed), but their regulation to correct the market distortion in the service they provide, always having in mind that this service is indispensable for the operation of the food supply system.

Traditional channel advocates say that the strong tendency to invest in physical "marketing" facilities (in the style of supermarkets) is due to the perceived political necessity of putting the taxpayers' money into things that are highly visible and durable. This bias is sometimes complemented by the foreign advisor's tendency to duplicate physical facilities from more advanced countries without adaptation to the local environment. This is not to say that improvements in infrastructure are not needed, but to highlight that physical infrastructure may be used to stimulate and encourage (rather than force) management innovations, and that marketing facilities should be designed according to stakeholder's dynamics, rather than against that. Thus, infrastructure investments should be thought to complement (not dominate as is so often the case) ongoing development processes.

On the other hand, public laws should be targeted to attempt to change their undesirable traits through education, technical assistance and economic incentives.

1.4.2. So, what approach to take? Are food markets an unnecessary system that distort the market or a necessary place for gathering and demand aggregation?

There are multiple examples in which the food markets and their middlemen are helping to make the food supply systems more efficient. According to a recent study which 11 trader associations[3] were studied [Shepherd, 2005], it was found that trader and associations assist their members to reduce transaction costs. In West Africa, associations negotiate with transporters on their members' behalf, making possible that small

[3] The following associations were covered by case studies. 1. Mohammadpur agricultural produce wholesale market traders' association, Dhaka, Bangladesh 2. Agbogbloshie tomato traders' association, Accra, Ghana 3. Apple traders' associations, fruit and vegetable markets, Azadpur Market, New Delhi, India 4. Brokers, merchants and millers Kahtaintaw association, Mandalay, Myanmar 5. Nepal fruit and vegetable wholesale traders' association, Pokhara 6. Ghana agricultural products traders' organization (GAPTO), Accra, Ghana 7. Dar es Salaam meat traders' association, Tanzania 8. Wholesale market traders' association of Antioquia (ASOBASTOS), Medellín, Colombia 9. Fruit and vegetable wholesalers' association, Sports City, Beirut, Lebanon 10. Karachi onion and potato merchants' and commission agents' association, Pakistan 11. Fresh produce retailers of South Africa, Johannesburg 12. Market traders' associations in Lagos, Nigeria 13. Busia district produce dealers' association (BUDIPRODA), Uganda

individual traders have cheaper access to transport and therefore reducing food prices and increasing quantities supplied to urban markets. In Pokhara, the association has negotiated new bus routes to the area of the market (most produce travels on the top of buses), and has also investigated the leasing of a truck to be shared by members. The Johannesburg association organizes transport for its members within the extensive area of the wholesale market and is planning to obtain a fork-lift truck. The Dhaka association's Cooperative Society purchases vehicles and sells them to members on an installment basis. The Lagos associations encourage collective procurement arrangements and the sharing of vehicles, as do the associations of Accra.

The association in Mandalay summarizes daily transactions and displays them on a large blackboard. This information is also sent to the Ministry of Agriculture's market information service (MIS) and to other agencies. In Pokhara, the association also assists with price collection for the Government MIS. In Dhaka, price information is monitored and posted in the association's meeting room. The Accra associations appear to be particularly active in this area. The tomato association monitors the price and shares this information with other markets in Accra and the rest of the country. The umbrella organization maintains close contact with all areas of the country and provides advice on the weather, crop production, road conditions, pest and disease problems, etc.

The Lagos associations actively encourage larger traders to lend money to smaller, retailer members. In Busia, members are linked to local microfinance organizations and the association assists with loan recovery from its members. The Mandalay association also links members with private banks. The association in Dhaka set up a Cooperative Society that actively lends to traders in the market

In Accra, the associations organize their members to carry out daily cleaning and assist the managers with more complex maintenance.

The Johannesburg association trains members in grades and standards and the Accra associations also address quality issues.

There have, however, been some successes in addition to those mentioned above. Negotiations by the Busia association, for example, led to a 60 percent reduction in market fees, improvements in market security, and a resurfacing of the market square.

This evidence shows that it is not possible to generalize as to what action measures should be taken to improve the efficiency of the food market systems. The incorporation of highly integrated and large scale markets agents may be appropriate under certain circumstances, and can make matters worse in others. Likewise, middlemen can act to the benefit or detriment of the farmers and final consumers. Consequently, there is a real need for having the information base necessary to judge objectively the role of the different stakeholders in the markets, and thus to define actions to improve their efficiency.

1.5. What is happening in Colombia?

Traditionally in Colombia the government interventions to support the development of the agriculture sector have been focused on increasing productivity through agriculture reform, credits, technical assistance programs, etc. PRONATTA, the Alianzas Productivas Program, Finagro, are just some examples.

Generally, this kind of initiatives has brought some benefits, but their impact has been reduced and they have not produced a sustainable improvement in the producer incomes, and have not contributed significantly to the improvement of their quality of life.

On the other hand, other government initiatives have tried to do food distribution system reforms. Even though these projects have failed to solve the problems, understanding

their evolution provides valuable insight as to the market dynamics in Colombia as well as the linkage between small-scale farmers and consumers via mom-and-pop stores. Two cases will be presented in the following sections: Bazurto, the food market of Cartegena, and Corabastos, the food market in Bogotá.

1.5.1. The Bazurto Market

The Bazurto market is the main food outlet of Cartagena, the capital of the state of Bolívar. This place attracts many market agents and consumers of all classes daily. Given the repercussion of the food market in the economic and social activities of the city, Bazurto has a significant importance for the city.

However, its uncontrolled growth, disorganization, congestion and insecurity among other problems, have turn Bazurto into a source of urban problems that have hinder the strategic and planned development of the city.

To understand the problem is necessary to refer to the history of the market and why this was created.

The Getsemaní Market

Between 1888 and 1890 arose the idea of creating a public market. The existing food market included fish vendors, small stores called *graneros*, and a butcher. The dispersion of these sale spaces drove the government to build a market for Cartagena [MIT, UTB, 2009].

The market was called Getsemaní and it was open in February of 1904. It was structured in several sections: a meat section, grain section, shoes section, and other sections added over the years. This facilitated the buying process of the people from Cartagena, since

back at that time there was not a supply center. Thus, Getsemaní become a point of converge of habitants of diverse social classes.

After a while, though, problems started to be evident. There was invasion of the public space, a continuous increase of informal vendors, precarious infrastructure, illegal activities, insecurity problems, and congestion. By the 70's, the market was in a highly advanced deterioration state. The number of vendors located in the streets had increased, the problems of hygiene had worsened, and the prostitution activities were spreading. On top of this, in 1962 a fire destroyed part of the market, and in 1965 a hint exploited damaging part of the market. Thus, the moment to move the market had arrived.

There were two proposals: the architect Gabriel Andrade Lleras proposed to locate the new market in an area called El Espinal, while Lemaitre Román showed the area of Bazurto as a better option because it was center of the city, and therefore a point where all people had easy access to. The market was eventually relocated in Bazurto despite the Plan Regulador had established that given that Bazurto was an area where many roads converged, it should be kept clear for the good of the urban mobility. Finally, in January of 1978 the vendors were moved (using force in some cases) to the new place.

The Mayor defined rules and policies to prevent the same problems of Getsemaní from arising in Bazurto. A new set of rules were defined (including for operation and cleaning), gates to control entrance and improve security were put, sales zones were clearly defined to avoid the invasion of the streets, sections for different types of products were established, parking lots for vehicles and trucks were built, new bus routes were created, a police station were put next to the market, etc.

In the 70s supermarkets were introduced in the city and for the first time Bazurto had a competitor. Besides, by that time the refrigeration was becoming increasingly popular and

there was no need to go to the market daily. This fact drove the market to adopt a role of wholesaler.

The Market Today

The Bazurto market, given their size and diversity of products, continue to be the main supply place of the city and therefore attracts a high number of people of diverse income level. However, and despite the measures taken to avoid the same problems that Getsemaní had, the market has grown without following any plan and the administration has not taken an active role in its sustainable development. As a result the bad life, work, and environment conditions are evident.

As mentioned, the market is located in a zone considered "bottle neck" for the city due to the narrowness of the area, which is driven across by the 90% of the bus routes. The location of the market in such a central and congested area has generated urban problems such as the insecurity, environment contamination, and lack of mobility, which affects not only the market but the neighborhoods around it. The problem is worsen by the fact that buses make frequent stops there, vendors are located in zones assigned for parking, load and unloading activities are carried out in random places, and that there are no sidewalks for pedestrians inside the market. Figures 1 and 2 show the congestion level and the environment conditions of the market.

Figure 1 Congestion level in Bazurto
Source: Brieva (2010)

Figure 2 Contamination situation in Bazurto
Source: MIT,UTB (2009)

What is being proposed?

The reform being currently proposed includes the restructuring of Bazurto, the building of a wholesale facility (located in the outskirts of the city), and a logistic platform (right next

to the wholesale facility) which would work as a storage and distribution facility. Thus, the idea is to relocate wholesalers in a new place, called Plaza Mayor, and let Bazurto be just a retailer trade facility. New roads and infrastructure would be put in place so that wholesalers can distribute to retailers, and thus eliminate the congestion, insecurity, and lack of hygiene of the market [MIT, UTB, 2010].

This reform was the result of the need to clear one of the avenues (Pedro de Heredia) that surround the market to build the new Transportation System called Transcaribe. More than 1000 informal vendors[4] are currently taking up this avenue.

In the short term, the reform requires the relocation of these vendors, in the long term a set of retail trade markets would be built where most of these people could work. The wholesalers, as noted before, would be in a place specifically built for wholesale trade.

1.5.2. The Case of Corabastos

Corabastos is the heart of the food supply system in Bogotá and Colombia. Thousands of buyers and sellers get together here every day. As in the case of Bazurto, however, Corabastos is currently facing many problems which include congestion, lack of hygiene, security, appropriate infrastructure, etc.

In order to understand the problems and the potential impact that the reforms proposed could have, it is important to understand what led to the creation of this food market by taking a look at the history.

[4] Informal vendor are individuals that undertake commercialization activities that are not monitored by the government.

Plaza Bolívar

From the early sixteenth century the main food market was located in what today is the city's central square, the Plaza de Bolívar. This and other nearby open air markets functioned as Bogotá's centers for wholesale trade until 1910, when the first indoor market, the Plaza de la Concepción, was opened by the government. This market was the first official attempt to regulate food commerce [Guarín, 2009].

In 1953 this traditional wholesaling plaza was transferred, by order of the military government of General Gustavo Rojas Pinilla, to a new place called Plaza España, which served as the main food market in Bogotá for the next two decades. The movement was not completely planned, and suddenly an old residential neighborhood was transformed into a food market. Consequently, the area quickly became a chaotic and dangerous part of the city, with traffic congestion issues and an evident problem of invasion of the public space and streets given the lack of infrastructure. This situation made urgent the need to remove the market.

In 1965, the Colombian government in collaboration with the Latin American Marketing Institute (ILMA), a division of FAO, proposed a reform, which included the building of a wholesale facility called Corabastos. Unlike the Bazurto's reform, this reform established as its main goal to improve the nutritional status of the poor in Bogotá. The new system was also supposed to improve and modernize food gathering and distribution, to serve as a means of better coordinating food production and consumption, and to reduce real costs to the end consumer.

In 1972, the Plaza España was militarized and evacuated, and vendors were moved to Corabastos. Some of the wholesalers, especially grain and processed food traders, kept their warehouses in the Plaza España, but all the fruit and vegetable trade moved to Corabastos.

However, the actual actions taken were not what initially proposed. Instead of focusing on the stated objective of lowering food prices for consumers, Corabastos launched a number of initiatives such as potato storage, fruit and vegetable processing and exporting, meat processing, and grain imports, which instead involved offering direct subsidies to producers. These programs were not economically sustainable and were abandoned after a few years. By 1975 Corabastos was near bankruptcy.

Despite this, the facility continued to serve as the place to trade. The big wholesalers were the most benefited. The improvements in transportation, logistics, flow of information, etc., enabled some market agents to use economies of scale and improve their bargaining power and their margins. The concentration degree was high especially in the fruit and vegetable supply chain, where the largest twenty percent of the merchants controlled sixty to seventy percent of the total volume traded.

Overtime, Corabastos lost its importance in the trade of grains and processed food since these supply chains become increasingly integrated, relying less on wholesalers. However, Corabastos continued to be, as currently is, the main food outlet for perishables.

What is being proposed?

The Plan Maestro de Abastecimiento de Alimentos a Bogotá (PMAAB) proposed to restructure the whole distribution food system, from production to retailing. To achieve this, the following changes are planned [PMAAB, 2004]:

- Farmer's business associations would be promoted (referred in the PMAAB as Agroempresas Participativas Integrales Sostenibles or APIS). They would be constituted by producers with the capacity to integrate in the APIS's business.

- 23 store and processing centers (referred in the PMAAB as Centros Integrales de Producción Agropecueria or CIPAS) would be deployed in the main regions that supply Bogota with fruits, potato, and panela[5]. The other products (sucha as meat, eggs, rice, and wheat) already have private organizations that take care of this.

- 7 wholesale storage and distribution centers which include 4 logistic platforms in the four cardinal points of the city, 2 special centers (in the Salgar Port and the Dorado airport), and Corabastos, which would transformed into a smaller wholesale market and completely eliminated in 10 year time.

- 17 new food markets, 14 restructured food markets, and 4 eliminated. The resulting 31 food markets would work as sub-platforms that could get provisioned in the logistic platforms. Mom-n-pops owners and other retailers would buy food from these food markets.

1.6. Learnings

There are some key lessons from the case studies:

- The position of most of the Colombian's governments as to food distribution systems is that they are places that should be completely "modernized". The cases of Bazurto and Corabastos are a clear evidence of this. To government officials, the combination of low quality standards peasant production, manipulative cartel-like wholesaling, and atomized retailing has created an inefficient system with high transactions costs. Consequently, there is little inclination to assist or encourage the current marketing system.

[5] The CIPAS would be implemented in: Facatativa, Madrid, Cota, Zipaquirá, Tocancipá, Sibaté, Chía, Subachoque, La Calera, Sopó, Villapinzón, Tausa, Choachí, Fusagasuga, Guaduas, La Mesa, Valle de Tenza, Paipa, Santa Ana, Tocaima, Tocaima, Espinal y Villavicencio.

However, in recent years, governments have revisited the problem of food markets. A clear example of this is the Master Plan for Food Security proposed in Bogotá. In the plan, the Mayor acknowledges the importance of Corabastos and the role of mom-n-pop stores. The solutions proposed, though, continue to be the implementation of a modern infrastructure to replace the existing one, so that food distribution systems start to look like and evolve towards a supermarket-like way of operation.
It is recognized that a better infrastructure is necessary. Lack of storage space that improves the handling of food, packing facilities that streamline the operations of the market, as well as better basic services such as electricity, water and sewage are evidently an urgent need in food markets in Colombia. However, the reform should include more than new buildings and facilities. The problems found in food markets range from cartels driven by guerrillas and paramilitaries to child labor exploitation and food contamination. In this context, it is hard to believe that marketing systems will evolve automatically if appropriate infrastructure is provided. Additionally, the reforms have not taken into account the effects that a modernization process may have, not only over the people directly involved in marketing activities but also over people who depend on those activities to have food and incomes.

- As it can be observed the reaction of government is to solve the problem through development of physical facilities alone. It is argued that by providing the infrastructure of what it is perceived like an efficient market, the way of operation of it will change naturally. It is claimed by some government officials that wholesalers and retailers will have to adapt to the new system and that by having new and clean facilities people will change habits and hygiene will improve spontaneously.

History shows that the projects aimed to improve the market infrastructure and/or to build new wholesale markets, storage, processing or other commercial facilities have not solved the problems in the markets, and on the contrary the problems have arose again in the new places and the reforms have failed repeatedly. In fact, Corabastos

and Bazurto were originally intended for wholesale trade only, from which products would be distributed to retailers, in similar way to how supermarkets works today, but even from its beginnings in the 1970s it was clear that the same complex mix of both wholesaling and retailing operations that characterized the old and former market places was inevitable here too. Rather than seeing an improvement in the efficiency of existing food distribution operations through gaining of scale economies and implementation of modern management methods, a multiplication of traditional operations has been observed.

- The reforms proposed for Getsemaní and Plaza España, and the one being fostered now for Bazurto, were motivated by the urgency of solving urban developing issues such as congestion, invasion of public space, lack of security and hygiene, ignoring completely the stakeholders that conform the food supply systems, which are bound together informally with each other. The reforms have not taken into account, for example, that the efficiency of each firm in the channel is significantly related to the effectiveness of its trading partners, their need for or willingness to use the proposed storage facilities and logistics platforms, the conditions necessary for a effective use of the facilities, or the availability of a competent public institution with personnel to manage the facilities, and more important if the facilities fit within the managerial and institutional framework of the system that utilizes it. In addition, reforms actually have never intended to radically change the way that agriculture was articulated to consumption, and did not lead to any substantial changes in the structure of production and marketing.

The reforms proposed are based almost exclusively on macro market analysis, but they do not effectively consider supply chain issues such as characteristics and problems of the marketing stakeholders (including farmers) at a micro level. As a result, there is insufficient awareness of the efficiency (or inefficiency) level of marketing tasks required to move products from the farms to the retail stores.

- Most aspects of marketing, other than investments in basic transportation infrastructure, have usually been relegated to a secondary role in the reforms. Actions needed to motivate markets participants to adopt better, improved or innovative services have not been included. Therefore, relatively little attention has been directed toward credit, technical assistance, market information, and training to improve marketing systems, especially private sector operations. Thus, it could be said that public programs to facilitate marketing system efficiency are often either completely absent or ineffectively instituted and managed.

- Base on the mentioned previously, it seems that the strategies for dealing with food supply systems have been based on conventional wisdom. As a consequence, government policies and programs often have little positive effect or, worse, may have a negative effect on the performance of the food production-distribution system. In order to be able to improve the process of de rural-urban commercialization to provide better conditions for the farmer to sell their produce, and in order to improve the prices paid to the peasant and reduce costs of marketing, it is necessary to develop the knowledge base and the analytical capacity to assure realistic analysis of food supply systems issues and to formulate effective government regulations, policies and programs.

2. ICT AND ITS USE IN COLOMBIA

2.1. Introduction

Worldwide the Information and Communication Technologies (ICT) are recognized by their impact in the development of the countries, and therefore their incorporation in the strategies and operation of the productive sector is considered essential.

Unfortunately only big economies have been able to take advantage of the development potential that this ICT-based paradigm, called the digital opportunity, offers, and whose impact goes beyond the economic field. Developing countries continue relegated and are experiencing another way of exclusion called the digital divide. Historically, the development of ICT has favored the more privileged, increasing the inequality. Thus, without appropriate intervention, ICT not necessarily bring benefits to all [Hilbert, Katz, 2003].

The different effects that the ICT have had could be a consequence that most of technologies have been conceived and developed in the context of developed countries, which have high capital intensity, and a bigger percent of workers and citizens with good levels of education. The situation is very different in developing countries like Colombia, especially in the rural zones where not even a stable electricity service is available, the phone lines are limited, and the Internet access is reduced [Departamento Administrativo Nacional de Estadística, Mapas Temáticos Censo General 2005, 2006].

Colombia is a very early stage in terms of ICT use and appropriation in the productive sector. Both the private and public sectors have put effort in promoting the use of ICT but the initiatives have been few and isolated [Ministerio de Comunicaciones, 2008]. In the agriculture sector specifically, only large scale production use these technologies. In the

industry and services sector the ICT penetration is also low since it is composed of mostly small and medium companies (SMB).

2.2. Current situation of Colombia in terms of ICT

2.2.1. ICT Infrastructure

Historically, the deployment of infrastructure in Colombia has faced important challenges as a result of their geography. The fact that Colombia has one of the most rugged geographies in the world, along with the high level of dispersion of population (especially in rural zones) has had implications in the provision of public goods, and in particular of infrastructure [Departamento Nacional de Planeación, 2006].

In the 90s, the telecommunication sector had a particular development given the shift from a monopolistic model to a competition model which led to an openness of the market. This improved the indicators of the sector and increased significantly the investment levels.

As it is shown in Figure 3, from 2001 until 2008 there were increases in the number of mobile phone users. 2005 was the year was the year of the highest increase (110%), in which Colombia reached 21.85 millions of subscribers. In 2007 the increase was of 14% which represent 4.18 additional users with respect to 2006 [CRT, 2008].

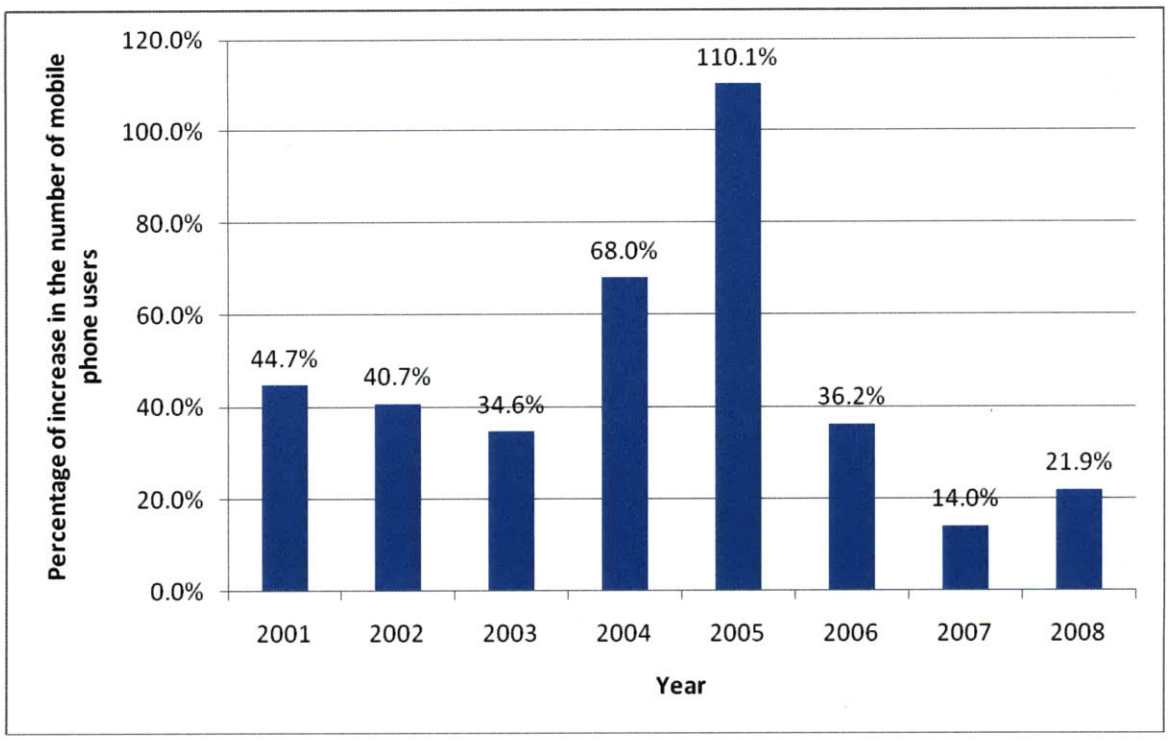

Figure 3 Percentage of increase in the number of mobile phone users in Colombia from 2001 to 2008

Source: CRT, 2008

From the last quarter of 2008 though, the number of users has decreased in a continuous way as showed in Figure 4[Comision de Regución de Telecomunicaiones Informe Sectorial de Telecomunicaciones No 15, 2009]. However, according to the World Economic Forum the current mobile phone subscription rate per 100 inhabitants is 91.9.

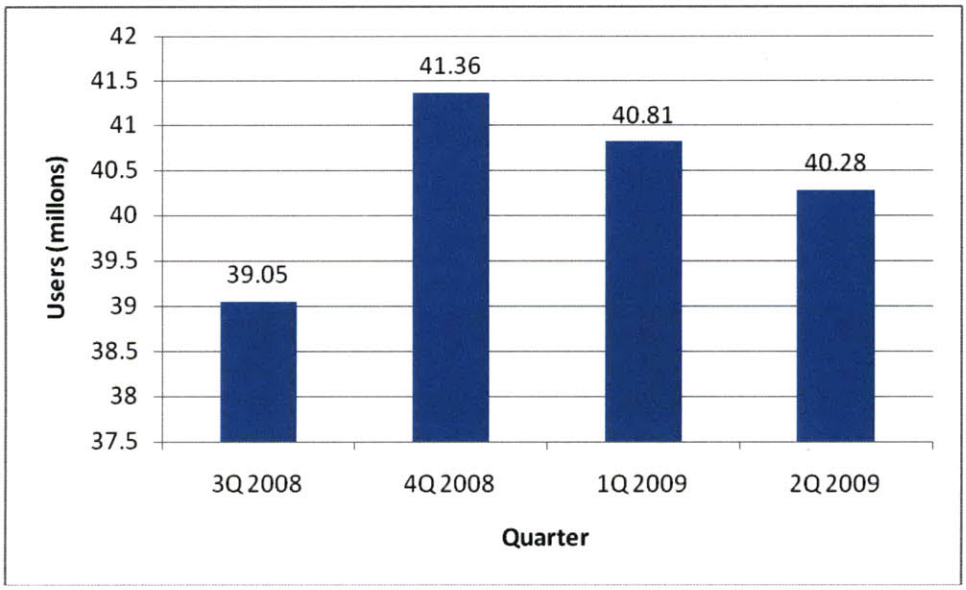

Figure 4 Number of mobile phone users in Colombia per quarter
Source: CRT, 2009

In the second semester of 2009, there were 34.3 millions of users in the pre-paid modality, which accounts for the 86.02% of the total subscribers in the country. In the post-paid modality there were 5.9 millions of users that represent the 13.98%.

Unfortunately the data are not disaggregated by urban and rural zones , but the Superintendencia de Industria y Comercio reported that in 2006 the 88% of the mobile telephony subscribers were distributed amongst the social stratum[6] 1,2 and 3 [Comisión de Regulación de Telecomunicaciones, Informe Sectorial de Telecomunicaciones No 8, 2007].

The progress that has been reached in this field was achieved thanks to a regulatory and normative framework that fosters the competence amongst the service providers [Ministerio de Comunicaciones, 2008].

[6] Group of people within a society who possess the same socioeconomic status.

The access to the Internet has also had an important growing and in 2006 for first time, the number of broad band users surpassed the number of narrow band users. By the end of 2009 the number of subscribers was 2,215,548 of which the 90.9% were broad band users [SIUST, 2010].

In June of 2009 Colombia reached 2,746,816 Internet users (both fixed and mobile), which represents an increase of 26% with respect to 2008. The number of Internet users through fixed networks had an increase of 11.26% and accounts for the 81.95% of the total users. On the other hand, the users who have dedicated access represent 77.3% (2,123,508) of the total of subscribers. The number of subscribers of the switched Internet services had 7,081 additional users which at some extent is the result of promotions or because the user cannot afford a dedicate Internet access plan [CRT, 2009]

Table 2 summarizes the distribution of Internet subscribers in Colombia by access type from December of 2008 to June of 2009.

Access media	Subscribers Dic - 2008	Subscribers Jun-2009	Variation
Dial-up	120,497	127,578	5.88%
Dedicated Access			
xDSL	1,198.306	1,360,553	13.54%
Cable	618,251	685,817	10.93%
Wireless (including WiMAX)	60,212	44,707	-25.75%
Others	26,075	32,431	24.38%
Mobile access	156,610	495,730	216.54%
TOTAL	**2,179,951**	**2,746,816**	**26%**

Table 2 Distribution of Internet subscribers in Colombia by access type
Source: CRT, 2009

Of the total of subscribers the 86.9% have broadband connections, which mean an increase of 25.3% with respect to 2008.

It is estimated that the number of people using these connections by June of 2009 was 19.792.718, which is a penetration of 44%, and an increase of 16.2% with respect to 2008.

On the other hand, Bogota, Medellín, Cali and Barranquila concentrate the 58.2% of the dedicate connections of the country as it is shown in Figure 5.

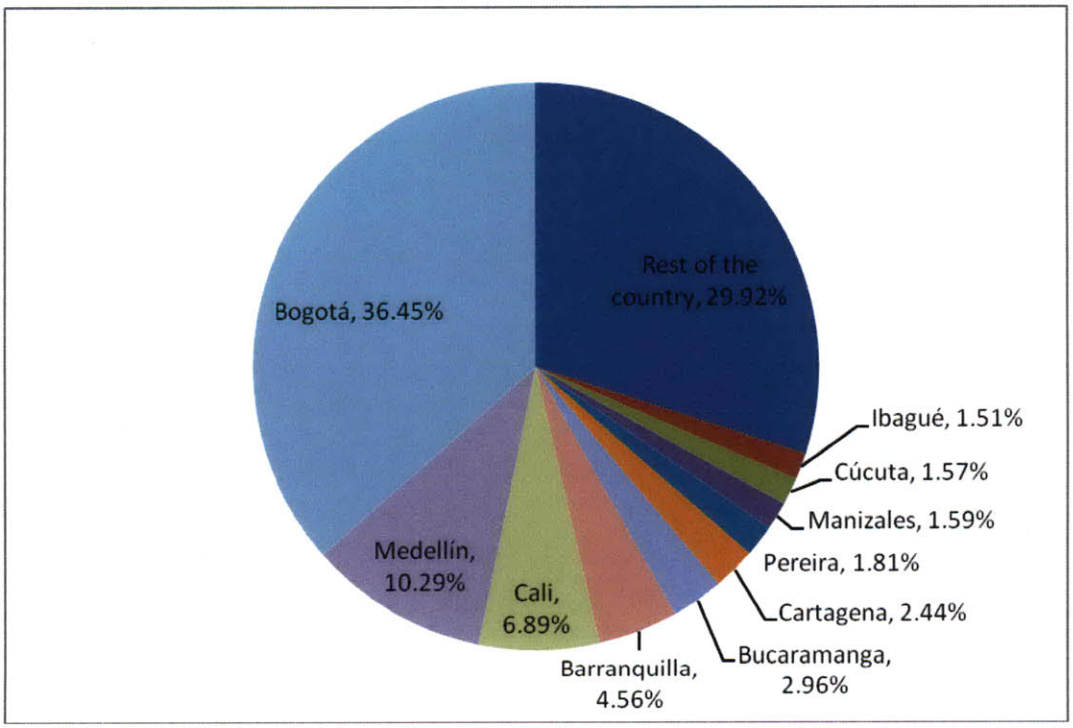

Figure 5 Distribution of Internet connections in Colombia by city
Source: CRT, 2009

For the rural sector though, the collective access options continue to be the main way of having Internet Access. According to the Sistema de Información Unificado del Sector de Telecomunicaciones by the end of 2009 there were 19,072 subscribers of which the 61% are in education institutions. Figure 6 shows the distribution of the collective Internet access in Colombia. Here it is important to highlight that the access in schools is limited in

terms of time and people. Only staff associated to the school is usually allowed to use the computers in business days.

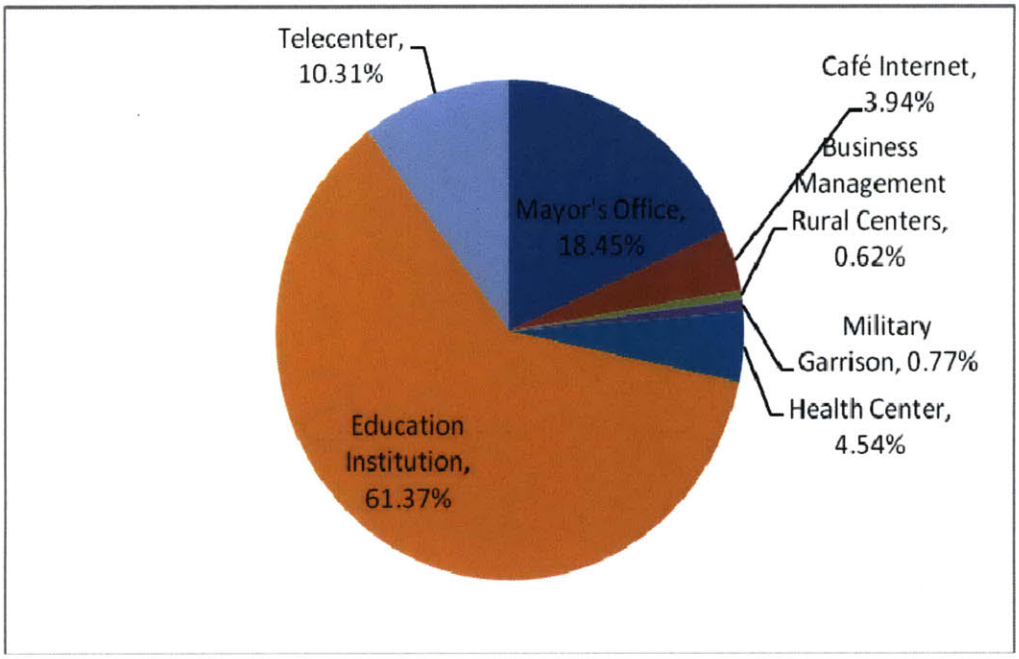

Figure 6 Distribution of collective Internet access centers in Colombia in the last quarer of 2009
Source: SIUST, 2009

2.2.2. ICT Preparedness

When analyzing the situation of a country of in terms of ICT, not only the infrastructure component should be considered. The utility that ICT can bring to a country is a function of both coverage as well as use. A brief and general diagnosis of Colombia in terms of ICT preparedness is included in this section. The most representative indicators (index) worldwide are analyzed for Colombia.

The World Economic Forum in cooperation with INSEAD produces a report with the Networked Readiness Index (NRI), which measures the economies' preparedness to leverage ICT advances for increased competitiveness and development [Word Economic Forum, 2010a].

The framework aims to measure:

- The degree to which a national environment is conducive to ICT development and diffusion, by taking into account a number of features of the broad business environment, some regulatory aspects, and the soft and hard infrastructure for ICT;

- The extent to which the three main national stakeholders in a society (i.e., individuals, the business sector, and the government) are inclined and prepared to use ICT in their daily activities and operation;

- The actual use of ICT by the above three stakeholders.

In 2009-2010 Colombia held the 60th position amongst 133 countries, and it was surpassed by countries like Panama, Uruguay, and Costa Rica. Chile had the highest rank of the Latin American countries. By looking at the individual components, Colombia ranked 81, 49, and 52 in the environment, readiness, and usage components respectively.

The World Economic Forum also developed a index called Growth Competitiveness Index which is made up of over 90 variables organized into 12 pillars: private institutions (pillar 1), appropriate infrastructure (pillar 2), macroeconomic stability (pillar 3), health and primary education (pillar 4), higher education and training (pillar 5), good market efficiency (pillar 6), labor market efficiency (pillar 7), financial market sophistication (pillar 8), technological readiness (pillar 9), market size (pillar 10), business sophistication (pillar 11), and innovation (pillar 12) [Word Economic Forum, 2010b].

Colombia ranked 69 among 133 countries in the Growth Competitiveness Index (GCI). When compared to other Latin American countries Colombia is behind countries like Chile, Brazil, Panamá and Uruguay. Specifically in the Technological Readiness component, and

when compared to other Latin American countries, Colombia is surpassed by countries like Uruguay and Brazil. Chile once again has the highest score in South America.

By looking at the aspects that compose the technological readiness, Colombia has higher scores in aspects such as Internet Users and Laws Relating to ICT, holding the positions 46 and 50 respectively. Broadband Internet Subscribers, Mobile Telephone Subscriptions, and Personal Computers have lower scores, keeping Colombia in the positions 61, 66, and 70 respectively. The country has the worst scores in FDI and technology transfer (75), Availability of latest Technologies (96), and Firm-level Technology Absorption (95).

The Economist Intelligence Unit has also an index called E-readiness which measures the quality of a country's ICT infrastructure and the ability of its consumers, businesses and governments to use ICT to their benefit. 70 countries are covered in the annual e-readiness rankings [Economist Intelligence Unit, 2009]. The following are the aspects measured by the index and the weights assigned to each one:

- Connectivity and technology infrastructure 20%
- Business environment 15%
- Social and cultural environment 15%
- Legal environment 10%
- Government policy and vision 15%
- Consumer and business adoption 25%

In 2009 Colombia moved up 6 positions with respect to 2008, holding the position number 52. In the Latin American context Colombia is surpassed by countries like Brazil and Argentina. Chile has the highest score amongst this group of countries. By taking a look at the categories Colombia had the lowest scores in connectivity, consumer and business adoption, and social and cultural environment, getting scores below 5 (maximum score is 10). Colombia got scores over 5 in the other categories, being 6.35 the maximum score

achieved in the category of Legal Environment. Table 3 shows the different scores and the corresponding weights.

	Overall Score	Connectivity	Business Environment	Social and Cultural Environment	Legal Environment	Government Policy and Vision	Consumer and Business Adoption
Category weight		20%	15%	15%	10%	15%	25%
Colombia	4.84	3.90	6.06	4.97	6.35	5.00	4.08

Table 3 Category scores for the E-Readiness Index
Source: Economist Intelligence Unit, 2009

As it can be observed, Chile always has the first position amongst Latin American countries, and Colombia is in general terms always below of countries such as Brazil, Argentina and Uruguay.

Colombia, always had low scores and positions in aspects related to usage and the incorporation of ICT at firm level: 52 (out of 133) in usage component according to Networked Readiness Index, 95 (out of 133) in Firm-level Technology Absorption according to the Growth Competitiveness Index, and 52 (out of 70) in consumer and business adoption according to the E-readiness Index.

The outstanding progress of Chile could be attributed to its commitment not only with the policies aimed to the increase of the competitiveness, but also with the policies focused on the appropriation and use of ICT [Ministerio de Comunicaciones, 2008]

2.2.3. ICT Policies

Since 1999, the national government has implemented universal access and service programs with the focus on developing communication infrastructure geared to the provision of telephony and Internet services.

One of them is "Computadores para Educar" which provides computational infrastructure to public schools. These computers are donated by institutions that do not use them anymore. It is expected 45% of public schools to benefit from this program at the end of 2010, and to have one computer for 20 students, instead of the current one computer for 48 students [Programa Computadores para Educar, 2009].

This strategy was complemented with the exemption of the IVA[7] to computers whose cost was less than $ 1,107 [8]and the provision of credit for college students and other specific groups [Ministerio de Comunicaciones, 2008].

Another program lead by the government is COMPARTEL [Compartel, 2010], which has five subprograms:

- Rural Telephony: provides telephony service in areas where it is missing.
- Tele-centers: deploys computers services, Internet access, and telephony in different municipalities in the country.
- Connectivity: provides Internet access to public institutions such as schools, libraries, hospitals, governmental and military facilities located in rural and/or excluded zones.
- Replacement and extension: focuses on the improvement and growth of communications infrastructure in area with high levels of unsatisfied basic needs.
- Community programs: foster the creation of broadcasting stations with public interest content to support communication strategies and strengthen indigenous culture.

It is hoped 22,406 public institutions to have Internet access by 2010. Besides, different strategies will be designed in order to improve the connectivity of 8,886 public schools

[7] Spanish acronym for "Value Added Tax" or VAT

[8] Colombian Peso to US Dollar currency exchange rate used: 1 USD = 1818.5 Colombian pesos

and transform these institutions into Community Access Centers, leaving the country with 10,000 Internet Community Access Centers.

Currently, Compartel is redefining its goal, and is seeking to regionalize its projects and give more emphasis on connectivity for Small and Medium Enterprises.

CERES (Centros Regionales de Educación Superior) is another government initiative to provide superior education in remote and rural areas or less privileged urban areas, and thus foster the social, economic, and human development. Each CERES is the result of a strategic alliance between national and regional governments, civil society, private sector, and superior education institutions. Offered programs need to be pertinent, high-quality, and may be taken at distance. To achieve this objective, the national government provides the financial resources to create a computer room with Internet access providing all the required equipment. By the end of 2007, Colombia had 100 CERES deployed through this initiative [CERES, 2010].

On the other hand the E-Government strategy has been strength. This initiative is being led by the program Agenda de Conecetividad and is aimed to help that the government becomes an example of ICT use and access to interact with the citizens, and ensure transparency in the decision making process and simplify the management. Their components are a government intranet and a set of E-Government services which are classified in three categories: transversals, sector based, and for access [Agenda de Conectividad, 2008]. The former involve the cooperation and participation of different public institutions from their design to their use, some examples are: el Sistema Seguro de Información, Antecedentes, Transacciones y Activos -PIJAO-, y el Sistema Electrónico para la Contratación Pública -SECOP-. The sector-based services are focused on the streamline of administrative proceedings such as: Ventanilla Única de Comercio Exterior (www.vuce.gov.co), Registro Electrónico de Derecho de Autor (www.derautor.gov.co), el Registro Sanitario Electrónico (www.invima.gov.co), and Registro Único de Afiliados a la

protección social -RUAF-. The services for access seek to provide citizens with easy and timely access to government information. Some examples are: Portal de Información y Servicios del Estado Colombiano (www.gobiernoenlinea.gov.co), Portal Único de Contratación (www.contratos.gov.co), Sistema Integral de información de la Protección Social - SISPRO - (www.sispro.gov.co)

As it can be observed, until 2007 the policies for ICT in Colombia were more focused in proving access to ICT. For this reason the strategies implemented centered their efforts in deploying infrastructure, and less attention was paid to the preparedness of people to use them, the content and services provided through that infrastructure and the sustainability of these projects with limited duration and funded with public resources.

In 2008 the Communications Ministry (now called Information and Communication Technologies Ministry) launched the National Plan for the Information and Communication Technologies (or PNTIC, by their abbreviation in Spanish). In this plan it was recognized that Colombia needed to cover the ICT infrastructure deficiencies while promoting the use of it [Ministerio de Comunicaciones, 2008].

The plan reflects that the incorporation of ICT is considered strategic to foster the competitiveness and the equality in Colombia, and was conceived as a medium and long term strategy to achieve the appropriation of ICT at individual, business, academic and government level. The goal of the government is that by 2019 all Colombians are connected and efficiently using ICT.

To achieve this goal, the plan is structured in 8 themes: 4 transversal and 4 vertical, as Figure 7 shows. The transversal ones cover aspects and project that have effect over all the sectors and groups of the society. The vertical ones are meant to help a better incorporation of ICT in some sectors prioritized. The transversal are: i) Community; ii)

Regulatory Framework; iii) Research, Development, and Innovation; iii) E-Government. The vertical ones are: i) Education; ii) Health; iii) Justice; and iv) Business Competitiveness

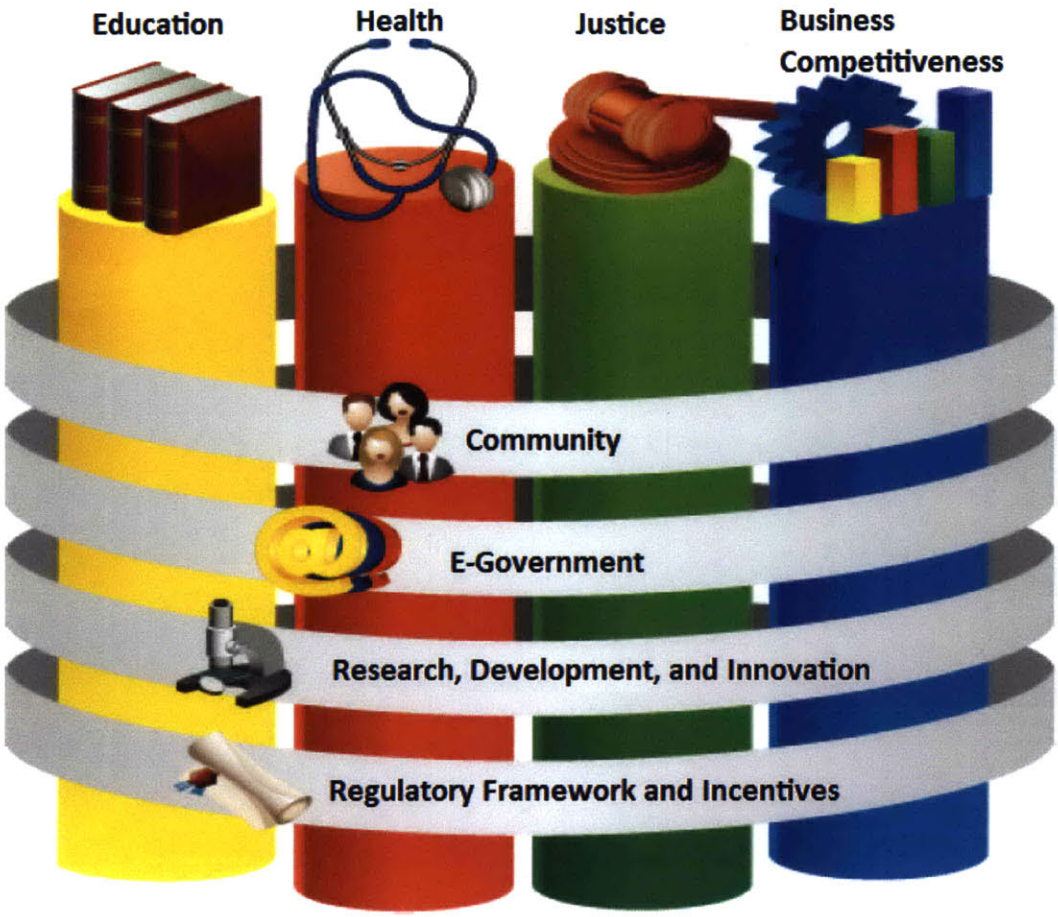

Figure 7 Components of the National ICT Plan
Source: Ministry of Communications, 2008

Given the limited public resources and the window of time in which the goal wants to be achieved, the involvement of the private sector is necessary. For this reason the public-private partnerships play a key role in the execution and sustainability of the projects. Strategic alliances with telecommunications operators, technology providers, associations, and the productive sector are just some examples. Likewise, the academy and the international cooperation also considered as important actors in this process.

Specifically in the business competitiveness component, both small and medium business (SMB), supply chains, and clusters are considered. The priority at the moment is the SMB and the focus is on to increase: the e-business and e-commerce activities, the broadband connections in SMB, the use of computers, the use of ICT in the productive processes, the preparedness level of the employees, the productivity indicators.

The indicators to measure and monitor the progress are: the percentage of employees that use ICT and the percentage of business that carry out business transactions through Internet.

To achieve this, the program Compartel, as noted previously, has broadened their focus and its priority is not only the improvement of ICT access in the most isolated areas of the country, but also the SMB. The program Digital Territories has also promoted the use of ICT within SMB.

On the other hand the government has enacted laws related to e-commerce and digital certification to create an environment in which companies feel motivated to use ICT in their business transactions.

Likewise, the use of ICT by the government has improved so that its relation with the business is easier, and now many administrative proceedings can now be done online. This fact along the credit facilities and the low interest rate, and the reduction of taxes (IVA) has led many businesses to acquire hardware and software in the last years.

These efforts have without doubt generated improvements. It has been found that the 90% of the companies with more than 50 employees have Internet access, 46% of bandwidth, and 52% have their own web page. These statistics, though, refer to the type of companies that only account for 14% of the productive sector.

In addition, this diffusion of ICT is concentrated in the urban areas and for this reason online services as not as developed as expected. The transactions via Internet are used only by 2% of these companies (with more than 50 employees).

Thus, actually just a low percentage of the business (between 30% and 40%) have Internet access, and an even lower percentage (25%) use ICT in their productive processes and commercialization of their products. If the informal sector were included, these numbers would be even lower. Thus, in Colombia there is a big digital divide between small and big enterprises that needs to be addressed, specially taking into account that the SMB represent 98% of the Colombian enterprises and they generate the 85% of the employment.

The problem is even more evident when export focused sectors report not to use ICT in some of their linkages. This is the case of the flowers and coffee in the part of agriculture production. The agriculture and the industrial production targeting the domestic market have the lowest levels of ICT appropriation.

2.3. How the ICT have been incorporated to help rural farmers and supply chains?

The Ministry of Agriculture and Rural Development, in collaboration with the Food and Agriculture Organization of the United Nations (FAO), has started an initiative called Information and Communication Network for the Agriculture Network or AGRONET. This website is aimed to provide policy markers with strategic information about the agriculture sector, as well as to provide small scale farmers with information about market prices, inputs prices, best practices, and credit access [Agronet, 2010]. This project started in 2005 but according to the case studies done (Bazurto and Corabastos) the availability of this information has not changed the dynamics of the markets, and it seems the use of this information services amongst farmers and other stakeholders is reduced.

However, there have been other initiatives undertaken for the private sector and the academia that have also tried to help small scale farmers and have left important learnings. This is the case of the LINK-ALL project which will be described next.

The LINK-ALL case

LINK ALL was a project of digital inclusion whose main goal was to help Latin America rural communities to achieve sustainable development, access to global market, and foster their collaboration and integration through ICT. It focused on three sectors: crafts, eco-agro tourism and cultural heritage, which are complementary and strongly linked to remote rural areas [Maya, Ramírez, 2006].

The LINK ALL platform, which was the main result of this project, was focused on business to business electronic commerce, and provided several facilities aimed to improve other process along the supply chain. It had services that allowed actors to share information about events, news, best practices, contacts, as well as to expose products, find funding opportunities, and make these communities and their products and activities both visible and accessible to global business actors. All the services were accessible via web, and some of them were made available through mobile phones.

In addition, some back-office and front-office mobile-based services were added. A traceability application which could be used to collect information in field by using mobile devices, and an application to manage orders through mobile devices were developed to streamline the logistics in the production and order management processes. As to the front-office services, an application to search for offers were implemented for business actors were able to look for products and services offered by the *demonstrators* by using their cell phones.

LINK-ALL was led by the Egnatia Epirus Foundation (EEF) from Greece and carried out by 6 European partners and 10 Latin American partners. Table 4 shows the different stakeholders that participated in the project.

Name	Country
EEF	Greece
Centre de Recherche Public Henri Tudor	Luxembourg
Instituto de Engenharia de sistemas e computadores do Porto	Portugal
Beratungsstelle fuer Formgebung	Germany
European Centre for Eco Agro Tourism	the Netherlands
Departamento de Telemática - Universidad del Cauca	Colombia
Cybercultus	Luxembourg
Iber2net – Ibermática	Spain
Centro Latinoamericano de Economía Humana	Uruguay
Instituto Latinoamericano de Museos	Costa Rica
Instituto Coordillerano de Estudios y Promoción Humana	Argentina
Manos del Uruguay	Uruguay
Gestión y Desarrollo	Chile
Industries Federation of Santa Catarina State	Brazil
Cooperativa Nacional de Ahorro y Crédito	Uruguay
INCO (Instituto de Computación) , Facultad de Ingeniera, Universidad de la República	Uruguay
Committee for Democracy in Information Technology	Brazil

Table 4 LINK ALL stakeholders
Source: Maya, Ramírez, 2006

The project started officially in October of 2003. Over the first years, the partners worked to identify specific needs of the three targeted sectors and Latin American rural communities that were prepared and willing to be involved in the project. These

communities were called *demonstrators*. The technological platform was developed and adjusted over the second year and the first half of the third. Over the rest of the third year, the *demonstrators* selected in Costa Rica, Brazil, Chile, Argentina, Uruguay and Colombia validated the platform. In order to do this the rural communities were provided with Internet access and training in the use of the use of computers, Internet and the LINK-ALL platform itself.

In the case of Colombia the pilot project or *demonstrator* chosen was the Corporación para el Desarrollo de la Sericultura del Cauca (CORSEDA) because it is made of 10 rural associations of silk producers and craftswomen located in the state of Cauca. More than 150 families from different ethnic (natives, campesinas, mestizas and afroamerican) group belong to CORSEDA, which includes from the growing of silk cocoons until their transformation into threads and clothes. The articulation level of this chain along with the fact that its products are 100% hand-made and organic was another aspect that made CORSEDA an excellent candidate for participation in LINK ALL.

CORSEDA, as the other *demonstrators*, was provided with Internet access, in this case through a wireless link to the data network of the University of Cauca. In addition some craftswomen were taught how to use the computer and the LINK ALL platform.

This project brought benefits to CORSEDA. At operation level the associations become more aware of what e-commerce implies, and could identify the aspects they need to improve such as the shipping of orders, and the ones they need to put in place such as intellectual protection to images and designs, and bar codes incorporation in their products, among others. At productive level associations were motivated to continue to improve the time and cost of production, the standardization processes, and understood the importance of traceability processes to enter to the global market. At strategic level CORSEDA was sensitized about the advantages, disadvantages, and challenges of

incorporating ICT and its potential to improve the quality the life of their producers and craftswomen. Likewise, the interest and confidence in the use of ICT was increased.

Unfortunately, the LINK ALL platform did not reach the expected impact because the platform was not used as much as expected and the lack of business actors prevented the platform from entering into an operational level. This experience, however, left lessons learned which are described next.

2.4. Learnings

- **Equally foster the development of digital products and processes**

To promote changes in organizations through the incorporation of ICT implies the digitalization of certain processes within and among associations. However, it is common that the ICT based strategies and projects to mix up digital processes with digital products.

It is very important to highlight that infrastructure and software deployment alone does not lead automatically to the digitalization of processes. This goes beyond and implies the effective incorporation of ICT in certain activities of an organization is needed to make them more efficient [EPAL, 2003].

Often it is also forgotten that the digitalization of processes are conditioned by factors that could either facilitate them or hinder them. Low income level, low education level, inappropriate regulatory frameworks, demanding standards fulfillment requirements are some examples of bottle necks that could prevent the digitalization of processes. There are both aspects inside an organization and conditions of the environment (local, national, and even international) that may affect positively or negatively.

In the LINK ALL project most of the efforts focused in the development of a B2B electronic commerce platform (digital product) developed with the newest available web

technologies. Even though the project was designed for the Latin American rural producers sell products to business actors in Europe where the electronic commerce (digital process) is more popular, several bottle necks were not taken into account which eventually would impede the functioning of the platform at commercial level.

A first neglected aspect was the fact the many rural communities were not prepared to start a process of access to the global market at a big scale. Their production is still a craft industry, their standardization and control quality processes are immature (if any), traceability processes are not in place, which in some cases are a requisite to export, the shipping of products increased considerably the cost of the products, and there were not financial resources to keep a stock abroad. The bottle necks came from many parts, not only from the fact that CORSEDA did not have connectivity or electronic commerce platform.

Besides, it is important to take into account that the digital processes have impact when the digital flows reach all the stakeholders involved not only a small group. For example, in the last years there has been a fast increase of web pages of small and medium enterprises. CORSEDA, for example, has had its own web site for many years and its experience shows that even though this can help to increase the demand of its products[9], it has not fostered the information flows within associations.

The LINK ALL platform was designed to promote the integration and inclusion of rural local actors. Services for the interchange of news, events, best practices, etc., were included. However, these did not have the expected impact either, not only because of the bottle necks created by the low education level of the rural producers, but also because the management information that this implied was too much burden for the producers both in terms of effort and time. Additionally, the incorporation of the facilities was not at the appropriate level to foster the information flows, and it was limited to one stage of the

[9] Most of CORSEDA's exportations are thanks to the advertisement of its products through its web site.

chain, the commercialization one. While the B2B electronic commerce service was meant to be used just by the stakeholders in the commercialization stage, to achieve a higher participation and interaction between producers required the ICT incorporation to a broader level within the supply chain.

Usually, these bottle necks are generated because the incorporation of a specific type of ICT is not appropriate for the capacity of the organizations, and therefore people cannot use them and take advantage of them. In other words, these bottle necks in some cases are due to the incorporation not contextualized of ICT in an organization.

Even though some bottle necks are due to external factors and therefore are out of the control of an organization, it is important to take them into account when it comes to define and design the type of processes of digitalization that want to be started, otherwise the internal efforts could be completely useless if there are exogenous factors that somehow hinder the digitalization of those processes. On the other hand the bottle necks created within an organization are easier to control and eliminate, but as it was seen in the case of the LINK ALL project, it is critical to be aware of what a digitalization process implies and not to underestimate its complexity.

- **Simple, traditional, and available ICT to facilitate appropriation, inclusion and sustainability.**

Taking into account that the rural zones are characterized by low endogenous capabilities and low use of ICT, the incorporation of simple, traditional and available ICT is an effective way to Foster the information flows and avoid some bottle necks.

Simple ICT to achieve appropriation

The term simple makes reference to ICT that do not require people to have high education level to use them, and where the basic communication skills a person owns allow her/him to make effective use of these technologies. Examples of simple ICT are the phone (both mobile and fixed) or community broadcast radio. It is worth it to highlight that the illiteracy levels in Colombia are high and therefore the type of ICT to be incorporated must be in keeping with this situation. Otherwise the cost and the effort needed to process information will increase instead of decreasing.

As the LINK ALL case shows, web based services usually require that the users have the necessary competences, not only to use a computer, but also to select, analyze, and evaluate information and sources of information. The model that the Internet imposed in the way of processing and gain knowledge requires people to go through a learning process that even people with higher education levels than rural people have not completed. As a consequence, many users still feel overwhelmed, confused, the transaction cost increases, and the main objective of the digitalization, which is to foster communication and streamline tasks, is not achieved.

On the other hand, the changes in the daily tasks that are generated when processes are digitalized are usually profound, and the effort required both in financial and human resources are big. For this reason the best way to start a digitalization process is with simple ICT that minimize the cost and the "extra work".

While big companies can invest now and to gain later, and the long term pay off is the best incentive to do big investments and changes, and even to tolerate possible reductions in the current production levels due to the incorporation of new elements, the small and rural business do not have capital to acquire advanced systems and are driven by short term results. In the LINK ALL process it was observed that if something requires a significant effort and dedication to generate results (such as the incorporation of the platform), it is difficult that people accept it because the cost may be too high for these

small organizations, especially if they are required to reduce the time to the productive activities themselves to do something related to the digitalization processes (such as attend training sessions or carry out content management). For this reason, the incorporation of ICT based tools that are demanding in terms of investment and social capital are not easily and rapidly appropriate in rural communities.

Traditional ICT to achieve inclusion

The term traditional refers to the technologies that are more aligned with the traditional ways of communication and interaction in the rural communities. In this sense, mobile phones are a good means to foster digital flows because the communication is voice based and person to person. Visits and personal meetings continue to have an important place in rural communication and cannot be easily or completely replaced by technologies. ICT have not surpassed the power that a face to face meeting has, where not only information is exchanged, but also knowledge, life experiences; and not only through text, video, or voice, but also through expressions, gestures and the fact of seeing other and learning by doing. For this reason an effective way to foster the digital flows is to use the ICT, not to change but to strength the traditional ways of communication in the rural communities.

The oral tradition has big importance in the rural population because for them this is most effective way to acquire new, practical, and useful information. The possibility of getting information from people in their same conditions is maybe the main advantage for them, because this information has been already filtered by the experience of others and is less abstract that the information provided by other means such as the Internet.

Any type of ICT was conceived thinking specifically in the rural population and in the demands of the agriculture sector. Thus, it cannot be expected that these technologies get naturally integrated in the productive organizations. However, some ICT are more easily

accepted by the rural communities because they are more in line with their way of interacting and communicating.

The experience with the LINK ALL project showed the ICT are usually seen as external elements and its incorporation that do not arise naturally within the rural organizations. In fact, the integration of ICT is usually done from outside to inside, and this increases the complexity of the process. However, by using ICT rural communities are familiar with can help to make these processes more agile and at a bigger scale.

Available ICT to achieve sustainability

The use of ICT easily accessible is important because only in this way it is possible to start digitalization processes more realistic and sustainable.

As it was observed in the previous sections mobile phones have reached the highest penetration in Colombia, including the rural zones. Even though the deployment of collective Internet access centers has increased the opportunity of rural people to access Internet, the usage level is still low. As described previously, most of these collective centers are located in schools, which limits the frequent use of the computers and Internet given the restrictions in terms of the people and hours of usage imposed in these institutions. The same situation is observed in Mayor's Offices, Health Centers, and Military Garrisons.

On the other hand, the Cafés Internet are increasingly becoming popular, at least in the rural regions with relatively high population density, but its cost continue to be far from affordable by everybody in the rural communities. From this perspective it seems that the mobile phones are more appropriate to initiate the generation of digital flows and the digitalization of productive activities in rural communities. These processes cannot take place if people only have sporadic access and use of ICT, as is the case with the Internet.

To think about the possibility of providing Internet access directly to the rural communities will be viable in some cases, for certain regions, and in some strategic points. However, as mentioned before, the digital flows need to reach all stakeholders along the supply chain. The cost of an Internet based solution includes not only the infrastructure costs, but also the training, maintenance, etc. The situation becomes more complex when satellite access is the only way to reach certain zones, the electricity service is not constant and stable, and the served population is dispersed and with limited transportation options.

- **The training processes should go beyond digital literacy and should include the development of information and communication competences**

The training is a critical component in the incorporation of ICT. These activities have been focused mainly in providing people with courses of a specific number of hours for them to use the computers, word processors, spreadsheets, the Internet, etc. This same method was used with the rural communities in the LINK ALL project. However, it has been seen that this approach has not produced the expected results. The motivation of people in the rural zones is not enough and in some cases they are not willing to invest time in this kind of activities; what is learned is easily forgotten due to the lack of opportunities to put the knowledge in practice; and the trained people not always become agents of change and transmit their knowledge.

One of the main drawbacks of this way of training is that is centered only in digital literacy, and even though this component is necessary, is not enough in a rural context. People need to develop other aptitudes and skills that enable them to manage information, which more than being related with technical aspects, are related with the development of the logic, the intuition, and the analytical thinking. These set of abilities

are commonly referred as information competences because are the competences a person requires to solve an information problem.

In order to have information competences a person should be able to recognize when information is needed, and he or she should be able to find it, evaluate it and use it effectively. In other words, a person is able to build links between the known and the unknown, to ask the right questions, and to get relevant information through different sources and finally to find an answer [García, 2006].

On the other hand, the training processes that are focused on how to use ICT do not generate incentives, especially in rural people, and this hinders the fast adoption of ICT. The certificates work well for formal professional education, but are not enough nor appropriate to generate interest and motivation to use ICT. The use of technology is fostered by rewards of economic or social nature that can be obtained in the short term, such as the resolution of problems, the saving of money, the facilitation of procedures, etc. The approach centers on the development of information competences offer incentives of this kind because provide people with more confidence and autonomy to resolve information problems. Conversely, with the method focused on digital literacy people feel that they do not receive any reward for learning how to use with efficacy the new tools, since they are taught how to use a computer and how to search in the web, but not how this new knowledge can be integrated in their daily activities to solve their problems.

On the other hand the development of information competences favors the interaction and not the individual work (as the training focused on the digital literacy does), and does not focused on the memorization of procedures nor the development of technical skills, but in the acquisition of transversal knowledge that are useful to resolve problems.

- **The goal of the digital processes should give priority to the development of endogenous competences, and not to be focused only in the provision of external services**

The tendency in Colombia and in Latin America in general is the use of ICT to digitalize the external processes of an organization through the use of web sites or B2C or B2B platforms as in the case of the LINK ALL project. In some cases this has caused that the potential of the ICT to improve the internal performance of the organizations is neglected or given a low priority [Hilbert, Katz, 2002].

On top on this, the concept of e-service is usually biased. Tele-health is associated to tele-appointments, the electronic businesses are centered in the relationship between the provider and the client, and the electronic government is focused on satisfying the needs of the entrepreneurial community, forgetting what have to do with the improvement of internal processes in hospitals and health centers, the efficiency of business procedures, and the increase of the transparency of the government.

The interaction between a business and the final user is just a part of the concept of e-service, usually the biggest benefits (and also challenges) are in the exploitation of ICT in the digitalization of the back-office, which include the internal processes and inter-organizational, the creation of networks both at horizontal and vertical level, etc. In the specific case of the electronic commerce, it is estimated that only a small percentage of the transactions are carried out by final consumers, while the rest are the result of the inter-enterprise interactions of the different productive systems [Hilbert, Katz, 2003].

The focus in the digitalization of external processes at the expense of the internal ones limits the potential of the ICT. The web sites for example usually have the only purpose of providing institutional information, show product and services, etc., but just in few cases

are used to facilitate the building of networks within and among organizations or to foster changes that lead to better ways of carrying out processes.

While in many developed countries the digitalization process started within the business, in the developing countries the process started the other way around. Many companies sent their first email before have their first data base [Hilbert, Katz, 2003]. This pattern can also be observed in hospitals, schools, mayor's offices, and rural farmers associations. The lack of use of ICT within the organizations is an obstacle to achieve appropriate and successful processes of digitalization. The benefits that a tele-appointment system or an electronic commerce platform can bring will be limited while the internal processes continue to be paper-based.

As it can be seen in this chapter, the incorporation of ICT in rural context requires taking into account the ways of expression, the beliefs, the traditional ways of communication, and the specific conditions of the rural population. Mobile phones seem to be the best alternative at the moment given the high penetration and the familiarity rural communities already have with this type of technology.

Thus, it is very important and necessary to formulate an ICT vision from a more social (as opposed to technological) perspective, where they are not perceived as inherent good tools or as instantaneous solutions to the problems of development. They should be considered as tools that can either increase or reduce the existing inequalities, and therefore its incorporations in any system requires a strategic planning and an incorporation appropriate to the social and cultural environment where they will be introduced (Cecchini, 2005).

3. OPPORTUNITIES AND CHALLENGES IN THE COLOMBIAN FOOD MARKETS

3.1. Introduction

As it was explained in Chapter 1, in order to create a favorable environment for improvements in the food supply chains, it is important for policy makers to better understand the interdependence of farmers and their marketing agents, because they are bound together in an often unknown or unrecognized partnership. Hence, the first step in the process of making policy recommendations should be to describe and analyze the current marketing system as a supply chain to identify major problems and opportunities.

In this sense, the analysis made in this chapter is aimed to go beyond the productive processes, and to be focused on the relationships established between the agents that participate in the food distribution systems, that are at the end what articulates the production and consumption. Thus, food supply chains are seen as social networks with dynamics of interactions both of cooperation and competence between their actors, which are diverse and heterogeneous, and in many cases, with interests in conflict [Plazas, 2007].

This analysis from a supply chain perspective it is also key from the a public policy perspective, since the policy recommendations to be made are meant to improve the quality of life of farmers, but not at the expense of the other stakeholders of the system, and specially final consumers. Special attention should be paid to avoid increases in prices of food that threat the food security of the low income population.

This chapter includes three components. The first is a model of a typical supply chain which allows representing and characterizing the most common path that a product follows from production to consumption. In the second part, an analysis of the

relationships of the different stakeholders is done. This is critical because in developing countries food distributions systems have in fact a number of structured systems and social norms of interactions that are not easily apparent but that are key for their sustainability. This leads to discover the challenges and opportunities that exist which are an indispensable input for the process of making policy recommendations.

3.2. Methodology

This analysis was made based on primary and secondary information. The former was collected through first hand observation, interviews, and workshops with different stakeholders in the market of Bazurto (Cartagena) and Corabastos (Bogotá). The secondary information includes studies, diagnosis, articles, and thesis related to supply food chains in Colombia, both general and specific to the targeted food markets. This information comes from institutions such as Agriculture and Rural Development Ministry, Environment Ministry, Supply Chain Observatory of Colombia, American Institute for Cooperation on Agriculture, Mayor's Office of Bogotá, etc.

The examination of the food distribution system in the market of Bazurto (Cartagena) was done in January of the current year (2010). This was possible thanks to the participation in the Practicum offered by the Department of Urban Studies and Planning Department, where 11 students from the MIT and 11 from the Universidad Tecnológica de Bolívar (Colombia), under the coordination of 7 advisors[10] studied four commodity supply chains. The fish supply chain was chosen as representative of animal protein, the plantain as perishable, and rice as no perishable, and flip-flops as non edibles

During the field work in Cartagena, several visits to the market were made. Once there it was possible to observe and understand in a detail way how the different products make their way from the farmers to the final consumers. In addition, interviews with

[10] From UTB: Jorge Alvis, Luis Ignacio Morales, Mauricio Rodriguez. From MIT: Edgar Blanco Martha Isabel Bonilla, Ralph Gakenheimer. External Expert: Alejandro Guarín

wholesalers, retailers, mom-n-pop owners were carried out. Meetings with public officials and other institutions involved with the reform to Bazurto also were held during the field work. These included representatives of Transcaribe, The Mayor's Office, and the Bazurto's Administrator.

The study of the Corabastos market in Bogotá was done in the summer of 2009, while doing an internship in the Center for Latin America Logistics Innovation[11]. The activities done included visits to farmers and farmer associations, meetings with institutions related to small scale farmers and food security such as Oxfam[12], Secretary of Economic Development of Bogotá, and the Green Hub Initiative of MIT[13]. Several distributors, retailers and wholesalers of food were also interviewed.

Other primary information was also available for this thesis thanks to the participation in projects focused on improving farmer's quality of life in the Department of Cauca between 2004 and 2008. Through the LINK ALL project (focused on helping rural communities to achieve sustainable development, access to global market, and foster their collaboration and integration as described previously) the way of operation of the silk supply chain was analyzed, and through the project Strategy to Improve the Competitiveness of Rural Small Scale Farmers in the Department of Cauca data of the fish supply chain was collected.

The map showed in Figure 8 summarizes the states and the commodities used for this thesis.

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[11] The Center for Latin America Logistics Innovation was established in 2008 and is focused on the innovation and economic growth of Colombia and Latin America through research and education in transportation, logistics and supply chain management [Center for Latin American Logistics Innovation, 2010].

[12] Oxfam is an international confederation of 14 organizations working together in 99 countries and with partners and allies around the world to find lasting solutions to poverty and injustice [Oxfam, 2010]

[13] The Green Hub at MIT is a center of research and practice that supports social movements, local governments, and businesses, primarily in major urban areas, in their efforts to leverage the emerging "green" economy for poverty reduction and social inclusion[The Green Hub, 2010].

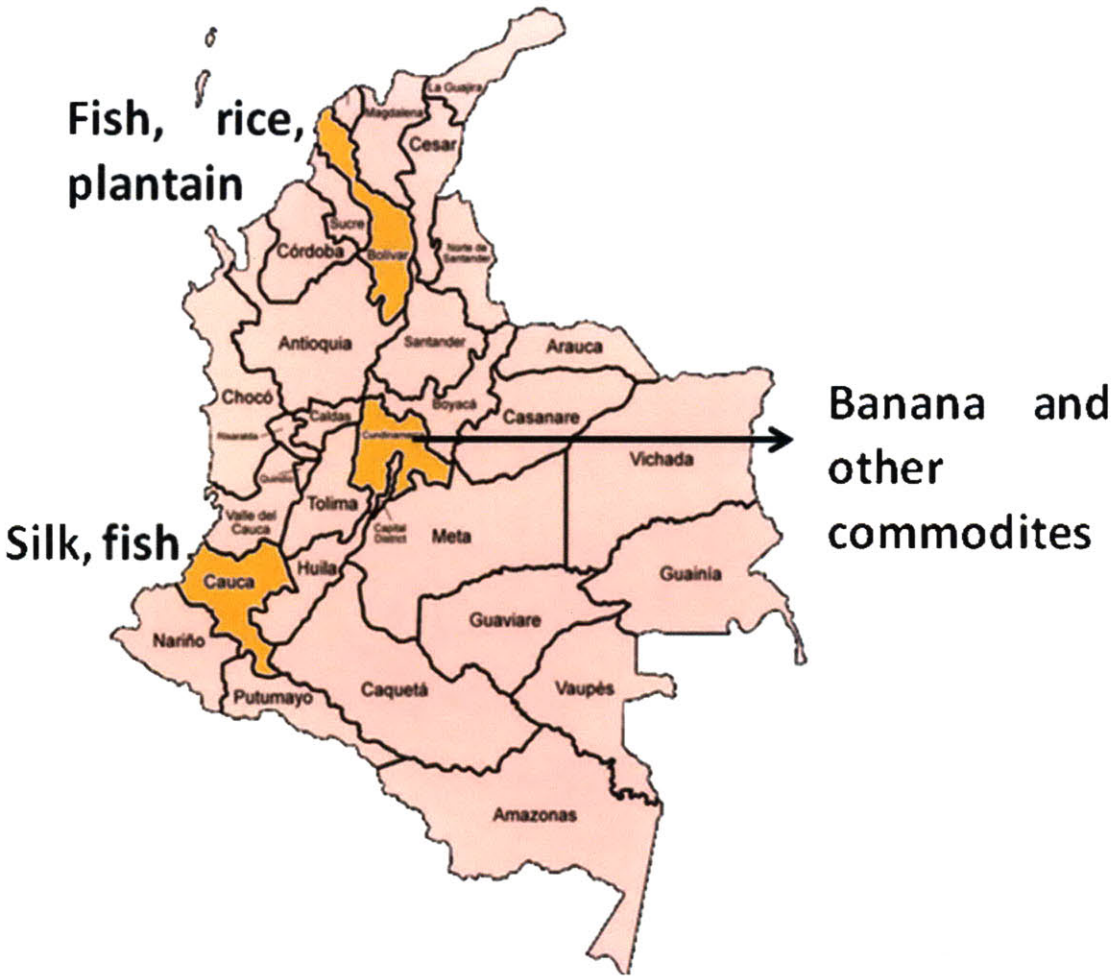

Figure 8 States of Colombia and commodities studied

3.3. Food Supply System Distribution Model

Figure 9 represents the model of the supply chain, which basically shows the stages a product goes through in order to reach the final consumer. As it was explained in the previous section, primary and secondary information was used as input to define the different stages. The model includes suppliers and farmers which belong to the production stage; specialized distributors, gatherers, and wholesalers who are part of the wholesaling stage; and institutional buyers, mom-n-pop stores, and householders who are in the retailing stage. The squares in dotted lines represent stages through which products may or not going to. The lines represent both the movement of a good and the economic

transactions, since the provision of a raw material or product implies necessarily an economic retribution.

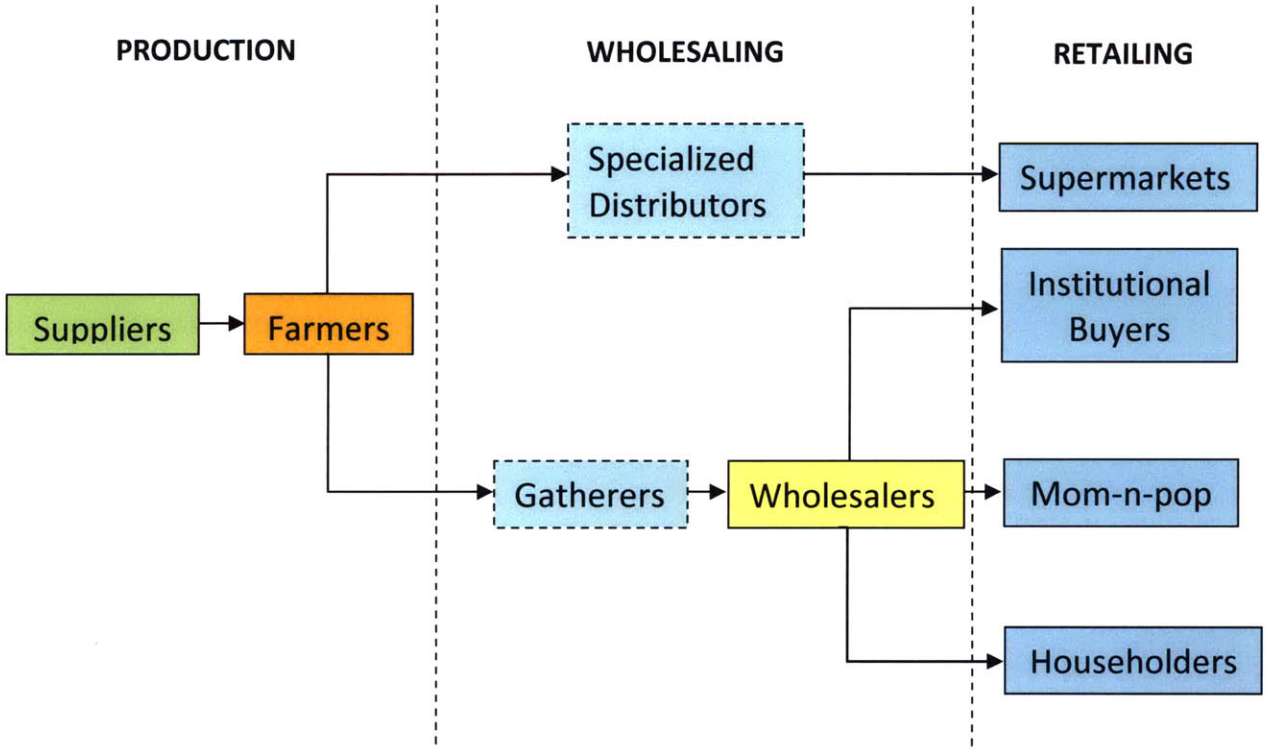

Figure 9 Food supply system distribution model for Colombia

3.3.1. Suppliers

The first stage in the supply chain model is formed by suppliers of various raw materials of supplies (e.g. vegetal material, agro-chemicals, bio-chemicals), equipment and infrastructure (e.g. protection equipment, tools and machinery for cropping) or services (e.g. training, technical assistance, lab services such as quality diagnosis) necessary for the development of farming activities. These services are provided through private, public or mixed institutions such as the Unidades Municipales de Asistencia Técnica Agropecuaria - UMATA, Empresas Prestadoras de Servicios Agropecuarios - EPSAGRO, Centros Provinciales de Gestión Agroempresarial - CPGA, Sena, universidades, asociaciones, Acción Social, among others.

3.3.2. Farmers

As explained in Chapter 1 the primary sector in Colombia is characterized by being a mix of two kind of productive systems: the large-scale commercial enterprises and small-scale peasant farms. In this framework the farmer's stage represent the farming activity itself done by individuals, as opposed to larger commercial entities.

Farmers can be classified in three categories according to their level of technological development level: rustic, traditional, and technical. Table 5 shows the main characteristics of each one.

Type of Farmer	Characteristics
Rustic	Craft Production Manual processes Zero or low investment capacity Production mainly for subsistence. Informal market Learning by doing (empirical knowledge)
Traditional	Craft production Manual processes Marginal investment capacity Production for personal consumption and for marketing Informal market Learning by doing

Technical	Industrial production
	Technology incorporation
	Access to credit. Higher borrowing capacity
	Production for marketing
	Specific markets
	Technical assistance
	Inventory registration
	Financial management
	Fulfillment of standards and requirements

Table 5 Types of farmers in Colombia
Source: Universidad Nacional, 2008

Producers can be associated or not. The associated ones usually belong to a federation, association or cooperative. Even though the way in which farmers are organized depends on the region and the type of crop, associations have become the articulation form that prevails in the country. Usually, they are formed by people who live within a specific geographic zone and belong to the same ethnic group, or in other words, articulation is more common between people who are close geographically and culturally. Associations can include stakeholders from one stage of the supply chain (horizontal articulation), or several, or even all the stages up and downstream in the supply chain (vertical articulation). For example, the association of silk craftswomen in Cauca called COLTESEDA, located in Timbio (Department of Cauca), includes silk worm growers, thread producers, and craftswomen, just stakeholders related to production of silk clothes. On the other hand, the fish men association of the municipality of Silvia (Department of Cauca), APROPESCA, has players from all stages of the supply chain: production, transformation, commercialization, and distribution.

3.3.3. Commercialization

This stage connects farmers with final consumers. Because peasant production is geographically fragmented and low in volume, commercialization involves many stakeholders that are involved in the process of taking the farmer produce and make it available to final consumers. Large-scale agriculture is better integrated and does not involve so many different intermediaries, or at least has central control and coordination amongst different players.

Some farmers take their produce directly to the food markets. When they belong to associations, there is a responsible who takes the role of connecting farmers with urban markets. In some other cases farmers sell their product to intermediaries at the farm gate. Usually these gatherers pick up the produce in the farm gate within a fairly disperse area, but in some cases peasants sell their produce in a specific place such as municipal plaza or storage facilities . In most of the cases, in order to move the produce from the rural to the urban zones, transportation services are hired. They charge a freight or, in some cases, a percentage of the total value of the produce.

When the product is sold directly to supermarkets, specialized distributors usually take care of the process of transportation. However, supermarkets are hard markets for farmers to reach since strict quality controls are in place. Therefore, just a few associated farmers are able to access these difficult commercialization channels for the average peasant produce.

Whether the produce is taken to the market by the farmer itself, its association, or an intermediary, trucks with food from any part of the country is meant to arrive to the food markets at night. Once in the food market, the load might be sold to another series of middlemen, or directly to one or several wholesalers, who rent warehousing space in the market.

There are basically two ways in which the price of products is determined. The first one, the most common one, is based on supply and demand, where usually wholesalers establish the rules of bargaining. They get a feel for the abundance and quality of the supply, and determine the purchasing price for any given day (in some cases the buying power of wholesaler might take the market in different directions).

Since prices are defined once the supply is known, the price can change in a daily basis. Thus, large wholesalers establish the broad conditions of trading, play a determining role in establishing the price of commodities, and set the pace of the market. Once a deal is reached, the buyer pays in cash.

In other cases the price is almost determined when the product gests the market and it is less variable since the percentage margins keep relatively constant among sellers due to the competition in the market. This can be observed in the rice supply chain for example. This is a chain highly vertical integrated where rice processors have control over most of aspects of production, transformation and commercialization. Thus, the industry has control over price and wholesalers only play the role of linking rice processors and retailer stores.

In any case, whether the price is largely determined by supply or demand or not, the quality of the product always play a role when it comes to set its price.

Here it is worth to mention that the volume transacted at Corabastos is so high, that the prices formed in this food market are used by other commercial agents and even supermarkets as a reference for their own products.

The second phase of the commercialization takes place when wholesalers sell the produce they got from farmers or gatherers. There are two types of wholesalers: large specialized

wholesalers selling only in big volumes and usually one product, and smaller wholesaler-retailers selling one or few products, in any quantity, to small retailers or consumers. This varies from product to product since some supply chains have regulations. For example, for some products it is possible to buy at retail from wholesalers at any time of the day, while for some other products (such as the fish in Bazurto) there may be agreements between wholesalers and retailers where it is specified the hours in the day in which wholesalers are allowed to sell small volumes, or in order words, can act as retailers.

Customers get up very early in the morning to catch the best produce at the best prices. Customers include: other wholesalers who will then sell products in other smaller food markets; institutions like hotels, restaurants, schools; and retailers like mom-n-pop store owners, householders, and even supermarkets. Fruits and vegetables are generally the major products purchased in food markets, though meat is also an important item.

Buyers go through the different warehouses in the food market to check the price and quality of the products. There is some room for bargaining and for minor price fluctuations, but the price is normally a fixed increment on what was paid to producers or gatherers.

Usually, after making the day's purchase, retailers such as mom-n-pop or restaurant owners hire one or more *coteros* who move food from the warehouses to the trucks. Within the market there are also people with baskets and wheelbarrows that provide transportation services within and around the market place. Retailers usually use these services to move their produce to their locations (if located within the food market or close by) or to parking spaces where cars or trucks, own or hired, are located. *Coteros* are paid by the sack (about a third of one dollar for each) so it is important that they carry as many sacks as they can during the relatively brief period when trading occurs. *Carretilleros* (wheelbarrows guys) charged depending on the distance and the amount of product being moved.

Most of the trade ends at around 6 am, when food markets shut down for cleaning until the cycle begins again.

It is estimated that between 5500 and 7500 tons of food are traded every day in Corabastos, three quarters of which are perishables, and a substantial portion of it is immediately rerouted and sent to supply wholesale markets and retailers and resold to final consumers across Colombia [Guarín, 2009].

3.4. Challenges and Opportunities

In this section some challenges and opportunities found in the different stages of the food supply system are described. It is important to make clear that the problems range from lack of appropriate sewer systems or electricity to lack of communication between traders in the market and the administration. However, for the purposes of this thesis, this analysis will be focused mainly on problems related to information and communication.

3.4.1. Farming/Production

Peasant farming has been stigmatized as unproductive and inefficient. In fact, as the Table 6 shows, the productivity of some key agricultural commodities, all of which are primarily produced in Colombia by peasants, is low, not only when compared to worldwide agricultural leaders like the US, but even to other Latin American competitors [Ministerio de Agriculture, 2007].

	Productivity (ton/Hectare)				
	USA	**Chile**	**Spain**	**Mexico**	**Colombia**
Tomato	73	65	62	32	**25**
Onion	55	48	48	12	**21**
Cabbage	25	28	35	32	**8**
Potato	43	20	NA	25	**17**

Table 6 Productivity of selected agricultural commodities, 2004
Sources: Ministerio de Agriculture, 2006; Observatorio de Agrocadenas, 2006 cited by Guarín, 2009

In general terms, the national production of most of commodities in Colombia is not consolidated enough to aspire to position in the international market. There is also limited technical capacity to fulfill the sanitary and the quality standards required in foreign markets. In fact, in many cases the production level is not enough to satisfy the domestic demand.

There are many arguments that explain what accounts for these differences which go from the geographic conditions to a weak entrepreneurial culture. The list is long and varied. Indeed, the soil characteristics of some regions and the impact of the weather conditions are some of the reasons why productivity is low. Likewise, the lack of training and technical knowledge (in many areas including entrepreneurship) is an issue that prevents farmers from being able to achieve higher productivity levels. However, low productivity is not only a consequence of climate/soil or technical problems, but also is a result of obstacles at social and economic level that could become binding constrains for farmers.

Lack of financial resources, land concentration, and the pressure of armed groups also affect in a substantial way the productivity of small scale farmers. The scarce availability of financing sources or the high cost of the credit available in the commercial bank affects the capacity of the farmers to buy supplies, equipment, and services offered by the

providers. Most peasants end up being victims of depredatory loans [Ministerio de Agricultura, 2006].

The presence of guerrilla and paramilitaries increases the cost of renting good land. Over the years these armed groups have occupied (either buying or using force and violence to take control over land) productive territories and therefore farmers are forced to stay in cheaper and less productive land [Avilés, 2006]. The interest of guerrillas in acquiring land lies in the fact that their funding come from drug selling and also in the need to launder the money that comes from these illicit business [Kalmanovitz & López, 2006]. For this reason many drug dealers invest in legal business such as palm oil production, cattle ranching, etc. Besides, the dominance of land is a source of prestige and a means to deploy regional political dominance [Guarín, 2009]. In fact, in some regions the guerrillas force peasants to grow illicit crops, and replace their own commodity crops. The limited access to land leads to the use of agrochemicals in excess, which in turns drive up the costs of production substantially, and damages the soils reducing their productivity.

Another problem is the highly fragmented nature of production and lack of regional specialization, which hinders the exploitation of regional comparative advantages and agro-ecological conditions.

However, the low productivity is not only a consequence of exogenous factors. There is evidence that farmers are not receiving adequate instruction on application rates for seeds, fertilizers and pesticides, resulting in both over and under use. Farmers also use prohibit pesticides or in doses or times out of what is recommended [Forero, Vega, et al, 2006].

Agrochemicals represent over a fifth of direct costs, and many consider that, due to the small scale of production and lack of proper technical education, farmers use much more than is actually needed [Ministerio de Agricultura, 2006].

There is also a lack of knowledge about sustainable production that prevents farmers from taking the maximum advantage of the land they own and the resources they have. In most of the regions, peasants follow practices that are not aligned with the best practices, in some cases because of cultural reasons, but in most of the cases because of lack of knowledge. Likewise, some farmers are not aware about the positive and negative, direct and indirect impacts that their current agricultural activities or practices have over their lands and their productivity in the future. In addition, it is common to find that farmers may not be specialized in the production of those crops best adapted to his soil and climate.

This is due, in part, to the low development of endogenous capacities, insufficient or no information management, and weak communication and learning processes among peasants. Efforts and initiatives to receive training are infrequent and generally fostered by external initiatives. Most learning is reactive rather than proactive. Knowledge is not articulated among them and, in the best case, they only share knowledge related to daily routines. In general, farmers, whether working individually or belonging to organizations and associations, are at a stage where only essential and necessary tasks for survival are carried out.

Additionally rural development interventions have several limitations that have not allowed having lasting and sustainable processes. In the first place, there are no sufficient economic resources which limit the coverage and the intervention time and actions of the projects, and it requires prioritizing actions towards those producers that maximize the cost benefit, leaving behind the small scale producers. Second, interventions continue to be based on paternalistic concepts supported by the traditional system of technology and knowledge transfer that do not take advantage of the huge potential of local knowledge, nor strengthen the farmer's capacities because the farmer is a passive receptor of knowledge [Plazas, 2008].

However, it is worth to mention that in Colombia, a few years ago, participative methodologies to foster rural development started to be incorporated. The peasants take a decision maker role in all the stages of the intervention process, from the definition of the problem and the definition of goals, to the evaluation and dissemination of results. This had lead to the convergence of scientific and traditional knowledge [Córdoba, Gottret, et al., 2004].

This represent an opportunity to get back, use, and disseminate local and traditional knowledge (validated through experience) as well as their articulation and reconciliation with scientific and technologic knowledge. This implies an articulation between researchers, agencies focused on agriculture, and the producers.

Table 7 summarizes the opportunities and challenges found in the production stage.

Opportunities	Challenges
• Room to improve productivity if there is a better knowledge about best practices • Increase of the quality of the produce if technical rules are applied • Potential to reduce cost if better practices are adopted (for example use of pesticides in the appropriate amount) • Improvement of learning dynamics if there is a better flow of information among groups and between them and the external groups	• Effect of weather change on productivity of the soils • Lack of financial resources • High cost of the investment capital due to the interest rates of the loans • Land concentration • Occupation of lands by armed groups • Pressure of armed groups to grow illicit crops

Table 7 Challenges and opportunities in the production stage

3.4.2. Commercialization

Gathering/Collecting Process

In addition to improve the productivity, the commercialization process is a key aspect for farmers, where many obstacles exist. As it was explained previously, most of the peasant's produce is sold in food markets, therefore many of the challenges and opportunities for rural producers come from the marketing practices of these places.

The produce of a big amount of farmers concentrates in the hands of a few gatherers or traders. As it was explain before there are several mechanisms through which the produce are collected and taken to the food markets. Whether the produce is collected in the farm gate or in central points, gatherers pay to the farmers by amount of produce or in some

cases they pay a fixed amount or salary [MIT, UTB, 2010], and the bargain power of the farmer is very limited. This situation is due to several reasons.

First, peasants usually do not know the price at which the produce will be sold in the market. The situation becomes more complicated because price information is not formally disseminated, rather it is obtained by talking to or calling others farmers or close friends that were in the market. Thus, personal networks are essential for getting market information, but inclusion in networks is not homogenous, and it can even be discriminatory by gender or ethnicity for example, as it was observed in the Department of Cauca, where two indigenous communities (Guambianos and Paeces) avoid to have any kind of interaction.

Second, (except for traditional export crops) production of a given product may be scattered over a fairly large geographical area, and this makes the process of collecting the produce more complicated and costly. Besides, given that the volumes in a specific area may be low, only a few traders get there and this fosters the creation of monopolies or oligopolies. In fact, in some cases the volume of produce may be low enough to prevent intermediaries from providing marketing services. Another situation that limit farmers bargain power is the fact that gatherers do not tell their colleagues if there is a large supply of a product in one area as the price may then increase when more traders arrive.

A third aspect that was found to prevent farmers from gaining bargain power, is the fact that they have the need to sell the product fast while it is fresh, otherwise the price will be lower or the produce cannot sold. For example, it was observed that in the case of the plantain, the price reduces up to 50% if the produce ripens. The situation is worsened by the fact that farmers do not have control over the crop lifecycle as peasant's production depends on rainfall seasons.

It was found that when a farmer's association or cooperative exits the price paid for the product varies less and a higher price can be guaranteed to the associated farmers. This is the case of the APROPESCA in the department of Cauca. The fresh fish arrives to the processing plants where it is packaged and commercialized at fixed price. By avoiding individual negotiations, APROPESCA guarantees to get a fair price for the product and the involving of rebels in the business.

Here, it is important to mention that in some regions the guerrillas and the paramilitaries have such a power that they have become big gatherers and they impose their own price, as it was found in the plantain supply chain in the State of Bolívar.

In Table 8 a summary of the challenges and opportunities for farmers when selling their product to gatherers or traders is shown.

Opportunities	Challenges
• The dissemination of information about price represents an opportunity to improve the bargain position of farmers. • The collaborative work of farmers can help significantly to reduce variations in price and guarantee fair prices. • The dissemination of information about the location and volume of produce could bring more traders to the peasant's farmers	• Peasant production is dispersed geographically • It exist social and cultural barriers that prevent farmers to have an equal access to networks where market information flows. • In some regions armed groups have total control over purchased prices of the produce of the farmers • Gatherers do not tell their colleagues if

• Gatherers in different regions which facilitates the gathering of the produce and the diversification of clients. • A better planning of crops could be useful to sell the products at a better price	there is a large supply of a product in one area as the price may then increase when more traders arrive • Farmers do not have control over crops lifecycle and have the need to sell the product fast while it is fresh, otherwise the price will be lower or the produce cannot sold

Table 8 Opportunities and challenges in the commercialization stage (farmer-gatherer)

Selling to Wholesalers

Once the gatherers get the produce, they sell the product to wholesalers or retailers. However, in some cases gatherers also play the role of wholesalers in the market. Usually gatherers have close relationships with farmers. The gatherers also are also more likely to have close relationships with wholesalers than with retailers in the food markets. This is in part because gatherers are just temporarily in the markets so their main interest is to sell in big amounts, and therefore they have a higher motivation to build relationships with wholesalers.

One of the main difficulties at this stage is to keep the price of the produce stable since the seasonality in the production makes difficult to guarantee quantities. As it was explained before the food markets start to function at night when trucks arrive to deliver fresh produce from around the country. Then, wholesalers begin to get a feel for the abundance and quality of the supply. These conditions determine the purchasing price for any given day.

Unlike supermarkets that plan the times, spaces, and quantities of the production, peasant's production depends on rainfall seasons, which brings as a consequence that the supply fluctuates and the therefore the instability of the price is very high. Examples of this are the plantain, whose price can fluctuate up to 100% in just a few days [MIT, UTB, 2010] and the potato, whose prices fluctuate up to 200% within the same year, and there is even significant daily variation. This is the case of many products that have a season of abundance and low prices, contrasted by a season of scarcity and high prices.

It is also difficult to provide a stable supply because there is no appropriate infrastructure. Since storage facilities do not exist or do not have the right quality, usually the trucks that enter the market are used as storage place of the produce and it does not prevent produce to get spoiled. Besides, in most of the cases trucks are not allowed to stay inside beyond the hours allocated for selling. In Bazurto it was observed that truck can be kept inside the market, but at a cost. A fee is charged for each day inside the market. Thus, there is need to sell all the produce during the day, and there is no way to keep reserves and have a control over the supply.

This unreliability and intermittency of production is also a result of the atomization of production and therefore of the lack of horizontal integration along the agents of the chain. The lack of coordination of farmers prevent them from reduce the problem of an unstable supply and from applying economies of scale for selling their products. This lack of appropriate cohesion between actors is due to different reasons, which range from difficulties to transport or move to differences at socio-political level[14].

The lack of articulation is also reflected in the way farmers work. It is common that they look for solutions for short term problems in an individual way, instead of collaborative initiatives that promote the competitiveness of the sector in the medium and long term.

[14] A clear example of this is the problem that exists between Guambianos and Paeces in the State of Cauca.

In some cases, even if an association exists the links between the stakeholders are weak. The reasons go from the geographic distances between them, to differences in terms of goals (increase of the productivity, access to resources, product marketing, etc.) or maturity levels (especially between associations created at different times). On top of that, the information exchange is scarce and in some cases it does not exist at all.

The inexistent or week horizontal articulation prevents peasants from being able to establish long term contracts or more favorable ones, and as a consequence the vertical integration is difficult or impossible, both upstream and downstream in the supply chain. It is very uncommon to see farmers who have (or have had) long term relationships with suppliers, marketers, processing companies, or final consumers directly. As it was said before, in most of the cases the farmers sell their product individually to gatherers who pick up the product in the farms or they go directly to food markets in the nearest city.

On the other hand, according to some public officials, the price is not always determined by supply. Some of the wholesalers have enough power as buyers to dictate terms to its suppliers, the farmers. In a recent study done in Corabastos none of the wholesalers approached agreed to be interviewed, and in the field work in Bazurto wholesalers were very cautious about giving information about their businesses. This secrecy surrounding the transactions serves to fuel the idea that wholesalers are actually taking advantage of farmers, reducing competition, and creating monopsonies. However, wholesalers argue that changes in prices are just a consequence of the variation in the supply that reaches the market every day, and that their mystery around the way they operate is just a matter of confidentially and security for their business.

Table 9 shows a summary of the challenges and opportunities of produce sold in food markets.

Opportunities	Challenges
• The provision of infrastructure, especially storage facilities, would reduce at some extend the problem of supply variation • Transaction costs can be reduced by eliminating the need to collect information and negotiate a price for each transaction • Improved coordination may reduce costs by allowing a more efficient scheduling of harvesting, transportation, and selling • Horizontal and vertical articulation would allow managing intermittency of supply and generate economies of scale	• Inability to provide a constant supply due to seasonality (or dependency on rainfall seasons) • Differences at social and cultural level that prevent farmers from working collaboratively • Some of the wholesalers have control over the price of the products. Armed groups have also get involved in the food distribution activity and this increase the centralization of the power

Table 9 Opportunities and challenges in the commercialization stage (farmer/gatherer-wholesaler)

Selling to Retailers

Once the wholesalers have bought their merchandise, it the time to sell them. As mentioned before, there is some room for negotiation between wholesalers and retailers but in general, the price is a fixed increment of the price. According to some, however,

those increments are higher than necessary. It is said that wholesalers are having extremely high margins at the at the expense of consumers. Besides, the fact that the information about the buying prices of wholesalers is not known, as noted previously, reinforces the notion that selling prices are set by collusion and monopolistic interest, and wholesalers are extracting high margins and raising the price of the food for citizens.

Other issue found in the wholesaler-retailer relationship is related to the boundaries of their business activities. In order to cover a broader range of costumers, many wholesalers also retail, and have costumers like mini-markets that buy big quantities and mom-n-pop stores (and householders) that buy by kilogram. Thus, food markets have become places that bring together merchants of all forms and sizes. This situation creates, according to some government officials, an environment where disorganization, lack of hygiene and security, informality, and crime can thrive. Besides, they argue, this way of operation may be increasing the price of the food. Instead of a clear and direct link between one wholesaler and one retailer, the food may actually go through a series of middlemen (including smaller wholesalers and retailers), which increases unnecessarily the costs of transaction.

On the other hand, it was found that wholesalers also have retail business, causing that the number of retailers in the food markets to decrease. Since wholesalers can sell at lower prices, they have clearly an advantage over retailers. Thus, from the perspective of these retailers, wholesalers are seen as direct competitors.

However, wholesalers also provide "loans" to retailers (who usually do not sell in the food market itself but around it) by allowing them to take produce, sell it, and then pay back within 24 or 72 hours. In some cases the percentage of sells done in this way could be higher than 80%[15]. This credit system is based on the trust generated through the personal interaction, the knowledge about the retailers' location, and the premise that

[15] This is the case of the fish market. In the case of plantains was found that approximately 50% of the selling is done by credit.

the retailers need to get more produce from wholesalers on a daily basis. In addition retailers can change a percentage of the product (10% in Bazurto) if it does not have the expected quality.

In general, the perception between retailers is that food markets are difficult environments. In the specific case of mom-n-pop owners (or *tenderos* as commonly called in Colombia), in order to be able to open their stores, which is normally at seven in the morning, most *tenderos* need to leave their homes at around two or three in the morning so that they can make it all the way to the food market and be back on time with fresh product for their clients. In the market, they go from warehouse to warehouse searching for supplies, trying to get the best deals.

Because of its perishable nature, most of the supplies acquired by the mom-n-pop owners have to be bought in a regular basis and in small quantities, which implies that store owners have to visit the food market at least a few times per week. According to Guarin (2009), *tenderos* may have to go to Corabastos as often as every other day in order to offer fresh products. Most of the *tenderos* interviewed in Cartagena said they go to the market every other week. Since they usually pay for the transport of the merchandise, when visiting the food market they try to buy small quantities of as many products as possible in order to minimize the transportation costs and the time of provisioning of their stores. Table 10 summarizes the opportunities and challenges mentioned.

Opportunities	Challenges
• The dissemination of information about prices along the supply chain could reduce unbalances in the relationships amongst market agents.	• Some of the wholesalers have control over the price of the products. Armed groups have also get involved in the food distribution activity and this increase the centralization of the power • The different, and often contradictory, perspectives about the role of a stakeholder, such as the wholesalers, makes difficult to define what actions should be taken in order to improve the efficiency of markets. • Lack of knowledge about how a stakeholder is adding value and at what cost, or if it is just increasing the transaction costs.

Table 10 Opportunities and challenges in the commercialization stage (wholesaler-retailer)

As it was seen in this chapter peasant agriculture is characterized by being a production at small scale where most of the processes do not follow strict technical or quality standards. Their main commercialization channel is the food markets, and their market is the domestic one. However, given the volume and quality level of the farmer's produce, supermarkets are difficult clients to target to. Likewise, the access to international markets is far from being possible in the short and medium term. In order to get the

quality for exportation and the international acceptance requires changing some production practices and incorporates some others. For exports to the European Union for example, the increasing use of certification, process-based standards, and traceability poses particular challenges. Thus, if small farmers find it difficult to provide supermarkets, it is unlikely that they can compete in a more global market, at least in a short and medium term.

However, there is a domestic demand for peasant's products. In Colombia, there is a significant unsatisfied demand from those who do not eat what is needed, and those who have an appropriate diet, but only consume some of the foods they would like to. Thus, the possibilities of growth for agriculture are clearer in the domestic market than in the international one. This domestic demand is represented by mom n pops and other final consumers who are linked to the producers through food markets. This leads to think that short term policies should be focused on how to improve the access of farmers to local and regional food distributions systems.

In the production stage there are opportunities to improve both the productivity and bargain power of farmers. On the commercialization side there is need to understand how each actor add value to the chain and at what cost, or if it does no add value at all and only increases the cost of transactions. As it was shown, the role of the wholesalers is seen in different, even contradictory ways, and this creates confusion as to how commercialization activities could be more efficient. Usually politicians and the media accuse traders of cartel operation and price fixing which prevent the government from effective regulation. On the other hand, wholesalers think they provide important services in a business characterized by sudden changes in price.

The following chapter is meant to define how ICT can help to improve the productivity and the bargain power of farmers, and fill the gaps existing as to the role of the different

stakeholders in the commercialization stage to eventually define how ICT could help to affect positively the quality of life of farmers and the food security of citizens.

4. POLICY RECOMMENDATIONS TO IMPROVE SMALL SCALE COMPETITIVENESS BY USING ICT

4.1. Introduction

Even thought ICT are far from being a total solution to the problems of food distribution systems, Corabastos and Bazurto are evidence that information is not something stakeholders take for granted, and this could be creating great unbalances in the bargaining power of certain agents that need to be addressed. In this sense ICT have the potential to increase the efficiency of food markets and the quality of life of those who sell and buy from these places.

On the other hand, as it was shown in Chapter 2, Colombia is improving in the provision of ICT infrastructure, and even though their use at productive and business levels is still low, the fast pace and adaptation of mobile phones represent an important opportunity that need to be taken.

By analyzing how the food markets work in Colombia there are opportunities to unleash the potential of ICT to improve both the productivity and the commercialization stages.

At productivity level, and as identified in Chapter 3, better knowledge management could help to increase the quality and reduce cost of production, as well as to facilitate the learning dynamics amongst farmers. At commercialization level, the dissemination of information about prices, location and volumes of the production could help greatly to increase the bargain power of farmers and balance the relationship amongst the other stakeholders in the system.

The challenge is to figure out how ICT, and specifically, mobile services can help to improve the knowledge management in a social and business environment constituted by

small organizations, with low capacity to develop of endogenous capacities, highly individualist agricultural activities, and difficulties to access and use ICT. Likewise, it is a challenge to define how mobile services could help to streamline the commercialization activities where there are different and even contradictory views about the role of some marketing agents and the usefulness of the market itself, and it is not clear if the ICT's role should be help to rebuild a new system or strength the current one.

Thus, in the first part of this chapter some ICT guidelines as to how ICT could help to improve the knowledge management in rural context are provided. Then, In order to propose how ICT can effectively stimulate the development of efficient commercialization processes, an analysis of the food market system at micro level is done. By understanding the behavior of participants in agricultural food distribution systems and the macro consequences that affect the well-being of all involved (consumers, retailers, wholesalers, gatherers, and farmers), it is more likely to get a better understanding of how each stakeholders affects the system and thus find appropriate solutions to the problems related to the production and marketing of food, and more precisely, how ICT can help.

Finally some specific mobile-based services are proposed to help the commercialization stage get more efficient. In the last section of this chapter who should take the leadership role is discussed.

4.2. Analysis of the Food Distribution Systems and the Incorporation of ICT

As it was noted in Chapter 1, an increased efficiency in food markets should bring reductions in food production and marketing costs. For this reason the analysis is divided in two parts. The first one is focused on production and how ICT can help farmers to use more effectively their resources to increase productivity. In the second part, the analysis is centered in the marketing process, in filling the gaps as to the role of the different

stakeholder, for finally to give some recommendations as to how ICT could play to streamline the operation of the market.

4.2.1. ICT in the Production Stage

As noted in Chapter 3, the root of the productivity problem is a structural limitation to land, which reduces the productive potential of peasant families. Because land is so concentrated, peasants are confined to small farms and can only employ a fraction of their labor force in agrarian duties. This forces them to employ their surplus labor in less remunerative, non agrarian tasks like weaving, or to remain inactive [Forero, 2002].

This land issue has also generated a problem of non-sustainable use of resources. As mentioned in the previous chapter, farmers apply agrochemicals in excess and it is in part because they are often in such a precarious position that they try to insure what is a risky business by applying great quantities of fertilizers and pesticides to their crops, often in excess of what is needed, which tends to drive up the costs of production substantially.

Besides, there are political and economic obstacles that hinder the access to complementary resources (for example capital, technology, human capital, etc.) that farmers require to increase their productivity and to assume the risks that these processes imply. This reduces significantly the management capacity of farmers, people and institutions involved in rural development.

Thus, given their conditions and the little support received, peasant productive systems are not necessarily inefficient. As Forero (2002) states, rural poverty is explained more by the lack of an adequate endowment of productive factors than by the supposed unviability of the peasant production systems.

However, the low productivity is not only a consequence of the lack of access to land. As it was explained, peasants are not aware about the sustainable use of the land and the impact of their agricultural activities on their lands. The knowledge is fragmented and unarticulated between stakeholders, and there are many gaps. In addition, farmers are in a stage where only the strictly necessary activities to survive are carried out, their vision is of immediate or short term, and the learning process are always reactive.

Knowledge management strategies are often related to big enterprises that have many intellectual assets, experts to solve every problem and the money to afford complex and expensive systems. But little has been said about how to manage knowledge in rural areas, especially in developing countries where local and traditional knowledge is the main resource, the poverty and illiteracy levels are very high, and the possibilities to access and learn about ICT are very low.

Different approaches exist as to how to tackle the knowledge management, and even though there is no a formal classification of them, three main lines of thought can be identified. In some cases emphasis is made in the knowledge as an organizational resource that should be exploited to generate economic benefits. In this case, the attention is focused on protecting the knowledge assets through an appropriate intellectual property protection, on managing and mapping the intellectual capital, and creating knowledge markets. This approach is scientific and is aimed to measure the amount of knowledge that an organization has. The use of ICT is fostered [C-SanD Project, 2002].

On the other hand (and of course with some exceptions), according to many professionals in the area of the ICT, the goal of managing knowledge is to capture and codify tacit knowledge so that it can be shared and used more broadly. Under this approach the knowledge is seen as an object and the emphasis is put on formal, as opposed to subjective, knowledge [Swan, Scarbough, 2002].

The third approach is centered on social and behavioral aspects (such the development of practice communities) where the knowledge management is seen as a process, making emphasis in subjective and informal knowledge, which is difficult to articulate, and is created and applied through personal interactions. Under this approach, the development and building of organizational processes and social networks is more important than the use of ICT, and in some cases the use of technology is not considered [Wyssusek,Schwartz, Kremberg].

This divergence at conceptual level reinforces the separation between technology and people, and it has made more difficult to achieve integration between knowledge management and ICT. In practice, the initiatives tend to take one approach at the expense of the others, depending if the knowledge management needs are analyzed in terms of economic benefits, capture and diffusion of knowledge, or promotion of innovation. The different approaches for knowledge management cannot be ranked; each one has advantages and drawbacks that make it more or less appropriate for a specific situation.

In Colombia the social perspective of knowledge management has started to be adopted in the rural context. It is recognized that most of the knowledge of the rural producers is tacit and shared through personal interaction. The social activities and the collaborative practices play an important role in the learning processes of the rural people who learn by observing, interacting, and doing. New knowledge is acquired by talking to others, sharing time with friends, listening to stories, etc. This knowledge transfer is possible amongst groups who are close both in geographic and cultural terms [Pemberthy, 2007].

Unlike traditional paternalistic approaches, where farmers are just receptors of external information, the initiatives based on the social approach have focused on making dialogue possible to generate trust and respect for the environment among individuals and fostering a culture in which sharing and communication of both traditional and external knowledge can thrive. It has been seen that personal meetings stimulate the interchange

of ideas that people may not be able to do through more formal knowledge management processes.

Many research institutions in Colombia [16] have carried out research and action processes in supply chains to develop an effective and suitable knowledge management approach for rural contexts, obtaining important advances both in methods and outcomes. There are several methodologies and each one has been designed with a specific purpose, but in general terms, their bottom line is to make rural population more aware of their potential and knowledge, so that they become more confident to contribute to the solutions of their own problems. The goal is twofold: to give them new knowledge and skills, and to show them that they can and should lead their own development processes [Alianza Cambio Andino, 2007].

It has been noted that these kinds of strategies have bigger possibilities to have impact in the productivity and life conditions of the communities. Its advantages go beyond the economic outcomes, by improving other aspects related to rural and social development [Pemberthy, 2006].

On the other hand, the incorporation of ICT in these processes has taken the approach of knowledge as object, and usually the efforts are focused in systems that support codification, storage, and transfer of knowledge among members of the rural organizations. It is assumed that all the knowledge can be made explicit and therefore is just a little more than information [Gasson, Shelfer, 2007]. Consequently, most of the ICT based systems are implemented as central repositories where people can put and get information in individual way.

[16] Such as the CIAT, la Corporación para el Desarrollo Participativo y Sostenible de los Pequeños Agricultores (Corporación PBA), la Corporacion Colombiana de Investigación Agropecuaria (CORPOICA), la Federación Nacional de Cafeteros, el Centro para la Investigación en Sistemas Sostenibles de Producción Agropecuaria (CIPAV), la Universidad Javeriana, and the CREPIC.

However, as noted before most of the knowledge that is created and used by the rural producers is tacit and not all of it can be represented explicitly. Farmers know things that are deep rooted to their mental models, beliefs, perspectives, and this kind of knowledge, even if it has been internalized over a long period of time and it is in a mature stage, is difficult to represent through documents and data bases. A craftswoman after years of experience can develop skills in their hands to weave, but hardly can establish the technical principle of what she knows.

Besides, the dialogue is critical to take advantage of the knowledge. Knowledge not only resides in the individuals, but also in the groups and in the relations between their members. In fact, a significant part of the knowledge in an organization is created through interactions, relationships, and joint work of their people.

Additionally, in a rural context there are additional obstacles to carry out knowledge management based on the codification of the know-how. First, the low education levels of rural population reduce their ability to completely represent their own knowledge and use external knowledge. Second, producers may not be willing to make their knowledge explicit given the complexity of this task and the fact that they need to reduce the time spent in their productive activities (and of subsistence). Third, some people may not be willing to broadly disseminate their knowledge for fear of lose status, power, and influence in the organization. Some indigenous communities in particular are skeptical about posting their knowledge because their traditional practices could be used and economically exploited by others. Besides, some communities have expressed resistance to introduce external knowledge that may threat their cultural belief and their life philosophy.

This lack of convergence between the knowledge management approach that is applied in the practice and the one used when ICT-based knowledge management systems are implemented has made difficult that the technologies actually support knowledge

management practices in rural zones. Thus, the challenge is how ICT can integrate appropriately to the social knowledge management approach.

Based on the analysis above it is recognized that: i) the essential aspect is to foster the learning and the knowledge exchange through the existing organizational structures and networks ii) the knowledge creation is a complex process that needs more that an increase in the amount of information available; iii) the knowledge does not add value if it is simply collected and stored; and; vi) the tacit knowledge that the rural producers have cannot be easily codified, and it is acquired through the practice. All these aspects lead to think that the knowledge cannot continue to be treated as an entity that can be directly and easily manipulated, but as something that is associated to an individual within a particular social context. Thus, the role of ICT, more than helping to capture, store, and disseminate knowledge objects, is supporting the social structures and the social learning dynamics.

Therefore, the use of ICT should focus on facilitating connections among the members of the organization and between them and external information sources. To achieve this it is important to start to understand what people actually do in the organizations. Most of the learning in the rural communities take place regardless the existence of a formal organization, and are precisely those informal organizations what really needs to be understood, those networks that people form spontaneously and voluntarily to share their knowledge and experience, and carry out their daily tasks. These networks are not static, but dynamic, and are formed around small and specific problems and big and complex ones. Usually these groups are composed by people that have a passion in common and share some type of expertise.

These networks are the basic means to manage knowledge in rural regions because they preserve and communicate those tacit aspects of the knowledge that the ICT based

systems cannot capture. From this perspective learning is more associated with the fact of belonging to a community than with the individual absorption of information.

Under these circumstances ICT can support knowledge management if they are designed according to these networks, and help them to scale and sustain. Thus, instead of promoting central repositories where people can individually put and pick up information, a system should motivate and help people to collaborate each other, to make interpretations, and make difficult decision jointly. In other words, ICT should foster people to interact to solve problems in a distributed rather than a centralized way, and should help these networks extend by connecting groups, especially those geographically distant. This is particularly important because the knowledge sources of the producers are generally limited to their close peers and friends, where the chances of finding new knowledge are more reduced.

The bottom line of this way of managing knowledge is that the best means to manage knowledge is the brain, the best network protocol is the conversation, and the emphasis is put in generating connections and building relationships.

On the other hand in a highly diverse and heterogeneous context like the Colombia's, the dissemination of knowledge imposes big challenges. When both the origin and destination group have a similar social and cultural context, the transfer of knowledge can be direct and immediate, but if this is not the case there is no guarantee that people can understand, interpret, and appreciate the knowledge they receive, and the knowledge exchange processes may not be useful.

As a consequence, the ICT should allow the strategic transfer (not homogenous) of knowledge by supporting ad-hoc behavior patterns. Usually the ICT are used as impersonal means (formal and informal) of knowledge transfer, but less as personal

means, which will be more focused on point to point message exchange between the members.

Another aspect to consider is that the rural population usually does not have the time, the skills, and the willingness to carry out time consuming information searches. As mentioned before they usually get information through stories and other's experiences. The information gotten directly from a peer is considered more relevant, useful, easy to appropriate and even truer than the information stored in an information system. In a rural context the credibility of a person is not measured by his or her degrees or education level, but by the first-hand experience acquired.

All these facts make evident that rural producers need interpersonal communication to manage knowledge. For this reason the ICT based systems for knowledge manage should be based in a community model or social network, where dialogue is the heart of the systems. The users should be able to interact, analyze, and question. In these systems there is no distinction between the evidence-based (scientific) and the experience-based (traditional) knowledge, both have the importance level and may even be combined. This option is more social, personal and flexible when compared to the information central repositories that are usually used for knowledge management.

The principle of "trust in users" that wikis, blogs and companies such as Amazon, YouTube, My Space, etc., have introduced, show that this approach has potential. While the web-based traditional systems are based on building trust and increasing quality through strict content management, the new model allow and foster the participation and creation of content by the users with low or few barriers.

The potential contribution of the ICT to the knowledge management processes is so broad that there is no one system that can cover all the needs within an organization. Thus, for a rural context, the deployment of diverse simple tools could be more useful than the

implementation of a unique complex system. Besides, how appropriate is a specific tool will depend of the situation, the practices, and the culture (and subcultures) of the rural communities. All these aspects determine what kind of knowledge is useful to manage, and how the knowledge will be used, created, legitimated, and distributed in the organizations.

The organizations that have not previously implemented knowledge management practices may want to start with relatively low cost and fast to implement practices. One strategy that can be used in a first stage is to create links to internal and external sources of knowledge (people in this case) by making available information about how knows what with the respective contact information. These "organization knowledge maps" enable individuals to find people with whom to establish synergistic relationships. The role of the ICT more than putting pieces of information together in a central repository, is facilitating the interaction amongst people and connecting it for them to find sources of useful knowledge and improve the flows of knowledge. As expressed in Malhotra (2005), there is a big information river out there. Instead of trying to build dams to capture and bottle it in discrete entities, people needs to be provided with canoes and compasses.

This strategy, besides being aligned and strengthening the traditional ways of learning of the rural communities, has the advantage that has into account the tacit dimension of the knowledge.

These maps of knowledge are not repositories of information implemented with complex technologies, but a simple tool that can be available through mobile phones (not only computers) and that provides access to other people (not only knowledge, many times abstract for rural producers).

Information about type of crops, region, and contact information would be collected for the knowledge map, but the service itself would be easier to implement and maintain that

solutions based on central knowledge repositories, and more importantly, the service would be to the reach of every person with a cell phone and would be easy to use. The voice and data communications facilities provided by the mobile phones make the communication among people, regardless of their physical location, possible in a cots/effective way in rural zones.

On top of this, additional information services could be provided by using text messages and taking advantage of the information collected. For example, tips for producers according to the crops they manage and region they live could be an effective way to increase knowledge flows.

Table 11 summarizes the main differences between the traditional model and the proposed one to manage knowledge and increase peasant agriculture productivity.

Dimension	Traditional model of knowledge management	Community based model of knowledge management
Environment	Controlled	Autonomous
Power	Centralized	Decentralized
Dependency	Intermediaries	Intermediaries are optional (provide guidance)
Nature of the information consumption	Consumers tend to be passive receptors of information	Consumers consumer and generate information
Nature of the interaction	Traditional Interaction 1:1 between the intermediary and the consumer of information	Complex interactions between individuals and groups in a connected environment
Filtration of the information	Hierarchical	Participative

Learning	More formal, based on absorption of information	More informal, based on participation, application and production of information.
Expertise	Measured against degrees	Measured against first-hand experience
Information source credibility	More important than the message credibility	Less important than the message credibility

Table 11 Differences between the traditional and the proposed rural knowledge management strategy

4.2.2. ICT in the Commercialization Stage

As it was mentioned before, there is not a complete and coherent understanding of how the food markets works in Colombia. In Chapter 3 was shown how government, citizens, and market agents blame each other and judge their roles in different and even contradictory ways. Thus, an analysis to get a better understanding of the relationships network that exist in the food distribution systems needs to be done to figure out how ICT can effectively help.

In analyzing the food marketing process it is important to determine if the market structure itself or common practices in the market are preventing food distribution systems from being efficient. Usually, these analyses are shaped only by the efficiency in economic terms, and therefore the drive is the minimization of transaction costs, often ignoring the social relations in which these economic activities are embedded. However, taking into account these relations is critical because they could indeed be adding value to the distribution system, an added value that is difficult to measure in quantitative terms but that is critical for the operation of the markets. In these cases there are social factors that should be taken into account when analyzing costs of transaction, so that the study accurately reveals what practices or stakeholders are in fact unnecessarily reducing

farmer's incomers or driving up the costs of food, and which ones are bringing a social benefit that compensate or even outweigh the additional cost they are incorporating in the system.

This is particularly important in a country as Colombia, because the efficiency and role of the traditional system of food marketing cannot be examined in isolation from the country's socioeconomic situation. It is estimated that Corabastos provides with food to more than 10 million people [Corabastos, 2010], and in Cartagena Bazurto is the food source of more than 80% of the households [MIT, UBT, 2009]. Thus, food markets have become the center of attraction of millions of people, mostly small scale farmers, people without a formal job, and low income consumers that use the market as a source of income or food. Therefore, when it comes to make policy recommendations, the impact that any proposal has on these people cannot be overlooked, and the bias created by the strictly financial/monetary vision should be avoid.

4.2.2.1. The structure of the food markets: chaotic or flexible?

According to many people, both from the civil society and the public sector the problem of the food distribution system is a consequence of the structure of the market itself. In particular, the heterogeneity in the products, the high confluence of different kind of marketing agents, and the high level of informality in the market, they say, reflect the disorganization level and the unnecessary long way that food have to go through to reach consumers [MIT, UBT, 2010][Guarín,2009][PAMBB, 2004].

However, as it was shown in Chapter 1, despite the many efforts to modernize food commerce most of the daily practices in food markets have changed little. This fact was reaffirmed when the current food system operation was described in Chapter 3, and the same problems seem to persist. Besides, all income-levels people buy from the market, and variety, low prices and product quality are some of the advantages that clients

mention when talking about food markets [MIT, UTB, 2010a]. Therefore, there should be something about food markets and the way they operate that has made them sustainable for such a long time.

It was found that food markets are attractive to small producers/gatherers because they can sell all their produce, regardless of their quality. Supermarkets only buy products with the highest quality which imposes many obstacles to the farmers. In the food markets, wholesalers buy products of all qualities and pay in cash as soon as the product is sold, an important advantage for rural farmers.

Another advantage farmers/gatherers find in food markets is that wholesalers buy big quantities, preventing farmers from dealing with the sell at retail which could be more time consuming and probably no more profitable. Transaction costs from a peasant perspective also includes the energy and effort that requires finding out where to sell and at what price, the cost of traveling from the farmers to the market place, the time waiting in the market place to sell the all the produce, etc. From this point of view wholesalers could be reducing transaction costs for farmers. Thus, based on the exiting evidence, it is difficult to claim that wholesalers are actually increasing the transaction costs.

Wholesalers buy products of all qualities because, as noted in the previously, in this way they cover a broader range of clients, from restaurants to mom-n-pop stores in the poorest neighborhoods and street vendors. Put it in another way, the fact the all kinds of qualities are found in the market is a characteristic that makes them very attractive for different kind of retailers. Small retailers can acquire the low quality product at considerably lower prices, while others can buy higher quality products, depending on their targeted market. This enables the existence of a market for second and third-quality produce that is absent both from supermarkets and from large-scale wholesaling [Guarin, 2009].

It was found that supermarkets also buy in food markets to supplement their supply, even though this is not usually accepted publicly. According to Guarín (2009), some supermarkets even have warehouses in Corabastos. Likewise, when products are rejected in the supermarkets due to they do not fulfill the quality standards, they are transferred to food markets. Thus, there is a flow of products from the traditional to the "modern" markets and the other way around that is often unknown or unrecognized by most of the people, and that makes suppose that the line that separates these two apparently independent systems is blurry. This leads to think that food markets also play a role in providing with food to higher income population through the provision of supermarkets. However, given the secrecy around these transactions is difficult to establish in quantitative terms the importance of food markets for supermarkets.

On the other hand, for retailers such as mom-n-pops owners and housewives, the fact that wholesalers also sell at detail represents an advantage[17] because they can buy quantities as small as they want at cheaper prices.

In addition, the credit services provided by wholesalers (described in Chapter 3) are of critical importance because allow most of retailers carrying out their activities and make possible that many individuals have a daily income for their subsistence and their families. It is important to highlight that retailers do not have access to bank credits or other credit alternatives nor the purchasing power to pay what they buy before selling it. Besides, according to the observations and interviews made in Bazurto, it seems that the existence of these systems is avoiding the arising of predatory credit systems such as "paga diario", which is an illegal credit system where the lenders offer to the most needed people the option to access money at a very high interest rate. It is usually controlled by criminals [MIT, UTB, 2010].

[17] For retailers located in the food market, however, the fact that wholesalers sell at detail is threatening their sustainability. In fact, in Bazurto many retailers are gone.

Since the operation of this informal credit system is enabled by the trust generated between stakeholders through the daily interaction, it is critical that wholesalers and retailers remain close to each other; otherwise the cost of food could increase as the cost retailers incur to go from one to other place goes up.

The fact that wholesalers buy all kind of qualities, sell to and attract many types of marketing agents, and provide a credit system for retailers (enabled by the geographic proximity among them) , creates a situation in which there is always a buyer for any product regardless of its quality, so that few products are discarded. According to a recent study made in 2006 in Corabastos the percentage of food that is wasted is as low as 0.08% [Forero, Vega, 2006].

All these aspects are of critical importance in a country like Colombia where there is a high degree of correlation between income level and type of outlet used. Stores like supermarkets are rarely used by lower income families, while retail stores like mom-n-pops and food markets are the major food outlet for low and middle income people.

Table 12 shows where most of Colombians buy their food provisions. As it can be observed by 2005 mom-n-pop stores and open air markets were the outlets preferred by the population in Bogotá, having in total a share of 51% of the food market [CID and Corabastos, 1971], [Ramírez and Otálvaro, 1985][Forero, et al, 2006].

	1970		1985		2005	
	Number	**% Share**	**Number**	**% Share**	**Number**	**% Share**
Corner stores	10,000	50	40,000	54	120,000	45
Open Air markets	35	21	N.A	20	40	6
Supermarkets and coops	87	20	89	20	213	21

Table 12 Number of stores and percent share of food market of different retailers in Bogotá, 1970, 1985, and 2005

Source: (CID,Corabastos, 1971),(Forero, 2006), (Jairo Ramírez, Otálvaro, 1985) cited by Guarín(2009)

The importance of mom-n-pops and food markets for food provision is also evident when analyzing the percentage of some of the main staples and products for Colombians that are sold in these outlets. As Figure 10 below shows, by 2005 more than 60% of the population in Bogotá bought rice and eggs either in mom-n-pops or food markets, and more than 70% and 80% bought potato and milk in these places respectively.

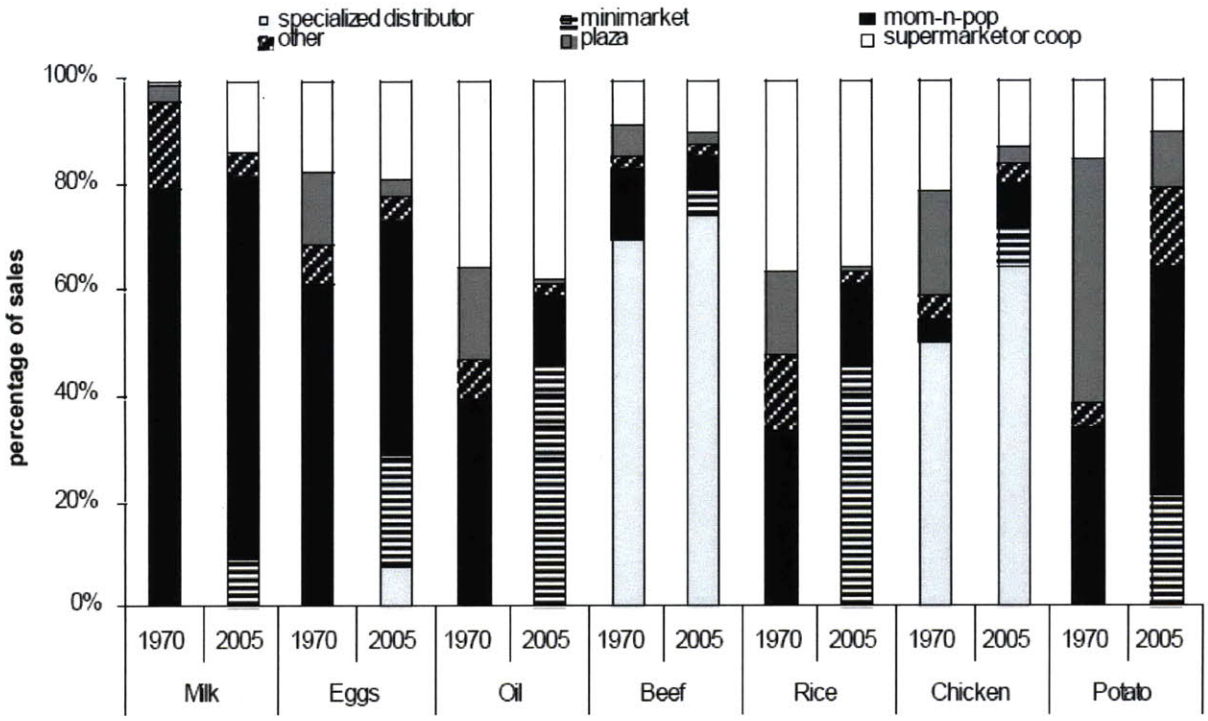

Figure 10 Percentage of sales of different types of food through various retailers in Bogotá in 1970 and 2005

Source: (CID, Corabastos, 1971) cited by Guarín (2009)

Mom-n-pop stores are popular amongst Colombian population because of the consumer need to find a food provision source close to their homes, and thus to avoid incurring in expenses associated to transportation. The majority of urban families in Colombia have low incomes and little or no cash reserves, and the lowest income families do not even have suitable storage space in terms of either refrigeration or security. Therefore, many food purchases are made on a day-to-day basis.

Usually supermarket's customer spend large sums in each trip, while mom-n-pop's customers make more trips (according to study made in Cali, on average people make 4 trips per week) and spend between 3 and 4.17 dollars per trip.

For this reason when visiting food markets, mom-n-pop store owners buy the products that are available at low prices. Since sorting is not a common practice in food markets, neighborhood stores owners have to do a hard job in order to find good and cheap products so that they can offer a relatively flexible basket of goods that adapts to their low income consumers. In addition, since these products are perishable and difficult to manage, and usually the storage space in mom-n-pop stores is limited, owners have to do several trips per month, as described previously.

This active engaging of *tenderos* with wholesalers in an effort to get the cheapest and most abundant products, contrast with the fact that the margins of products they usually buy (like fruit, vegetables, grains, etc.) are very low (between 2% and 8%) [MIT, UTB, 2010a]]. This raises the question why *tenderos* take such an active role in the commodities trade when the margins are so low. They could chose to sell products such as processed foods which leave higher profits and essentially the products are shipped to their stores (usually these supply chains are highly vertically integrated).

However mom and pop owners make the effort to go to the market and get products like rice, tomato, onion, etc., because they are central to the eating habits of consumers, and therefore are essential to attract consumers into their stores. Mom-n-pop owners claim that buyers expect to be able to find these products regularly and at stable prices, if they do not have them consumers feel unsatisfied and prefer going to another store. Here it is important to note that the geographic proximity, once again, plays an important role here, since it is the search through the market what allows *tenderos* provisioning their stores with the products their clients can afford.

Thus, the fact that the food supply chains operate because of the existence of an informal network of wholesalers and retailers of many sizes and types (from supermarkets to restaurants to mom-n-pop stores), which concentrate in the same place, creates a flexible distribution food system that fulfill many different interests, and on which many farmers

and low income consumers depend on. Maybe the mix of retailing and wholesaling activities looks messy, but it is critical in linking peasant economies with low-income consumers.

The variety of produce quality that is offered, the high confluence of different kind of marketing agents in food markets, and the informality in the trade, are elements that, if seen from a pure transaction costs analysis, would be judged as a source of inefficiency. For this reason there is a strong tendency to propose reforms to modernize the food markets. However, if seen from a more micro perspective, it is evident that food markets and the way in which they operate are actually critical both for farmers and the food security of citizens, especially the poor. Neither there are many consumers who can afford the high quality products sold by supermarkets, nor there farmers who can afford or have the resources to produce those products. Besides, it is worth to highlight that quality of agricultural products is measured in terms of color, shape, and other external characteristics, not the nutritional value or properties of the product. Thus, what is usually sold in food markets at lower prices is as nutritive as more expensive products [Guarín, 2009].

Likewise, the current structure of the market seems to be facilitating the buying and selling of products in short time and with low waste, which implies less losses and transaction time for the products to reach final consumers [MIT, UTB, 2010].

This argument is reinforced by looking at the prices of food in supermarkets. It would be expected that given the economies of scale and the fewer middlemen, the supermarket-like systems had less operation costs and therefore offered more affordable food. But this is not proven yet, and the observations done and other studies show that supermarkets if fact sell at higher prices than the informal vendors in the food markets [Forero, 2006]. Thus, it seems that a market where exist a high concurrence of marketing agents not necessarily increases the transaction costs, and that in fact, this way of operation could

bring more benefits than a system, according to government officials, more "organized" and supermarket-like.

4.2.2.2. The Commercialization Practices in the Food Markets: inefficient or necessary?

Some people instead of focusing on the structure of the market itself, think that the problem lies in specific behaviors or practices of some stakeholders of the food system, that if eliminated would improve significantly the efficiency of the market. Specifically, the small scale, dispersed, and highly diverse nature of peasant agriculture and the control that wholesalers may have in the market (given their limited number), are mentioned frequently as ones of the issues need to be addressed urgently.

Lack of specialization in farming: a signal of inefficiency or a way to face market uncertainties?

There is a tendency for farmers to produce several products, often in small quantities. Some argue that this fragmented nature of the peasant production results in higher transaction cost because the production is scattered over fairly large geographic areas and therefore assembly cost are high. Either the farmer or the gatherer must expend time and effort to transport and sell these small quantities. In addition, it is claimed, production costs are often higher than they might be if each farmer specialized in the crops best suited to his soil and climate. Also, as a result of the lack of geographical concentration of agricultural production, there are frequently very few rural traders available to purchase an individual farmer's produce [Forero, 2006][Guarín, 2009].

Some criticize this diversification behavior and describe it as inefficient, but under conditions of limited market information, unstable prices, uncertain markets, and weather

uncertainties, crop diversification is probably a rational behavior. Individual rural small scale farmers can do very little about the uncertainties that force them to diversify.

Thus, a first step to solve this problem, more than try to foster large scale production (difficult given the limited access to land) and more specialization (difficult given the risks involved) among rural peasants, is to see how to reduce market uncertainties that prevent farmers from wanting to have a higher degree of specialization.

Wholesalers: controlling the market and increasing transaction costs or facing risk and providing useful marketing services?

Wholesalers, on the other hand, are seen by government officials as marketing agents that increase transaction cost and therefore must be carefully policed and avoided if possible. It is claimed that wholesalers have a total control over the market because exert monopsonistic and monopolistic power, setting prices that prevent farmers from getting more profit and increase food costs for final consumers. It is assumed that producers and retailers function in perfect markets because there are a large number of them, while assemblers and wholesalers are essentially monopolists because of its limited number. However, the evidence collected in Bazurto and previous studies of Corabastos, show that in practice, only a handful of players have the size and financial capacity to set the price and that the margins gains may not be as big as it is usually thought.

First, as noted in the previous chapter, in the process of price formation in food markets, wholesalers estimate the volume of the supply based on information from the growing regions, inventory from previous days, and the number of trucks that have entered the market. Thus, to a large extend, the price variations results from natural harvesting cycles and from the fact that food markets are places of high confluence of people, where thousands of producers and millions of consumers interact mediated by middlemen, not necessarily by an intentional price manipulation. Thus, in most of the cases, variations in

price are a natural consequence of the uncertainty in the business, and reflect the individual efforts that the wholesalers make to cope with the high risks of the market.

On the other hand the "control" that wholesalers may have over the market stems from their ability to gather information about supply and demand and is a response to the high risk they are facing given the sudden changes in price. Large wholesalers have huge purchasing power and elaborate information systems that allow them to collect local, regional and national movements and volumes. This situation reflects the expected behavior given the uncertainty faced in terms of the supply, rather than a cartel-like behavior, and it is a problem of asymmetries of information, more than a problem of exploitation of the weak parts of the system.

Second, there are no evident barriers to entry, and according to the observations made, there is no control over the trucks that enter the market each day. In fact, wholesalers compete to buy produce from gatherers and farmers. There are also studies made in the food market in Bogota (Corabastos) that support this affirmation [Forero, 2006]

Third, prices of food also depend on the willing to pay of the retailers and it was observed that the wholesalers, even though are few, compete to attract customers. The fact that there are hundreds of small and medium-sized wholesalers creates a competitive environment and gives retailers bargain power. This bargain power is enabled by the geographic proximity between wholesalers and retailers. By seeing the quantity and quality of produce in the market, and by having the chance to check and change the produce, retailers can negotiate and pay the best price for the best quality product. This is necessary because the commodities sold in food markets in Colombia do not follow any standardization system and therefore quality verification is important [MIT, UTB, 2010].

Likewise, it was found that even when a credit system is in place, this does not prevent retailers from getting the best price or allows wholesalers to take advantage and fix the

price. First of all wholesalers have expressed the need to have the credit system to assure the selling of all the produce. Thus, most of them offer a credit option without interest rate or low ones, and therefore there is competence that favors retailer´s position. Second, as it was described in the previous chapter, retailers have the option to change certain percentage of produce if the quality was not the expected. Third, retailers make their buying decision based not only on whether a wholesaler is providing or credit or not, but also in the quality and price of the product. In fact, according to interviews and observations done in Bazurto, the criteria retailers use to choose the wholesaler to buy from in order of importance are: price, quality and access to credit. Thus, a retailer would decide to buy a product with higher quality and/or lower price rather than buying a product with lower quality or higher price by credit. This creates a competition environment between wholesalers.

Thus, it seems that the control that the wholesalers have over the market is not that unlimited as usually stated, and the structure of the market where all stakeholders are brought together to the same physical space not necessarily foster the creation an environment where price manipulation can thrive. Rather, the confluence of stakeholders in the same place may lead to greater transparency in the price setting process.

For decades neither the government nor independent researchers have been able to determine with accuracy what the real profit margin is for wholesaling transactions. Even though the most commonly spread perception is that wholesalers have high margins at the expense of the farmers and final consumers, according to testimonies of a recent study, the time of the "Queens of the Products" is being left behind, and nowadays a more competitive environment can be found in the food markets, which have reduced the revenues of the wholesalers [Forero, Vega, et at, 2006]. When wholesalers can effectively manipulate the market and have asymmetric relations with their providers and clients is usually due to the involvement of guerrillas or paramilitaries. However, this is a social and

political issue that has many dimensions and that does not result from the way in which the market itself operates.

Table 13 summarizes the main differences between the traditional way of tackling the commercialization issues in Colombia and the one proposed in this thesis.

Dimension	Traditional Model to Improve Food Systems	Proposed Model to Improve Food Systems
What is the drive? (efficiency indicators)	Reduction of operation and logistics costs required to take a product from the farmer gate to the consumer	Increase of quality of life of farmers and reduction of cost of food for final consumers
How to determine efficiency?	Analysis of cost and benefit strictly in economic terms and focused on the food market operation	Analysis of cost and benefit can obscure the process. Social variables must also be taken into account. What benefits will the general population derive? What are the long term benefits?
How to get efficient?	Reaching economies of scale and reducing the number of middlemen in the food markets	Coordinating the high number of agents that belong to the food distribution system so that all stakeholders add value
What measures/actions should be taken?	Short term: measures aimed to fix market failures (monopoly-monopsony, collusion, entry limits) such as legislation against speculation, control price, and elimination of middlemen. Long term: measures aimed to change completely the current food market structure. For example: the building of the physical infrastructure of the desired system (facilities for	Actions oriented to create synergic relations amongst stakeholders of the food distribution system as a whole and reduce unbalances in the relationships. For example: mobile services that facilitate appropriate flows of information and reshape certain aspects of the system.

	wholesaling, retailing, logistics platforms, etc.) to force changes at functional and organizational level	
What is being considered?	Internal characteristics of the commercialization process such as stakeholders marketing practices and structure of the market	Internal characteristics of the food distribution system as a whole and external factors that may be shaping those characteristics (i.e. farmers: limitation to land; marketing agents: lack of access to credit; final consumers: price elasticity of the food demand)
How the problem is being tackled?	By improving each stage independently	By improve the system as a whole since stages are interdependent

Table 13 Differences between the traditional way of tackling the commercialization issues in Colombia and the one proposed

4.2.2.3. The take away

It is usually assumed that the performance of a market will be good as long as it fulfills the characteristics of the perfect competition model. As a result there is strong tendency to eliminate the middleman, change the structure of the market, and to make policies oriented to speculation and price control.

It is being forgotten that traditional food distribution systems they exist not only due to disproportionate power of some wholesalers, but because a large proportion of low income rural and urban populations of Colombia depend on them to survive. In fact, the demand of poor consumers is a factor that is determining the structure and the way in which the market functions.

As it has been showed, the wholesalers play a critical role in the linking of farmers and retailers, and provide services that make possible that big volumes of products can be

bought and sold, and the subsistence of thousands of people who sell food and millions of people who consume it.

This analysis demonstrates that usually the notion that the government officials have about the role of the wholesalers is usually based on only the economic transactions of the marketing channel and falls short in taking into account social variables that could change completely the perception of the transaction costs and the value that a specific stakeholder is adding to the whole food distribution system.

The problems of low bargain power of farmers, and low and unstable prices do not stem from the structure of the food distribution system or the existence of middlemen itself. In fact, is the way in which food markets operates that make possible that the products of thousands of geographically dispersed farmers reach millions of urban consumers in a matter of a day or two, a period short enough to ensure the freshness of the produce. Farmers as well as the other stakeholders in the market channel are facing risks and uncertainties, including (but not limited to) variability in volume of supply or effective demand and therefore price levels vary. Most of these uncertainties are a consequence of lack of coordination in the market channels, which are a result of lack planning and also of limited information flow.

Thus, the policies should not be focused on how to "modernize" the food markets, better eliminate middlemen, legislate against speculation, or control prices, and the role ICT can play is not precisely to support the digitalization of all the business processes or help farmers to skip or avoid the set of middlemen by creating direct commercialization channels as it is usually stated. The policies should be focused on how to consolidate and coordinate the high number of agents that participate in the marketing of food, and avoid the exclusion of some stakeholders based only on cost transaction or logistic efficiency analysis. What is needed is to organize a commercialization that is governed by clear rules, and the ICT can help to add that transparency that now is lacking.

Figure 11 shows the scope of the impact of the policies recommendations done in this thesis versus the ones usually made.

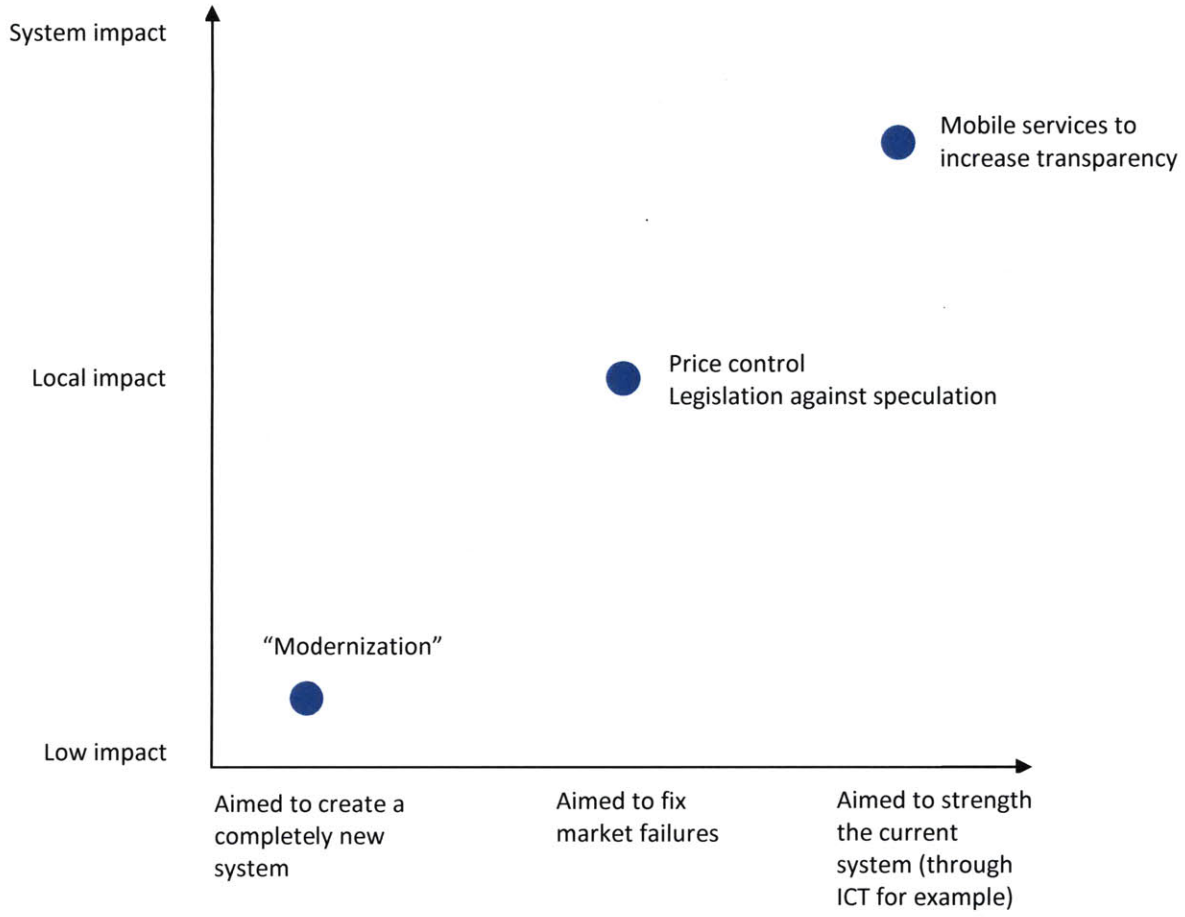

Figure 11 Scope of the impact of different policies used in food supply systems

4.2.2.4. ICT: reducing uncertainty and adding transparency

ICT can be a very useful tool to help to solve the problems just mentioned, but it is important to take into account two characteristics of the operation of food markets. First, the geographic proximity between wholesalers and retailers is important for the operation of the systems of credit and change, for the retailers to have bargain power when buying products from wholesalers, and for guarantying that the transactions time are more efficient. In interviews, retailers expressed their intention to move close to the

wholesalers if an only wholesale facility were built [MIT, UTB, 2010]. Second, in food markets all transactions are made in person, verbally, and in cash. There is no track of deals, trade terms, or transactions in written documents. Although the use of cell phones is becoming increasingly common, negotiations always take place in a face to face meeting where physical inspection can be done.

Based on the previous analysis it seems clear that in order to reduce uncertainty and add transparency in the food distribution systems it is necessary to democratize the information, which implies the dissemination of information along the whole system.

The most common approach to solve this issue is a system that collects and disseminates in a daily basis the prices that are paid to the producers in the main assembling points, the buying and selling prices at wholesaler's level, as well as the sale prices to the final consumer [Forero, Vega, et al, 2006]. Indeed, the dissemination of this information would be a mechanism that would help to generate trust between stakeholders and would reduce the chances of price manipulation, which in turn would improve the bargaining power of weaker elements in the system. Unfortunately, it is not possible to count with all the pieces of information. As described before, the information about selling and buying prices at wholesale level is jealously managed and it is difficult to create incentives for these stakeholders to share it, especially because this would threat the business of those who legally compete (and maybe have privileged positions thanks to the information they collect by themselves) and the power position of those who manipulate the market (for example when there guerrillas or paramilitaries involved).

However, the information of the price to the consumer is public (for example in AgroNet as mentioned before, or it could be easily collected manually). This information could be easily disseminated through messages. This would guarantee that the price paid by the stakeholders is fair and that the information could reach most of people who live in rural

zones. With this information farmers could have a better sense about when and where could be better to sell.

It is important to recall that prices are set once the supply is in the market place and therefore the price information provided to farmers cannot be the price of the day. However, information about prices of the previous days would serve as an indicator of how the market is likely to behave in a specific day, and the historical data would help to see tendencies along the year.

Without doubt price and market information would enable peasants to have a better idea of the price their produce could be sold in the market, would allow to judge what a fair price could be when selling to gatherers, which in turn would increase their bargain power. However, since most of products sold in food markets are perishable and the time they stay fresh is short, the timeframe to wait an increase in price in short as well, and peasants could feel the need to sell their produce even if the price paid is not good enough.

Thus, given the way in which food distribution systems operate in Colombia, the systems for price information dissemination would help at some extent to increase the transparency in the transactions between farmers and gatherers, and to reduce the uncertainty to farmers. However, the dynamics downstream in the supply chain would not be different due to the incorporation of a price dissemination system. While improvements all along the supply chain are not possible, it is difficult to achieve higher efficiency levels, since the different stages are interdependent. Farmers would continue to depend on the willingness to pay of the gatherers since middlemen would continue to face uncertainty about the supply in the market.

For this reason, it is necessary to think how ICT can help to attack the root cause of the problem: the variability in the supply. In this sense ICT could help either supporting the

provision of information about supply meant to reach the market so that variations could be known by the stakeholders in the system, or supporting a real control of the supply. In the first case, the goal is to manage uncertainty; in the second one is to eliminate it.

By providing stakeholders with information about the supply (which could include regions and volumes), as a complementary service to the price information service, would allow them to foresee at some extent the price changes that could occur. Thus, famers not only would have a better bargain position before middlemen, but also could plan ahead what crops to plant or how much to plant so that they can get better prices. On the other hand, gatherers could have symmetric relations with wholesalers since both would have the same information, and they could plan better their trips to pick up produce based on the information about where and how much produce is available. As it was described before, gatherers have to collect produce over a fairly dispersed area. Wholesalers, would be benefited because the supply could become more stable and this in turn would reduce the risk of their business.

This could be implemented through an aggregate supply system where farmers and gatherers provide information about how much supply they have of a specific product and where it is located. The collection of information could be done in strategic points in the different municipalities or on the roads where peasants and gatherers have easy access to. Its dissemination could be easily done through text messages.

Since farmers know their crops and the rainfall seasons, and gatherers know their sellers, the collection of information should be a one-time per year process with probably some updates over the year, depending on how much unexpected weather conditions or other circumstances change the productivity of the crops or the farmer's activities.

The success of the service though, would depend on the level of engaging and participation of farmers and gatherers in providing information, so that the data

collected reflect the reality in terms of number of tons of food arriving to the market. The challenge is even bigger in markets like Corabastos and Bazurto where produce from different parts of the country arrives daily. However, farmers would have incentives to share this information because its dissemination not only would allow them to know when it could be more favorable to sell, but also because their produce and their location would be "advertised" to marketing agents for free. As noted previously, in some regions just a few traders go to peasant's farmers, and this reduce their bargain power and even creates monopsony situations.

Gatherers also have incentives to share information about supply. By knowing where and how much produce is likely to arrive to the market, gatherers not only improve their bargain position before wholesalers, but also could have a better idea of how much product it would be worth it to transport to the market and at what days.

Besides, it is important to highlight that, even thought it could be challenging to collect all the information, some stakeholders are already doing this by using people and in some cases cell phones. As noted before, the biggest wholesalers, based on information from farms, trucks that enter every day to the market, and inventory from previous days, are able to estimate the volume of produce arriving to the market. This was observed in Corabastos, the biggest food market in Colombia, therefore it is assumed that with enough coordination it is possible to replicate this at a bigger scale throughout Colombia in smaller markets.

The other way ICT could help would be by supporting the actual reduction of uncertainty. In order to attack the root of the problem of uncertainty would be necessary to provide a service that helps somehow with the problem of variation in the supply itself and allows to control it. The horizontal and vertical integration seem to be the solution to this issue. In fact many producers have already begun to form cooperatives and associations in search of greater bargaining power, and wholesalers have started (even slowly) to evolve

towards a more vertically integrated supply system (meat and rice supply chains are examples of this).

It is clear that the association processes are long and complex and require the intervention of external institutions and the support of the government, especially at rural peasant level. The wholesalers need to plan which products to sell and coordinate with gatherers and peasants so that they can arrange what crops are going to be planted. Even thought the association level required requires more than the incorporation the ICT, they could play a critical to achieve a timely and broad enough exchange of information between the different stakeholders of the supply chain. The ICT though would be just a small part of the solution, and the way in which they could contribute would vary from product to product, and even from region to region.

4.3. Who should take the leadership?

4.3.1. Should be the government?

Perhaps one of the most important issues is related to public sector intervention in food distribution activities. Should government stimulate improvements in marketing efficiency? If so how?

There are wide differences of opinion concerning the extent to which the government should directly intervene in the actual buying and selling of commodities. The cultural and political heritage of Latin America has left a predominantly market exchange system [Harrison, Henley, 1987] in most countries and the private sector intermediaries continue to be the central core of the food marketing systems. In recent years, however, there is a trend toward planned development that has increased government intervention [PMAAB, 2004]. It is argued, as noted previously, that due to poor market information, market

concentration and other market imperfections, private firms are able to extract monopoly profits, and this justifies and requires the public sector to take measures.

It is widely recognized, and the previous analysis suggests so, that public efforts to stimulate the development of effective food distribution systems are needed. Farmers and all marketing agents need to be motivated and assisted (and even subsidized in some cases) to carry out the necessary changes. Specifically, as described before, the strategies would be aimed to encourage farmers and businessmen to adopt channel coordination improvements and to encourage the organization of effective food distribution chains at the wholesale-retail level.

However, the unsuccessful food-market reforms and the reduction in the efforts to improve the competitiveness of the rural sector in Colombia shown in Chapter 1 are evidence that the public sector is not very effective in this area.

One of the factors that could make government ineffective when it comes to solve food supply distribution system problems lies in the structure of the public sector itself. Colombia's government, like most of the governments, is divided according to the traditional sector lines (i.e., Ministries of Agriculture, Industry, Commerce, Information and Communication Technologies etc.). As a result of this, there are wide differences in perceptions of marketing problems and a variety of opinions on what should to be done about them. Ministries of Agriculture usually put highest priority on farm production problems and the socioeconomic wellbeing of rural people, and may, for example, become convinced that low prices is a major constraint. Thus, it is difficult for them to deal with food distribution systems problems as a whole, and maintain a balance between farmer and consumer interests. Therefore, there are strong tendencies toward perceiving that marketing problems limit farm production rather than taking the view that production and marketing activities should be organized because they are all connected and affect each other. Likewise, urban planning agencies tend to focused on the solution

of physical and architectural problems of rapidly growing cities, and for them the problem could stem from the old traditional market area in the center of the city which generates traffic congestion or make difficult the implementation of a new public transportation system. Therefore, they tend to propose solutions more oriented to eliminate a socially and aesthetically undesirable place, with less concern for food supply system efficiency and the need to coordinate urban food distribution with rural production activities. On the other hand the mayor of the city may be concerned about the food security of the city. For him the way of measuring efficiency is the prices offered to the consumer and therefore his goal is to achieve economies of scale regardless the impacts that this can cause to the other stakeholders upstream in the supply chain.

All these perceptions may be right. But their individual and partial approaches to the problem often prevent people from proposing effective solutions. Food market systems improvements require thinking in "systems terms". Marketing activities are performed by large numbers of independent agents bound together in a highly complex and dynamic system.

In addition, there is little incentive for an individual institution to use scarce resources to fully understand a problem when the solution would require actions beyond the scope and capability of that single institution. So marketing system problems are either ignored or dealt partially.

On the other hand, the Mayor's Offices have shown to be unprepared or unwilling to engage traders in policy dialogue. Usually market's stakeholders are not consulted before making a decision, and there are many politically motivated decisions.

These aspects lead to think that even though the government support is critical to achieve improvements in the supply food systems, there are structural limitations and of scope (or mission) that make difficult for public agencies to take care of the problem of farmers and

food distribution in a comprehensive way, therefore the leadership role should be assigned to somebody else.

4.3.2. Should be the administration?

The administrations of the food markets both of Corabastos and Bazurto have also been involved in the processes of the reforms, and they could be seen as good candidates to take the leadership. Their mission is precisely to look after food market's interests.

However, the cases of Bazurto and Corabastos show that usually the role of the administrations is by far much narrower. Administrations have been dedicated to the collection of a daily or monthly fee for the space rented in the food markets, but they have not placed themselves as actual management body of the market, and there is no link with other institutions or agencies that work for the rural development or food security [MIT, UTB, 2009].

Administrations have also failed in taking into account the interests of all their members and they have not been involved in the process of management of the market. Traders complain about lack of market improvements and the tendency of the authorities to make arbitrary decisions (without previous consultation). Some people who work in the market feel that administrations are not interested in dialogue.

The communication between the administrator and the other stakeholders of the market is almost inexistent, and basically there are no communication mechanisms in place. The case of Bazurto is a clear example of this. During the visits to the market, most of the people interviewed (which included retailers, wholesalers, informal vendors, *tenderos* and consumers) did not know about the reform that is being proposed or just knew it partially.

The little interest in making the food market grow (reflected in aspects like lack of basic infrastructure) has to do with the fact that managers are not usually directly related with or affected by the market activities. The administrator position is a job assigned by public officials, which means that the person in charge not necessary have the experience, knowledge, and interest to understand the market dynamics, its problems, and to work to solve them. Thus, administrators do not seem to have the enough motivation to take a leadership role either.

4.3.3. Should be the stakeholders?

The different marketing agents in the market are directly affected by the conditions of the market; therefore they could be another possibility to take the leadership role. However, there are many limitations. Not only they do not have enough political power, and restricted economic resources, but also it is difficult that these grassroots initiatives are sustainable, given the high commitment and coordination required from all stakeholders. Besides, it cannot be forgotten that these stakeholders have their own interest, many of them in conflict, which would make difficult to reach consensus and get the things done.

The fact that it is about incorporating ICT-based system to improve the efficiency of food marketing systems adds challenges. As it was shown, information flows are critical to improve the food distribution systems, however, problems of lack of information and information asymmetries are along the whole supply chain. Thus, the development of appropriate ICT based services may be beyond the technical or financial capabilities of any individual market participant, or may be only marginally profitable or even unprofitable (or perceived as unprofitable) to the individual investor, especially when there may be significant external benefits.

4.3.4. Should be the private sector?

The provision of services by the private sector has shown to be a powerful force for meeting economic and social challenges. There are many examples of this: the provision of mobile telephony in Bangladesh (Grameenphone, Bangladesh)[Isenberg, Lane, et al, 2007], the provision of marketing services in India (E-choupal) [Upton and Fuller, 2004], the facilitation of mobile banking transactions (M-Pesa)[Vodafone, 2007], the connection of buyers to sellers (CellBazaar)[CellBazaar, 2010], the aggregation of information for crisis response (Ushanhidi)[Ushandhidi, 2010], and even the provision of healthcare to underserved areas (Sana, previously called Moka)[Sana, 2010]. The list is long and varied.

Many of these services have been enabled by the fast penetration of mobile phones in developing countries, even in rural zones, and it is expected that the advent of broadband access in poor areas of developing countries bring another wave of mobile and web innovations.

This new paradigm of providing the poor with affordable services is the result of entrepreneurial ventures undertaken by the civil society who are looking for profits while serving underserved population, who usually has been neglected by both the government and big companies. These social enterprises have started to show that business can be profitable in the poorest areas of the world, and the bottom up development is possible. Under this perspective the poor are not seen as limited people and mere recipients of goods and services (top down approach), but like actors in their own economic well-being, and potential producers and problem solvers if provided with the appropriate tools [Quadir, 2010].

While many people pursuing purely social ventures are doing admirable work, for-profit ventures have the necessary scale and scope to help to solve the underlying causes of

social problems. When entrepreneurs deliver productivity tools to ordinary people, the resulting increases in efficiency become a social force.

The key to achieve scale and scope is to take a commercial approach for tackling social challenges. People's own desire to increase their productivity and quality of life makes low income population a huge and still unexplored high profit market. The fast pace of mobile phones penetration in places where there are inadequate roads, unreliable electricity, or little potable is a clear evidence of this. People are willing to pay for tools that help them to grow. On the other hand, the competition that is inherent to the for-profit world is critical to find cost-effective ways of providing goods and services at lower costs and to expand market. Innovations and lower-cost products naturally emerge in this environment.

Thus, the services and tools that are considered necessary to solve the problems of food distribution systems in Colombia could be provided at low cost and with a comprehensive view by the private sector. They would have the economic incentives to understand well the problem and propose solutions where all stakeholders benefit.

Table 14 shows the pros and cons of the different leadership options described.

ICT Leader	Pros	Cons
Government	Interest in the problems of farmers and food security Access to more resources (economic sustainability) Power to make decisions, and take actions	Assist by providing subsidizes, not necessarily empower Structure divided according to traditional sector lines (Ministry of Agriculture, Ministry of Industry and Commerce, Ministry of ICT, etc.) that prevents government from taking a comprehensive approach to the problem Many stakeholders need to be involved and coordinated Politically motivated decisions
Administration	Have food market interest as core mission Power to influence policy making	Not an effective management body (e.g. no communication with market stakeholders) Administrator position is a job assigned by government officials (e.g. administrator not necessarily knows the market problem) Their interest is focused on the food market itself, not the whole food distribution system.
	Directly interested in solving food distribution system issues	Not enough power to influence policy making Restricted economic resources

Market Stakeholders		Difficult to get consensus given the conflict of interest Implementation of ICT based systems goes beyond their financial and technical capabilities
Private sector	Empower by providing productive tools Inherent competition of the for-profit world leads to cost/effective solutions Has economic incentives to understand the problem from a system-view and include stakeholders Decisions and actions are carried out by few stakeholders, whose interest is making profit	Likely to take advantage of vulnerable parts of the system Lack of incentives to "start-up" innovative business models

Table 14 Pros and cons of different leadership options for food supply systems reforms

5. CONCLUSION

Most rural communities are not prepared yet to initiate a process of access to the global market. Peasant production is still at small scale, their standardization and quality control are very immature (if any), traceability processes are not in place (which usually are a requisite to export), etc. Therefore the domestic markets, represented by the traditional food markets, are the main commercialization option for these small scale producers. This, in turn, creates a link between the food security issue and the agriculture problem that make them inseparable.

However, both government officials and the citizens do not understand the necessary functions of food marketing and the utility of those functions to rural farmers and society, and usually there are negative attitudes, both public and private, toward food markets. It is claim that the traditional informal trade that prevails in these places is inefficient, unhygienic, unsafe, and its structure only fuels the creation of monopolies and monopsonies. Consequently gatherers, wholesalers, and retailers in food markets have been treated as enemies rather than as allies, to the extent that market reforms have been usually aimed to affect drastically the traditional food marketing system.

Reality is, however, much more complex. The persistence of certain informal or traditional practices cannot be judged just from a pure economic and logistic efficiency perspective. Informal retailing involves some social and health problems, but there are very powerful reasons why more than 10 millions consumers get their food (directly or indirectly) from a market like Corabastos.

It is important to recognize that the current food distributions system, even though do not have an optimal performance and have many issues, serves a critical role, not only because most of the edible and non-edible products are distributed there, but also

because thousands of sellers depend on this system. Food markets continue to be the main commercialization place for products (in spite of the expansion of supermarkets), and the complex and varied relationships between peasants, wholesaler and retailers have persisted over time simply because they are vital for the subsistence of many people.

The negative public attitudes about intermediaries have limited development of effective public policies for food distribution systems. Thus, first, the perception about intermediaries should change and they should be seen and treated as providers of socially useful services for whom policies should be developed to foster efficiency and social welfare. Otherwise, as the Bazurto and Corabastos cases showed, the public resources are wasted and more uncertainty and distrust are generated.

This is not to imply that food distribution systems should be left are they are now. This is meant to say that it is not about design new systems (with new stakeholders) and eliminate what is perceived as inefficient. It is about to count on the existing stakeholders, which represent an immense social and human capital, and reconcile their interest so that their participation in the system brings benefit for all.

The thesis makes recommendations regarding ways in which ICT can improve the way in which food markets can function by taking into account the motivations and interest of the different stakeholders. It is argued that through the provision of simple services that improve the dissemination of information up and down the supply chain, ICT can help farmers to increase their productivity and can create the transparency needed in the commercialization of food.

By using ICT to make dialogue possible, rather than a simple transference of information, by creating links between people, rather than central repositories, that foster the building of relationships rather than the individual absorption of information, it is possible to

strength the learning dynamics of peasants and to foster the exchange knowledge amongst them and with external sources.

Likewise, by using mobile phones to disseminate information about prices and volumes it is possible to reduce the uncertainty and high risk that cause that farmers do not specialize, that gatherers pay low prices to farmers, and wholesalers buy at low cost and sell at high cost. It was seen that farmers have in their in hands critical information necessary (information about supply) to reduce the problem of uncertainty in the food markets. It seems more a matter of organization and coordination to use that information to improve their bargain power and ultimately their quality of life.

However, the incorporation of mobile services will not be enough. Governments and municipalities should first recognize the potential of the different stakeholders involved in the food distribution processes, understand their interests, create incentives, and work together to find solutions to various problems that currently food markets face. At the end, the success of a ICT based project does not result from the incorporation of ICT in a social context with poverty, exclusion problems, and with high illiteracy levels. Given the conditions, the people, the policies, and the institutions working to solve the problems, the ICT can make the difference.

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