

**Experiences in the use of
text messaging services and
mobile telecommunications in
the agricultural markets
of Costa Rica, Ecuador, Trinidad
and Tobago, and Uruguay**



Market Information Organization of the Americas (MIOA)
Inter-American Institute for Cooperation on Agriculture (IICA)

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Inter-American Institute for Cooperation on Agriculture (IICA), 2016



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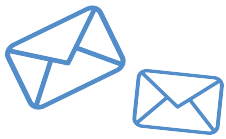


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Foreword

The Market Information Organization of the Americas (MIOA) is a technical cooperation network that supports the development of agricultural market information systems (MIS), the purpose of which is to enable a timely and continuous exchange of information in the member countries.

Some of the countries that belong to the MIOA have developed technological tools to facilitate access to information for users including farmers, intermediaries and end consumers. The MIS of Costa Rica, Ecuador, Trinidad and Tobago and Uruguay stand out as leaders in the use of SMS (Short Messaging Service) mobile messaging as a method to communicate the prices of agricultural products.

With financing from the Foreign Agricultural Service of the United States Department of Agriculture (FAS-USDA), and in coordination with the National Production Council (CNP) and the Integrated Agricultural Market Program (PIMA) of Costa Rica; the National Information System of the Ministry of Agriculture, Livestock, Aquiculture and Fisheries (MAGAP) in Ecuador; the National Agricultural Marketing and Development Corporation (NAMDEVCO) in Trinidad and Tobago; and the Model Market and Grain Observatory (DIGEGRA) in Uruguay; and with support from the MIOA and Inter-American Institute for Cooperation on Agriculture (IICA), an evaluation was conducted on the mobile messaging service offered in these countries, the results of which are compiled in this document.

The Secretariat of Planning and Evaluation (SEPE) at IICA provided support to the MIOA in systematizing the results. The goal of this exercise is precisely to learn from the experiences of each country, analyze successful cases and identify opportunities for improvement in the field of information services.

This overall vision will undoubtedly help member countries of the MIOA to make use of this tool and the information systems applied to agricultural product markets, so that they can strengthen the bonds with private actors requesting timely, reliable and veracious information from the markets in order to make better commercial decisions.



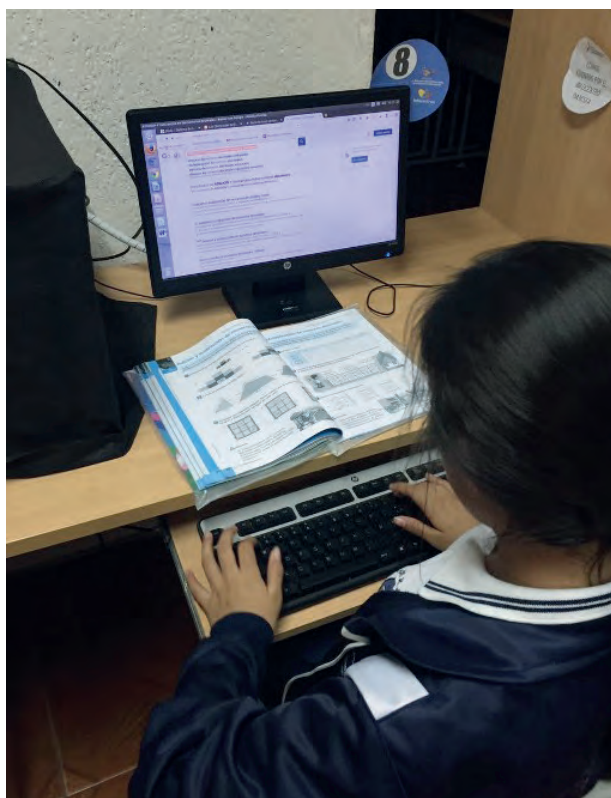
Introduction

The goal of the Market Information Organization of the Americas (MIOA) is to strengthen agricultural market information systems (MIS) in the different countries of the hemisphere in order to promote transparency by facilitating a timely and systematic exchange of information. By doing so, merchants, farmers, intermediaries and consumers will be better equipped to make adequate decisions in regards to their productive or commercial activities.

Many countries in the region have responsibly implemented the concept that agriculture and knowledge must go hand in hand. For more than two decades, governments and representatives of the private sector have promoted programs and strategies that enable access to information. Many official websites and information centers allow the download of free information and encourage users to profit from technological tools such as computers, tablets and mobile phones.

Nevertheless, many farmers still have structural difficulties to access timely and reliable information, especially in more remote rural areas. This data would allow them to be better equipped when negotiating with intermediaries and potential merchants, or directly in the markets. Knowledge is undoubtedly an essential tool to strengthen their economy and therefore improve their quality of life.

The MIS have implemented different tools to generate more accurate, reliable and transparent information. As societies become increasingly computer-based, options such as websites and databases are complementing more traditional information services such as radio, television, fax, telephone recordings and others. One of the most widely used mechanisms to disseminate information on agricultural product prices is text messaging or SMS (short messaging system), especially using low-range phones (this system was implemented even before smartphones became widespread).





As a result, in 2014 the MIOA and the Inter-American Institute for Cooperation on Agriculture (IICA) developed a joint technical cooperation project entitled *Strengthening private sector linkage to market information systems (MIS) and evaluating short message services (SMS)*, which were aimed, among other things, at ‘evaluating SMS programs in four selected MIOA member countries, in terms of their business model, sustainability, and effectiveness in providing timely and reliable market information to farmers, especially small and medium-sized farmers, and to assess how farmers access and use information.’

In order to reach this goal, we proceeded to evaluate text messaging services (SMS) in four countries, namely Costa Rica, Ecuador, Trinidad and Tobago and Uruguay. Evaluations included the support of Representations of the Institute in those countries.

Once the studies were concluded, the MIOA asked IICA to systematize the results, on the basis that mobile communication is a suitable tool to provide farmers with market information that will allow them to improve their competitive position. The fieldwork took place in September 2016 through the Secretariat of Planning and Evaluation (SEPE), with a methodology designed to systematize the different experiences.

It is worthwhile mentioning that in Costa Rica, the text messaging service entitled Agromensajes is under the Integrated Agricultural Marketing Program and the National Production Council; in Ecuador, the SMS-MAGAP is promoted by the Ministry of Agriculture, Livestock, Aquaculture and Fisheries; in Trinidad and Tobago, the service entitled NAMDEVCO is developed by the National Agricultural Marketing and Development Corporation; finally, in Uruguay, the information service is managed by the Model Market Administrative Commission, which includes the Municipality of Montevideo and the Ministry of Livestock, Agriculture and Fisheries.

Objectives of systematization

The objectives of the systematization of experiences implemented by IICA were to:

- Organize and reconstruct available information on SMS experiences in the countries and evaluate these services promoted by the MIOA.
- Systematize the design process logic, as well as the implementation and operation of the national SMS experience.
- Perform a critical interpretation of the process and its stakeholders.
- Identify lessons learned for future projects or actions associated with the use of SMS in the different markets.

As a response to these guidelines, this document includes an introduction, four chapters describing experiences in Costa Rica, Ecuador, Trinidad and Tobago, and Uruguay, and a section with final comments on the use of short messaging systems (SMS) as a mechanism to disseminate information related to markets and the common elements resulting from the systematization process.

Each chapter describes the context of each agricultural market, as well as the main market information systems of the country in question. It also discusses the experience of mobile telephone text messaging system (SMS) and analyzes their usefulness as a means of communication between the market and the different stakeholders involved in the commercialization of agricultural products.

The evaluation is performed on-site with the direct involvement of those responsible for the market, as well as other key stakeholders in the development and evaluation of information initiatives of this nature. Text messaging services and their application at the national level are described and then evaluated. Afterwards, the lessons learned and good practices are described along with a series of recommendations associated with markets or the text messaging service.

We would like to thank the MIOA and IICA's delegations for the support provided in all four countries analyzed, especially by officials of the different ministries, municipalities and companies, as well as merchants and farmers who dedicated their time and shared information to make this project a reality. They are the ones who transform agricultural markets into more professional, transparent and democratic spaces on a daily basis, which ultimately results in greater competitiveness of agricultural chains and more prosperity for food producing families.



COSTA RICA:

use of the “Agromensajes”

text messaging service

Introduction¹

Costa Rica is a Central American country with a surface area of 51,000 km² and an estimated population of 4,937,755 inhabitants as of June 2016, with the agricultural sector playing a strategic role. According to the National Institute for Census and Statistics of Costa Rica, in 2015, 27.3% (1,319,286 people) of the population lived in rural areas, and the workforce or economically active population (EAP) of the agricultural sector accounted for 12% (273,973 people) of the total national workforce. On the other hand, 72.11% of agricultural and rural employment was generated in rural areas, which places it in the second position in terms of employment generation in the country.



Indeed, the sector provided work for 252,801 people among the national agricultural EAP, which represents 12.3% of the national total. This figure is higher than that of 2012 (10.2%, or 203,816 people).

According to statistics provided by the Economic Commission for Latin America and the Caribbean (ECLAC, 2016), the gross domestic product (GDP) moved from USD 46.47 billion in 2012 to 52.96 billion in 2015, with a per capita GDP for those same years of USD 9,959.1 and USD 10,985.4 respectively.

On the other hand, the annual share of the agricultural, livestock, forestry and fisheries sectors of total GDP fell from 5.4% in 2012 to 4.8% in 2015, which places it behind the industrial, commerce and transportation sectors.

Regarding production value-added – which represents nearly 13% of GDP in 2014 -, this originated mainly from the agricultural sub-sector (75.7%), followed by the livestock sub-sector (19.2%), fisheries (2.2%) and wood (2.1%). This has remained stable since 2012, with pineapple, banana, melon, chicken, African palm and milk being the activities with the best performance.

¹ The data presented in the introduction were taken from the following sources: INEC 2010 and 2014, INFOAGRO 2016, ECLACL 2016 and PROCOMER 2016.



The main destinations for exports are the United States, the European Union, Central America and different countries in Asia. In relative terms, the sector accounted for 24.8% of total exports in 2012; 28.9% in 2015; and 31.1 % as of August 2016. The main products for export include coffee, banana, sugar, meat and non-traditional products such as pineapple, melon and cassava, among others.

On the other hand, about 35% of the total surface area of the country is used mainly for agricultural activities. 54% of the 500,000 hectares dedicated to agricultural activities are used for industrial crops (such as coffee, sugarcane, oil palm); 22% is used for fresh fruit (such as oranges, pineapples and melon); 19% for basic grains (such as rice or beans); 1.5% for vegetables (such as carrots, tomato, broccoli) and 3.5% for tropical root crops (for example cassava and tubers) (IICA, 2014).

CIF imports in the agricultural, livestock, forestry and fisheries sectors soared to USD 992,779,000 in 2012 and USD 977,180,500 in 2015. By June 2016, that number had reached USD 536,787,900. The most relevant products imported are corn, wheat, rice and beans.

The 2014 National Agricultural Census (INEC, 2014) reports a total of 93,017 farms covering a total of 2,406,400 ha, of which 65.2% (976,083 ha) focuses mainly on agricultural activities², 32.5% (109,695.2 ha) focuses on livestock³ and 2.4% (158,568.2 ha) focuses on other activities⁴. Regarding land use, 167,133.1 hectares are used for tillage, 377,214.4 ha are permanent crops, 1,044,909.7 are covered in pasture and 736,505.2 ha are covered by forest.

Of the total surface area under cultivation in 2013, the main agricultural activities included coffee, with 93,800 ha (13.0%); rice, with 59,300 ha (12.2 %); banana, with 48,000 ha (9.3 %) and pineapple, with 45,000 ha (8.8 %).

Costa Rican agricultural markets: CENADA and Farmers' markets

National Food Supply and Distribution Center (CENADA), managed by the Integrated Agricultural Marketing Program (PIMA)⁵

Law N° 6124 was passed on November 4th 1977, in which *“The Institute of Municipal Promotion and Assistance (IFAM) is hereby authorized to purchase directly [...] the properties [...] on which the National Food Supply and Distribution Center shall be built”*. On November 25th 1977, Law N° 6142 was passed, providing legal entity

2 Includes the main activities associated with annual, permanent, forest and ornamental crops.

3 Includes the main aquiculture, poultry farming, pig farming and beef cattle, other minor species and livestock activities.

4 Includes the main aquiculture, poultry farming, pig farming and beef cattle, other minor species and livestock activities.

5 This section is based on Rodríguez (2012).

COSTA RICA: use of the “Agromensajes” text messaging service

and patrimony to the Integrated Agricultural Marketing Program (PIMA), as an institution with the following roles:

- i. Organizing and managing CENADA.
- ii. Conducting studies and research on marketing systems for products associated with CENADA in order to make improvements.
- iii. Providing technical assistance to municipalities in the organization, structuring and functioning of their respective markets.

The CENADA began operations on 23 April, 1981 with the purpose of consolidating the operation of a Wholesale Facility. Over the years, the institution has expanded its offer of products and services benefiting the Costa Rican agricultural sector, to include:

- **The Wholesale Markets Information System (SIMM).** This system collects, processes and disseminates primary information on 140 products marketed within CENADA, resulting in a single database with information on the wholesale of produce in the country and reference pricing for most transactions of this nature. It also generates other tools such as the Seasonal Price and Offer Indexes, the Directory of Merchants and the Marketing Manual.



- **Management of the National Refrigeration Network.** In 2003, PIMA assumed responsibility for the administration of refrigerated warehouses installed at CENADA and in Zarcero. Refrigeration and Freezing services are provided in these facilities, with a capacity of up to 3 million kilograms, to extend the shelf life of agricultural products.
- **Modernization of municipal retail markets.** As of 2004, municipal markets in Central America and the Caribbean underwent an evaluation process that included the assessment of 25 Costa Rican municipal markets, with the purpose of modernizing them. This was an acknowledgment of the importance of municipal retail markets in the market chain.
- **National Collection Point Program.** Between 2000 and 2007, PIMA executed a project to provide farmers' organizations with financial resources to assist them in marketing their products directly through collection points. This program benefited 25 Costa Rican organizations.



- **Development of regional markets.** Two projects are aimed at developing wholesale markets in the regions of Chorotega and Brunca, to extend marketing services provided by CENADA to other regions of the country. The Chorotega Market is now in its final phase, and the investment is estimated at about USD 15 million; the Brunca Market is going through the negotiation phase with respect to the land, and the final investment will be approximately USD 5 million.
- **Trend analysis for the consumption of fruit, vegetables, fish and shellfish.** As of 2000, PIMA has conducted trend analyses for the consumption of fruit, vegetables, fish and shellfish in Costa Rica. The data obtained is useful to make decisions in the education, health and commerce sectors. It is also essential for public policymaking aimed at promoting the consumption of these products.

Farmers' markets and the National Production Council (CNP)

In 1979, the municipality of the central canton of the province of San José authorized farmers to settle in the areas surrounding the Plaza de Toros de Zapote to celebrate the First Farmers Market (CNP, 2011). 64 farmers participated from different villages in the metropolitan area. During the first years, the National Farmers Market Program (PNFA) first fell under the responsibility of the Ministry of Economy, then of the Ministry of Agriculture and Livestock, until 1994 when it was transferred to the CNP. The CNP commissions the management and execution of the fair to the National Confederation of Agricultural Centers, and is only in charge of supervising and controlling the activities.

One year later, a more participatory and democratic organizational structure was created, giving way to the National Market Board and nine Regional Market Committees that included entities in charge of the supervision of these fairs and other bodies in charge of issuing credentials in each region. The CNP still maintains its role as supervisor and monitor. Since its creation, the legal standard applied to regulate the PNFA was the executive decree, until 2006 when Law N° 8533 was passed to regulate farmers' markets.

Currently, farmers' markets are among the most relevant channels to commercialize agricultural, fish, poultry and agro-industrial products, and handcrafts, apart from a large variety of fruits, vegetables, meat products and others. The PNFA operation includes more than 90 farmers' organizations and more than 8500 independent farmers who sell their products directly in these markets. These markets take place on a weekly basis and are a point of access that is close to the consumer.

These agricultural markets have proven to be the best alternative to solve the commercialization problem affecting small and medium sized farmers, since they are a preferred point of sale for consumers (14.5%) to purchase fruits and vegetables (PIMA, 2009). They are also the main target market for low and middle class consumers, because of its proximity and because they can purchase produce at an affordable price.

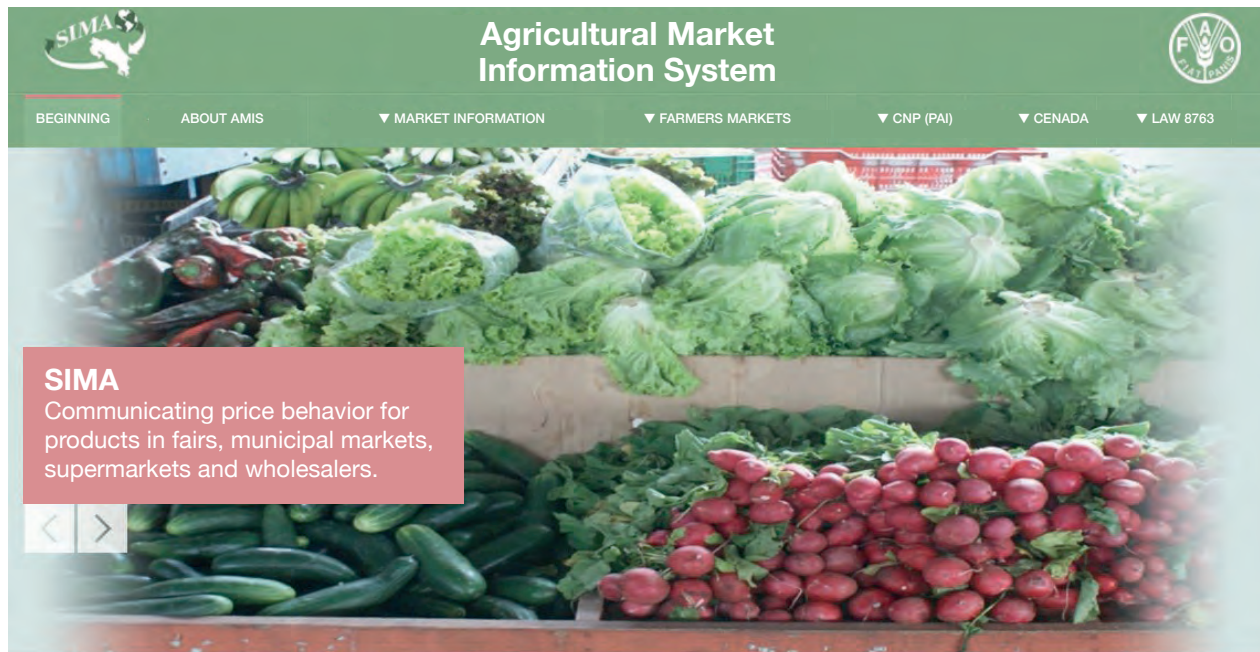
The CNP was created in 1940 with the purpose of "supporting added value generation, focusing on quality, food safety and commercialization [...] by providing goods and services that promote competitiveness and sustainability for productive activities and are involved in the market to ensure food security and benefit farmers and consumers alike..." (CNP, 2011).

COSTA RICA: use of the “Agromensajes” text messaging service

The CNP focuses on agricultural commercialization, and is therefore invested in issues such as entrepreneurship development, marketing, information, quality, agro-industry and institutional supply, among other topics. One of its responsibilities is to coordinate the Agrifood Markets Information System (<https://simacr.go.cr/>), where information is available on different points of sale in the country and the institutional supply program.

Agricultural information systems

In Costa Rica, there are two official, government-sponsored agricultural market information systems, used to suggest prices and support the decision-making process for farmers, merchants, intermediaries, distributors, retailers and consumers. The first one is the Wholesale Market Information System (SIMM), which uses information generated at CENADA, and the second one is the Agricultural Information System (SIA) of the CNP, which generates reference prices for farmers’ markets.





Wholesale Market Information System (SIMM)

The SIMM began its operations on the same day that CENADA opened its doors in 1981. The system compiles prices and data related to transactions of fruit and vegetable products that take place at CENADA and generates useful information (in different formats and of different types), not only for Wholesale Facility users but also for other sectors of the agricultural chains and the public in general.

The SIMM has an interdisciplinary team and specialized software used for four basic activities: data collection, data storage, data processing and dissemination of information. The general goal is to contribute to market transparency by collecting, analyzing and disseminating information on prices, volume and other parameters associated with the products marketed at CENADA.

Some of the products generated by SIMM are: reports containing sales prices, from wholesale to retail, monthly reports (including a list of measuring units and a list of products according to their origin), reports containing volumes and prices in USD (daily rate) and a weekly report to the Regional Market Intelligence System (SIMEFRUT) and price information for more than 40 products, distributed through the AGROMENSAJES platform.



Information is collected starting at 4:30 am on Mondays, Wednesdays and Fridays by market researchers from SIMM, who are present at CENADA with their corresponding uniforms and identification and rotate between the different sectors of the center on a weekly basis. A quality control process is applied on three levels: analysis conducted by researchers, analysis at the office and analysis conducted using software. Furthermore, the information is verified by consulting buyers and internal or external informants.

In order to avoid price speculation or bias, a minimum sample price is established for each product, thus preventing the impact of only a few players on the suggested price; if the minimum established price is not respected, the price of that product for that day is not published. Likewise, in order to comply with daily market conditions, marketing units are updated every two years and an annual census is conducted to have an estimation of volume behavior at CENADA.

Agrifood Information System (SIA-CNP)⁶

The National Production Council (CNP) has an Agrifood Information System (SIA) that includes an interdisciplinary team of professionals analyzing different variables associated with domestic and foreign agricultural markets.

Apart from collecting and validating information on national and international prices for agricultural products, the system processes data on supply, demand, foreign trade, opportunities and threats, and other types of information, all used to prepare reports on market intelligence that are distributed through different media.

The CNP establishes a reference price for fruits and vegetables, both for the farmer and the farmers market. In the case of basic grains, it establishes prices for farmers, wholesalers and consumers (supermarkets). As for meat products, it stipulates prices at the level of the packing plant, cattle auctions and retail sales. It also has a record on cattle transportation and bovine and porcine extraction rates.

The CNP also receives notifications from the State Phytosanitary Service, the Ministry of Agriculture and Livestock, the Central Bank of Costa Rica, PROCOMER and other entities. With the data collected, the SIA works in the following areas:

- i. Prices and markets:** Periodic reports are drafted on local and international prices for fruits and vegetables, basic grains, meat and sea products, seasonal indexes and channel analysis and commercialization and distribution margins.
- ii. Local and international monitoring:** A permanent warning system is implemented to monitor products in different markets (production, fertilizers, biofuels) and sends notifications about opportunities and threats, measures implemented by other countries, competitiveness studies and impact of natural disasters.
- iii. Market research by product:** Periodic analyses are conducted on products in different markets, considering aspects such as supply, demand, consumption, competitors, prices, margins, commercial strategies and conditions of market access.
- iv. Dissemination of information:** Information is communicated via email, fax, websites, post, telephone or personally at the Documentation Center.

⁶ This section is based on CNP s. f.



AGROMENSAJES⁷ text messaging service

One of the main problems faced by agricultural information systems in this country was failure to benefit from new technologies to disseminate information. The only way in which farmers, intermediaries and consumers could become aware of market variables was via email or electronic newsletters issued by PIMA and the CNP, or consulting national newspapers that published this same data once a week.

One of the first proposals was to promote the use of a toll-free line; however, when the technical team (CNP-PIMA-IICA-ICE) further analyzed the idea of making phone calls, for example, to 1-800-TOMATO, they realized that this entailed a considerable investment of money and time. As a result, text messaging became a low-cost, fast and easily accessible option.

In order to make this decision, three aspects were considered: 1) the world trend to provide services using ICTs, resulting in cost reduction of up to 20% between 2008 and 2011; 2) by 2011, Costa Rica had 4.35 million cell phone subscribers -approximately 92 cell phone subscriptions for every 100 inhabitants-, with a growing trend, and; 3) in Costa Rica, the average subscriber sends up to 180 text messages per month, way above the average observed in countries like Peru (9), Chile (7), and El Salvador (11) (SUTEL 2010).

As a result, in 2011 the PIMA and the CNP implemented the project entitled “*Dissemination of information on prices and markets of the agricultural sector through text messaging using cellular phone services (Agromensajes)*”, with the assistance and support of the Inter-American Institute for Cooperation on Agriculture (IICA). This project also constitutes an instrument in the Agricultural Sector and Rural Development Policies 2010-2021 to promote the use of information and communication technologies to communicate prices of agricultural products.

The purpose of Agromensajes is therefore to transmit, in an easy and timely manner, the price of agricultural products so that farmers, merchants and consumers can make informed decisions.

The system uses databases on prices and market information from the agricultural sector, and the technological platform of the Costa Rican Institute of Electricity (ICE). This platform is capable of sending text messages of up to 140 characters and the cost is borne by the person or entity requesting the information.

This institutional alignment project has not required significant investments and is expected to help promote competitiveness in the sector and foster rural development in the country.

The price of each product (40 in total registered in the system) can be consulted from any cell phone as long as it has text messaging service or SMS. The procedure is the following:

⁷ This section is based on CNP and PIMA 2012b.

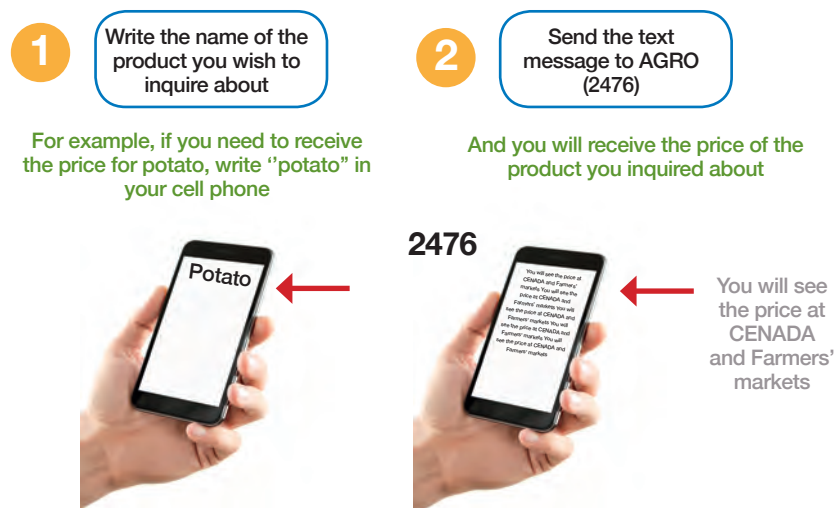
COSTA RICA: use of the “Agromensajes” text messaging service

Step 1. Choose one of the 40 products registered in the system (Table 1)

Table 1. List of 40 products registered in the AGROMENSAJES service.

| | | | |
|------------------------|----------------------|----------|-----------------|
| Apio verde | Chayote sazón blanco | Manga | Remolacha |
| Ayote sazón | Chile dulce | Maracuyá | Repollo verde |
| Ayote tierno | Coliflor | Mora | Sandía |
| Banano criollo | Culantro castilla | Ñampí | Tiquisque |
| Brócoli | Elote | Naranja | Tomate |
| Camote | Fresa | Papa | Vainica |
| Cebolla suelta | Lechuga americana | Papaya | Yuca parafinada |
| Cebolla trenza | Lechuga criolla | Pepino | Zanahoria |
| Chayote tierno criollo | Limón mesino | Piña | Zapallo |

Step 2. Send the name of the product as text message (write, for example, the word POTATO) and send it to A-G-R-O (2476).





Step 3. In only a few seconds, you will receive the most recent commercial price for two types of market: wholesale price from CENADA and consumer price for farmers' markets from CNP.

This service has national coverage, works 24 hours a day and has an average response time of 10 seconds. The text message indicates date of query, the acronyms for both institutions providing the reference price information and the name of the product in question. Then, the mostly price is received (the most repeated price of the day) at CENADA as well as the suggested price for farmers' markets, according to the marketing unit indicated in the technical manual. The cost of each text message is ₡3,96 (three colones with ninety six cents), is subject to adjustments by the Telecommunications Authority of Costa Rica (SUTEL) and is charged to the user's monthly bill. Incorrect messages and responses are not billed.

About the prices:

- Prices are in Costa Rican colones and are suggested prices; this means that buyers or merchants cannot legally require or enforce them. Buyers and merchants are fully responsible for the prices charged or paid.
- Mostly prices⁸ reflect the latest trend collected at CENADA; prices are compiled by SIMM personnel on Mondays, Wednesdays and Fridays between 4:30 am and 6 am, and are published after 10 am on the same day in different media and at www.pima.go.cr.
- In the case of farmers' markets, the Agricultural Information System (SIA) of the CNP updates prices on Fridays, and these are reference prices for selling at the farmers' markets; prices are sent to the different users via email and fax, and are published on the institutional website (www.cnp.go.cr). These same prices are published on Saturdays in the different media (press, radio and television).
- The marketing units for some products in the CENADA wholesale market may differ from the units used for farmers' markets.
- Prices make reference to the top quality product established by the market, be it at CENADA or in farmers' markets, taking into account that the size and overall appearance are the main factors considered to define the quality of a product. No local or international protocols are applied, involving aspects such as product features, damages, defects and resistance.

In an attempt to include the names of the products that users may misspell and thus ensure a more appropriate response to the request, a list of alternative names for each product was drafted. There is also a double cycle of queries and responses; for example, if the user writes CHAYOTE, the system sends a text

⁸ The mostly price is the most repeated price of the day for the trading of a specific product.

message requesting the specific type of chayote. If a new name is found which is not included, this can be reported by sending an email to: agromensajes@pima.go.cr

A manual entitled “AGROMENSAJES Technical Manual” was created to explain the functioning of the system and allow the user to correctly interpret the information provided.

Evaluation of the “AGROMENSAJES”⁹ service

The Market Information Organization of the Americas (MIOA) requested that IICA conduct a study on the information needs of the Agromensajes service, a task implemented by the Secretariat of Planning and Evaluation in coordination with IICA’s Delegation in Costa Rica and its national counterparts.

Methodology

The Institute carried out a first descriptive statistical analysis on the use of the Agromensajes service, based on information provided by the Costa Rican Electrical Institute (ICE) during the period between January 1, 2014 and May 18, 2016. The initial database was made up of 534,811 events from 13,150 different users, who requested information on one of the 40 products registered in the system. This database was reduced to 531,140 by excluding messages not addressed to the system (Category E), meaning those that were never intended to use Agromensajes.

In order to evaluate user perception of the services, and at the same time get to know the information needs of those not currently using the platform, IICA proceeded to measure the level of user satisfaction and improvement opportunities of the platform in order to take appropriate measures. The tool was applied to a sample of 169 people, whose contact information was extracted from databases for potato and tomato farmers, as well as agricultural organizations identified by IICA’s delegation in Costa Rica.

Of all respondents, only 14% were women. The age range was 22 to 77 years, although most people (44%) were between 43 and 57 years of age. 74% of the sample included people exclusively dedicated to farming, 11% worked in farming and another activity (including milk production and construction), and 9% not only produce agricultural products but also market them.

Please note that the sample analyzed includes users and non-users of the platform which, given the nature of their activity, could at some point need first-hand information regarding price behavior for agricultural products.

⁹ This section is based on IICA (2016).



Analysis

88% of queries (467,430) sent to the Agromensajes service were successful, and only 12% failed (63,980). Likewise, during the period in question, the service underwent a general growth of 45.7%, moving from 44,332 queries during the first quarter of 2014 to 64,599 queries during the first quarter of 2016 (Chart 1).

Chart 1. Success rate of queries sent through Agromensajes, by quarter (2014-2016).

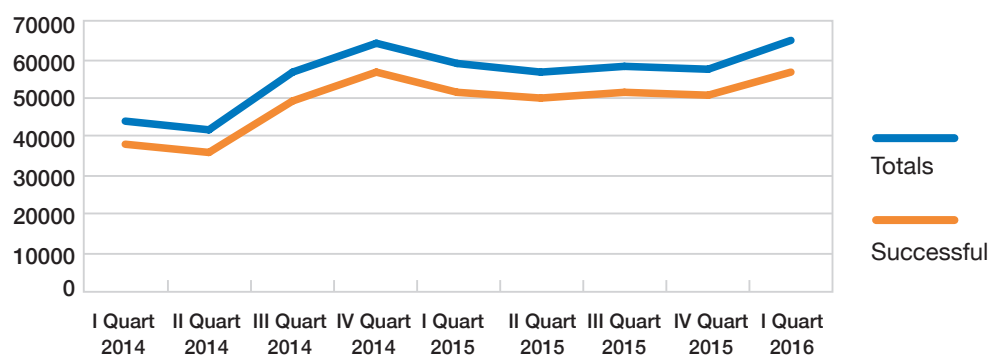


Chart 1 also shows that, apart from a slight reduction observed between the first and the second quarter of 2014, queries increased uninterrupted until the fourth quarter of 2014. As of the first quarter of 2015, a significant decrease is observed and then the curve remains constant until the first quarter of 2016, where there is a new increase. The trend for successful queries is usually similar to the one observed for total queries.

The error rate detected in queries, under the categories “misspelled”, “product not found in the system”, or “questions about quality or quantity” showed a slight decrease between 2014 and 2015, while the category “others” showed an increase of 12% (chart 2).

This same chart shows that the most common error had to do with misspelling the name of the product (54%), queries about products that were not in the system (24%) and asking about quality and quantity (6%). These errors include the category “others” (12%), which include queries that were spelled with spaces between the words, cases in which it is not clear whether the name was misspelled or if it was an incorrect message, and cases with a combination of words that did not allow a clear identification of the product in question.

Chart 2. Most common error in Agromensajes queries (2014-2016).

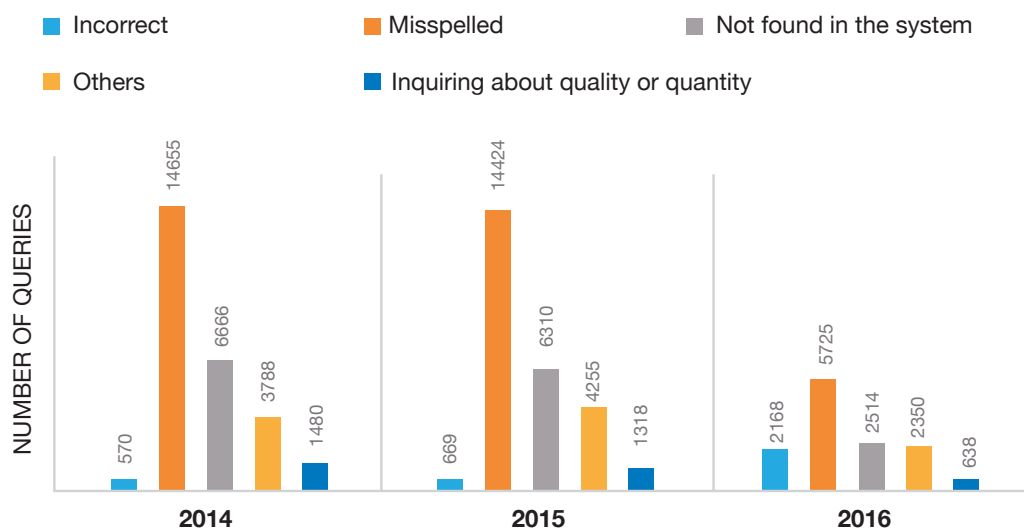


Table 2 lists the main products consulted that are not in the system, proposes alternative names for the most frequent errors when spelling these products, and the total number of queries.

Table 2. Ranking of consulted products not included in the system.

(Translator’s note: for the purpose of clarity, the names were left in Spanish to show the errors more clearly)

| Description | Possible alternative names in the case of misspelling | Total queries |
|----------------------------|---|---------------|
| Frijol (beans) | Frijol tierno, Frijoles, fijoles | 973 |
| Mango | Mangos, Mango sele | 678 |
| Melon | Melón, canttaloupe | 583 |
| Zuquini (Zucchini) | Suquini, Zuquin, zuchini | 517 |
| Mandarina (Tangerine) | Mandarina dulce, Mandarinas | 443 |
| Cebollino | Cebollin | 311 |
| Guanábana | Ganabana | 305 |
| Cebolla morada (red onion) | Sebolla morada | 258 |
| Other 11 products | | 1770 |
| | Total | 5838 |



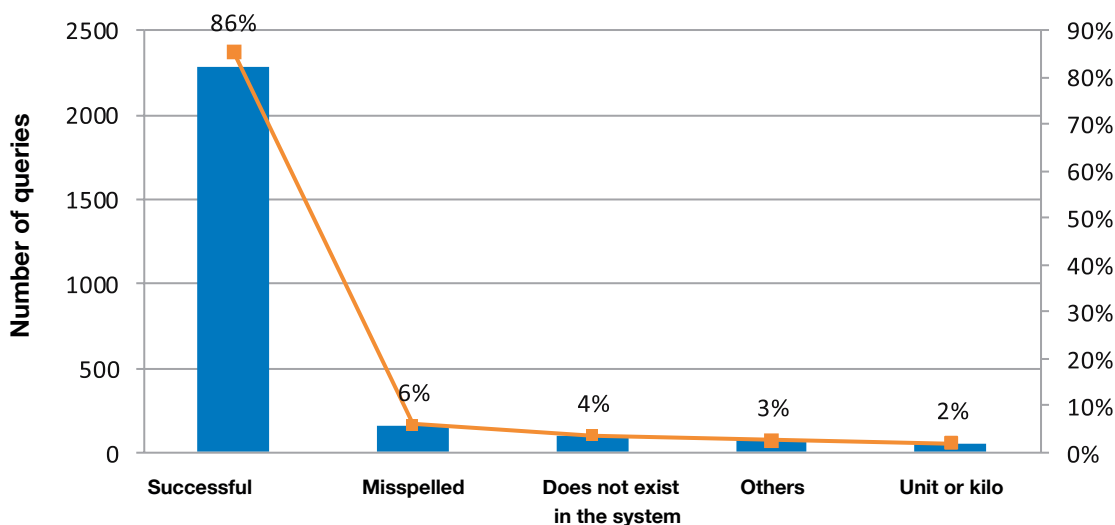
During the period in question, 13,150 users sent messages through Agromensajes: 7,215 joined in 2014, 7,800 in 2015 and 4,116 in May 2016; this means that the service grew by 8.1% between 2014 and 2015. Ever since the service was launched in 2014, the monthly number of users has remained stable at between 2000 and 2500 per month.

Of the 7,800 people who used the platform in 2015, 4,618 (59.2%) were new users, while 1,317 (32%) of the 4,116 people who used it in the first quarter of 2016 were new users.

As for the number of times the system received queries, each user made 40 queries on average during the period analyzed; in 2014, the average was 29 messages per user; in 2015, 30 per user; and as of May 2016, 23 per user.

Of the total number of system users, 2,670 used the platform only once, and 86% of them did so successfully while 14% did not succeed (chart 3).

Chart 3. Effectiveness of the service for one-time users of Agromensajes (2014-2016).

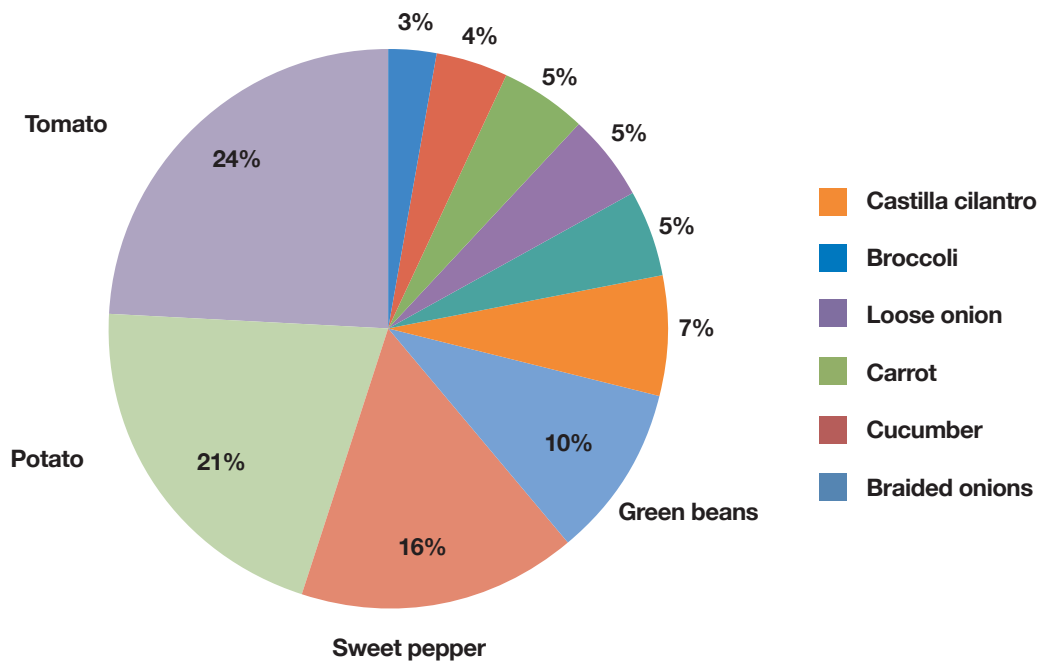


As for the percentage of users who consulted the system only once during the entire year, no significant variations were observed between 2014 (16%) and 2015 (15%). On average for the entire period in question, 20% were one-time users of the service during a single year. This analysis took into account only successful queries, which was equal to 267,430 events for the entire period.

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Chart 4 displays the top ten consulted products: tomato was number one, with almost one fourth of the total successful queries (24%), followed by potato (21%) and sweet pepper (16%). Broccoli, onions by the pound and carrots showed similar percentages (5% for each one).

Chart 4. Percentage of queries made per product (2014-2016).



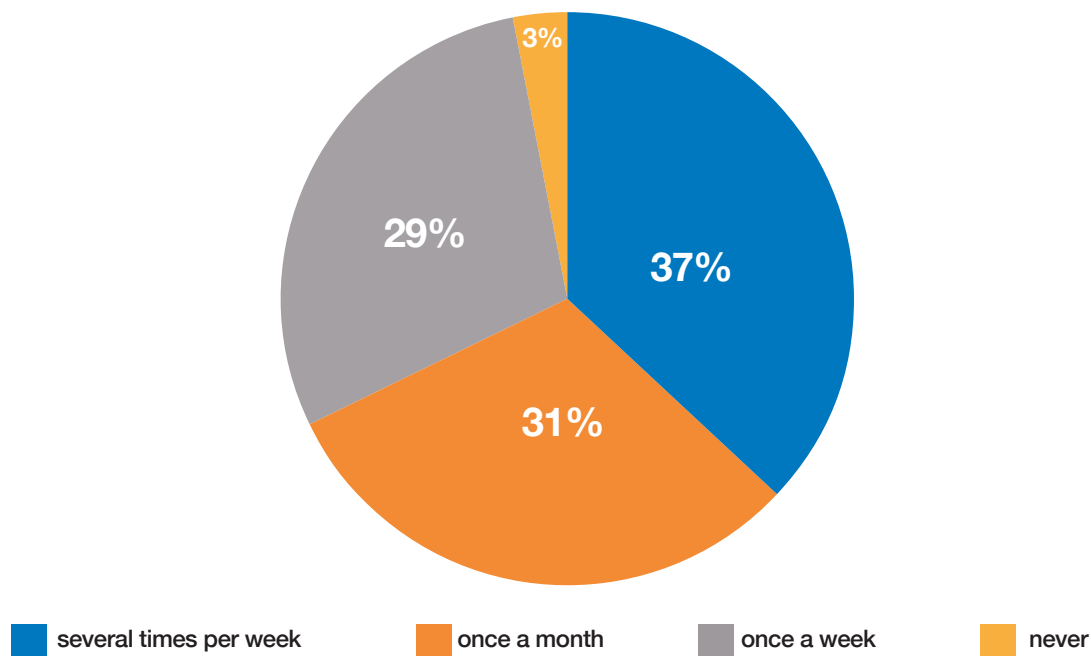
With respect to need for information, only 37% of the 169 people consulted claim to know about the service, and 20% of those respondents say they have used it. It is worthwhile mentioning that 13.6% use it as a reference to establish the price for their product, but remarkably, many are unaware that the service is called Agromensajes. Those who had used the system in the past but ceased to do so, claim this was due to lack of interest, difficulty in using it, and the possibility of using other price information methods.

Most people first heard about the existence of this service through other farmers or friends. Some mention having received this information in workshops and training events, and some claim that they found out via the news, radio, press or television.

Chart 5 shows the frequency of use indicated by respondents: 60% consulted the system at least once a week, most of them did so at least once a month. These numbers can be explained by the fact that all respondents claimed that the platform was easy or very easy to use.



Chart 5. Relative distribution according to frequency of use of Agromensajes.



Difficulties mentioned by respondents regarding the use of the service included:

- a) Message is returned because of spelling errors.
- b) Response time is slow; sometimes there is no reply or the system is out of service.
- c) Prices do not coincide with market reality.
- d) The message fails to mention the agreed price or the quality of the product (does not distinguish between grade A, B or C).
- e) Users inquire about products that are not included in the service.

As for the cost of the message, 57% of users claimed they did not know it, 26% said it was a fair price, 14% thought it was cheap, and only 4% considered it expensive.

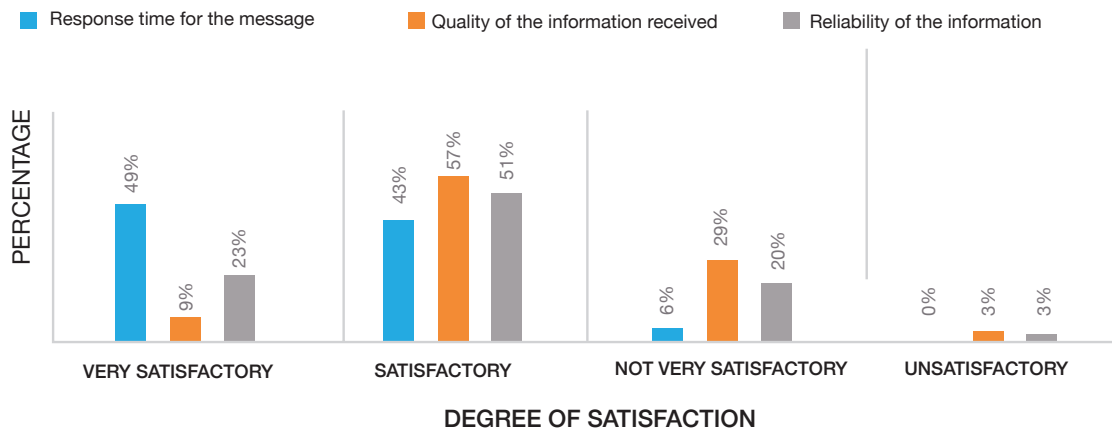
A similar thing was observed with the behavior of users of the Agromensajes platform and the ICE database; the sample of respondents stated that they consulted mostly about the price of potatoes (49%),

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tomato (43%), onion (38%) and sweet pepper (34%); and to a lower extent (less than 15%), the price of cauliflower, celery, broccoli, papaya, avocado, garlic, plantain, tiquizique, cassava, chayote and pumpkin.

The degree of satisfaction with the service itself - response time, quality and reliability of the information -, is shown in chart 6. In general, respondents were satisfied, especially with delivery times, but the level of satisfaction was low when they were asked about the quality and reliability of the information, due to the difficulties mentioned above.

Chart 6. Level of satisfaction with the Agromensajes service.



Respondents were asked to grade the service using a scale of 1 to 10, 1 being the lowest score and 10 the highest. 15% gave it a 5 or less, while 74% graded it between 7 and 10. 55% described it as good or excellent, 40% believed it was average. Only 5% qualified it as a bad service.

94% of users say they would recommend the service to other farmers, since they do not know about other similar sources of information except the Cartago Vegetable Market and the Surco market, in the north of Cartago, which send the prices of the products sold there. The remaining 6% stated that they would not recommend the service.

When asked whether the service was useful for decision-making, most respondents answered that it was useful or very useful, while only 7% stated that it was not useful. On the other hand, 39% considered that the service did not provide the price information needed to make decisions.



Respondents also indicated that the most useful way to make decisions is the platform itself as well as the internet. Traditional media (radio, newspapers and television) do not seem to be as important for inquires about prices and market information.

This market research focused on four aspects when evaluating the needs that must be met by a price information system:

- **Accessibility (information exists and is available to most people):** The fact that this system disseminates information using mobile devices meets this need for accessibility, since 98% of respondents own a cell phone. On the other hand, 21% of those who claimed they knew about or had used the platform said that it was easy or very easy to use. However, 40% of those who used it stated that they had had difficulties.
- **Updates:** This criterion considers the responses provided by people not using the platform, but who could be potential users. Their observations are indicative of what the service should look like in order to meet the client's needs. The analysis was conducted using a scale of 1 to 4, with 1 being the most important feature and 4 the least important. The top position was for speed when delivering results; second, how current the data was; third, simplicity of use; and in last place, its low cost.
- **Speed** was the most important feature because potential users wish to receive the information without having to leave the sales point, and this is information that they need right away; they are also interested in the data being the most current one, since they use this as a reference to make decisions.
- **Timeliness (response time):** In order to analyze this feature, only non-users were considered. The analysis showed that 43% consider that Agromensajes does not cover all the price information needs to make appropriate decisions; they stated, among other reasons, that the information failed to be appropriately updated.
- **Variety (sufficient information or other data they might need):** This analysis revealed that the main points of distribution and trading of agricultural products are the wholesale market (23%), intermediaries (23%), farmers' markets (22%), retail stores (16%), and the farms themselves (14%). This distribution shows that the data supplied by the system is useful, since target markets tend to have the same price information line as the Agromensajes platform.

Other products that both users and non-users need information about include livestock, basic grains and agroindustrial products. Likewise, 15 respondents stated they were interested in knowing the prices for products such as coffee, milk, eggs, beans, chives, taro and zucchini. Many demanded the inclusion of products which are already part of the system, such as potato, tomato, onions, sweet pepper and coriander.

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The “Others” category refers to products mentioned once or twice, such as auction cattle, chicken, pig meat, rice, cacao, sugarcane, soursop, plums, guava, taro, mango, peach, apple, melon and rambutan, among others.

When asked about other products they would wish to inquire about, a high percentage of respondents answered “none” or simply failed to respond, which can be attributed to the fact that the system already provides them with the information they need for their activity. Some products mentioned that were already in the platform such as strawberries, cabbage, lettuce, tomato and squash. Fruits in general, and specifically uchuva, zucchini and cas, appear among the products mentioned that are not in the system.

With respect to other information they would like to receive through this platform, the responses were categorized as follows: 29% mentioned market-related issues, such as existing markets, supply and demand of products, international prices, consumption averages, price margins between intermediaries and farmers, production, market behavior, price trends and projections, and new markets.

Other categories mentioned included inputs (10%) and technical assistance (9%). When mentioning inputs, they made reference mostly to where to obtain them and their price. Regarding technical assistance, they mentioned pest control, cropping techniques and technical production information. Finally, one or two people referred to issues like favorable loans, weather forecast, labeling and packaging, other price sources, seed information, production sectors, transportation services and prices for organic products.

On the other hand, 54 % of users thought the platform was useful for the decision-making process, but the same percentage stated that the internet was as useful, or more useful, than the platform for the same purpose, since the network allowed immediate access to daily information.

Non-users, on the other hand, chose the internet as a first option to obtain market information, and consulting other farmers was their second choice. They also believed that the information offered by publications, MAG officials, intermediaries or radio is of little or no use for being outdated and in some cases, they claim, incorrect.

When asked about what were the means that farmers and merchants use to obtain market information, Agromensajes was fourth (8% of the respondents), since most people in the sample were not aware of its existence. CENADA was in first place (32%), followed by other farmers (20%) and intermediaries (11%). Although this last option was quite useless as a source of information, its impact on product pricing is remarkable.

Farmers need updated and timely information and must be able to access it from their workplace. For this reason, 88% of respondents stated that they would be willing to receive information from markets using a mobile application, as long as the cost remains affordable.

The main reasons stated by farmers for not using the Agromensajes platform were lack of interest, lack of awareness of its existence, insufficient information supplied by the system or difficulty in using it.



Lessons learned, final comments and recommendations

Lessons learned

- The country has moved forward significantly in the development of market information systems and has made an effort to implement state-of-the-art technologies; however, most farmers feel strongly attached to traditions and habits that do not always accompany the technological tools placed at their disposal. This lack of information or misinformation results in everyone not being able to fully benefit from the inputs generated by these systems.
- The key to success is to apply integrated implementation strategies; that is, to comply with all stages such as training, development, support and follow-up. It is remarkable how users mistrust the information they receive although it is exactly the same as the one offered by CENADA and CNP, the primary sources. In market dynamics, it is of paramount importance to pay attention to this type of behavior, since a business opportunity could otherwise be missed.
- Another important factor is the lack of sufficient regulations to establish quality standards for the products. This same study proves that, while other countries have guides to standardize the characteristics of each category of quality, in Costa Rica the concept of quality may vary according to known and accepted aspects, but which are certainly situational and subjective.

Final comments

- **Having a phone service governed by PIMA and CNP is convenient, appropriate and universal:** the Agromensajes phone messaging system is a “country project” involving social responsibility and mostly aimed at notifying farmers. Its implementation responds to the criteria established in State Policies for the Agrifood Sector and Rural Development 2010-2021 of the Ministry of Agriculture and Livestock (MAG). Reference prices are updated three times per week and the information has a strong, fully reliable methodological and institutional support. Agromensajes is a valuable tool for farmers and farmers’ organizations, since it helps them make more informed decisions about their businesses, points of sale, partial or total harvesting periods, and other processes.
- **Agromensajes has great potential and has evolved in a positive way:** the Agromensajes system had made significant progress over the years, both in terms of successful queries and new users. During the period under review, 13,150 people used the system; 45% were new users and 20.3% were one-time users. The margin of error of the system was 12%, but 7.2% of this percentage corresponds to spelling mistakes and questions about quality or formats not available in the system.
- **Stronger focus on communicating the existence of the service:** Although the average use of the system per user is equivalent to 40 queries, it is safe to say that there is a lack of awareness about the

existence of the service, and in some cases farmers do not know the system by its name (Agromensajes). This means there have not been sufficient advertising campaigns aimed at farmers and merchants. A significant percentage of users know the platform only by reference (recommended by other farmers), which strengthens the idea that so far, institutional promotion has been insufficient. Considering the fact that the system is used constantly, and that many users consult it several times per week, it becomes necessary to consolidate aspects such as speed and reliability so that farmers, merchants or stakeholders can consider this as valid input for their decision-making process. Overall, the system is perceived as accessible, but speed, timeliness and quality of information cannot be neglected, given that these are the features users consider essential.

Recommendations

- **Improve the response time of the service.** Responses of 140 characters sometimes take a long time to arrive, which makes the pricing decision-making process more difficult.
- **Increase success rates** by correcting the most frequently-mentioned errors when entering the name of available products in the system.
- **Further develop communication strategies for the platform**, so that more farmers can profit from it. One example is to promote its use in the same regions where products included in the Agromensajes list are cultivated, and explain to farmers how the system works. Campaigns should reach as many farmers and merchants as possible, since it is the users who usually recommend the platform to their fellow farmers. These strategies should also include a clear explanation, assuring them that the information provided is accurate, timely and reliable, and quickly respond to comments that discredit said information.
- **Draft a manual with specifications and technical standards** to regulate the different quality levels for the products, and support processes that may help collect and disseminate more complete information about market behavior.
- **Strengthen the institutional framework:**
 - **Within CENADA, the following actions are recommended:**
 - Appreciate the value of using technological tools, such as Pocket PCs, to collect information as quickly and efficiently as possible.
 - Provide more training for officials (MIOA/INA/USDA/PROMEFRUT).
 - Integrate the SIMM systems into other national and international market information systems.



- Integrate the system into international databases (SIMEFRUT/PAPA).
- Offer new information products for specific groups (hospitals, jails, CENADA users, etc.).
- **Within CNP:**
 - Categorize and codify farmers' markets.
 - Implement a program to assign positions at CNP.
 - Monitor prices at fairs, supermarkets, etc.
 - Training programs.
 - Comprehensive diagnosis.
 - Non-financial services.
 - Annual awards at farmers' markets.
 - Creation of an Inter-Institutional Farmers Market Commission.
- **Including other content in the service.** Although the information provided currently partially covers the customers' needs, there is a segment demanding the inclusion of, for example:
 - Data on supply and demand, to see how much product should be removed, when to sow, and price statistics indicating when prices go up or down.
 - Product prices differentiated by quality.
 - Agricultural input prices.
 - Points of sale to place the products, with new market opportunities or new trading sites.
 - Including other products such as zucchini, tender beans, cas and cherry tomatoes.
 - Weather alert notifications.
- **Revisit the ideas** of the Institutional Program for the Integrated Development of Farmers' markets, proposed in 2011, which includes a series of programs and services that help comply with legal stipulations and promote the integrated growth of this commercial circuit.

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ECUADOR:

use of the “SMS-MAGAP”
text messaging service

Introduction

Ecuador, with a surface area of 256 370 km²s, is a very diverse country situated in the northwestern part of South America. In accordance with the projections of the National Population and Housing Census 2010, in 2016 its population will be approximately sixteen million five hundred thousand inhabitants, of which nearly six million (36.4%) will form the rural population. The economically active population (EAP) slightly exceeds six million inhabitants, and the agricultural sector accounts for 27% of employment (INEC 2015). The per capita Gross Domestic Product (GDP) was estimated at USD6222 in 2014.

Ecuador has 842 882 agricultural production units (UPA) that cover a surface area of 12.3 million hectares (INEC 2000). Of these, 2 976 379 are farms (permanent crops, transitory crops and fallow land, and land in rest); additionally, 4 486 868 hectares are devoted to livestock activities (natural and cultivated grasses).

The surface area for agricultural activity (permanent crops 26.1%, transitory and fallow land 16.8%, natural grasses 12.5% and cultivated lands, 44.6%) amounted to 5.67 million hectares in 2015, 5.1% more than in 2014 (5.38 million hectares). Banana, coffee and cacao, rice, flowers and sugarcane, potato, corn, and fruits and vegetables were the main products of the agricultural sector (INEC n.d.).

Since 2012, there are established policies for supporting productivity and competitiveness of the sector related to transfer of technology, development of improved seeds, and access to credit and inputs, that are partially implemented through projects such as the high performance seed plan and the coffee and cacao farm reactivation programs.

In 2014, the agricultural sector was lagging behind the oil and mines, construction, professional and technical sectors. In 2105, the agriculture, forestry, game and fishing sector was behind the social services relating to health and teaching.

In terms of the value of agricultural exports and imports, the ratio is 4 to 1, which generates a balance of trade surplus which, in 2014, amounted to USD 7.3 billion. Around 50% of the structure of the Agricultural GDP (AGDP) relates therefore to activities that are oriented towards exports, especially to countries such as the United States, Germany, Russia, and the Netherlands, among others.



The FOB agricultural exports amounted to USD 9.6 billion in 2014 (shrimp, banana, tuna fish, cacao, roses, palm oil, coffee, banana, broccoli, pineapple, passion fruit, *naranjilla*, asparagus, and others), while agricultural imports CIF was USD 2.3 billion in 2014 (soybean pie, wheat, fish, soybean oil, seeds, apples, yellow corn, others). In 2014, 47.3% of all products exported were non-oil products.



The agricultural markets of Ecuador

Ecuador applies a reference price policy for its wholesale market, which is governed by Executive Decree N. ° 1438, so that the responsible authorities, in this case, the MAGAP and the Ministry of Industries and Productivity (IPM), each within its scope of action, can exert a certain control over speculation. Reference prices must be published on the respective Website during the first five days of each month. Furthermore, a method for calculating this price is provided, as well as a list of 45 agricultural and livestock products to which the policy should be applied.

Both ministries have to collect, calculate and publish the reference prices; with respect to price control, they are assisted by the Inspectorates General and by the Police Departments.

The Decree also obliges the administrators of wholesale markets or food transfer terminals to visibly display, in these markets, reference prices of the products that are subject to this provision, once they have been published on the Web sites of both ministries.

With respect to the MAGAP, this mechanism operates with the support of the institutional framework that the ministry has in place at the central, provincial, and area-based levels. This is done via the General Coordination of the National Information Systems for Agriculture, Livestock, Aquaculture and Fisheries (CGSIN), the Zone Coordinators and the Provincial Directorates, as well as with support from the twelve most important wholesale dealers in the country, which are quite different in terms of characteristics and levels of development.

These are the transit points for the highest amounts of the main basic fresh produce, as well as other products such as rice, dry corn, brown sugar paste and other products that are negotiated in the commercial warehouses for grains and non-perishable goods that are on the premises. The wholesale markets are classified as four types, namely (CGSIN n.d.):

Terminal wholesale markets: Also known as distribution and consumption terminals. They operate as recipients of the flow of products coming mainly from the collection and intermediate markets and markets from adjoining production areas, for further distribution to the retail markets. There are three such markets:

- **El Arenal de Cuenca Wholesale Market**
- **Guayaquil Terminal Food Transfer Market (TTVG)**
- **Quito Public Corporation Wholesale Market (MMQ-PE)**

Wholesale collection markets: These markets play a dual role, that of collection and redistribution to other markets, especially to the terminal and border markets, which means that they could be referred to as transit markets. They have broad areas of influence, both for collection and for distribution. These are markets where there is a coming-together of farmers and rural collectors as principal suppliers and of market collectors, local wholesale dealers and consumers as buyers. There are four such markets, which are held periodically:

- **Ambato Municipal Public Corporation Wholesale Market (PE-EMA)**
- **Ibarra Wholesale Market (COMERCIBARRA)**
- **“San Pedro de Riobamba” Municipal Public Corporation Agricultural Farmers Market (PE-EMMPA)**
- **Santo Domingo de Tsáchilas Wholesale Market**

Intermediate markets: These markets play the dual role of transfer and redistribution to the provincial terminal or border markets. This group consists of four markets:

- **Bolivar Market in the Carchi Province**
- **Potato Market in San Gabriel, Carchi**
- **Latacunga Market**
- **Portoviejo Neighborhood Market N.º 2**



Border markets: These markets operate in the population centers of the border areas such as Ipiales, in the case of Colombia (linked to Tulcán), and the border area of Aguas Verdes in the case of Peru (linked to Huaquillas). In this type of market, the prices of transactions vary in the same way as they do in the neighboring countries, which in turn is reflected in the price patterns in Ecuador’s domestic market.

Furthermore, in these markets there are commercial warehouses, which are also a channel for marketing that is supplied by large scale agribusinesses and wholesale merchants. These markets therefore have warehouses where they exhibit and distribute products, and where there are also additional spaces for temporary storage of products.

Although the markets are the place where products are negotiated in large volumes, and the place where supply and demand meet, and therefore where the prices of products are generated, the markets in and



of themselves still do not offer the user (whether producer, merchant, end-consumer or other) either transparency or timely information on market intelligence (prices, volumes traded, product presentations, quality, etc.) for making well founded decisions.

This is partly due to inequality with respect to the development, vision and conditions that exist in these places, which eventually has direct consequences on the manner in which the products are negotiated, on the quality of the product and on how the product reaches the end-consumer. Hence, the key role that the MAGAP plays in providing the stakeholders in the markets with the basic information they need in order to identify what the competition is, what prices are being negotiated and the characteristics of the products traded, among other aspects. This is achieved by means of the National Information System for Agriculture, Livestock, Aquaculture, and Fisheries (SINAGAP).

For this reason, in compliance with Executive Decree N.º 1438, the wholesale markets must visibly display for the users the shadow prices that the MAGAP provides.

In some cases, such as the Ambato Market, there has been great progress in this direction. Reference prices are offered that are collected from buyers and sellers for a list of 50 products, and this is disseminated to the other wholesale markets. In addition to the price, the origin of the products and the quantities traded are checked and the presentation of the product is examined (packaging, weights, measures). To this end, 12 supervisors are involved who record the prices and then post them on the Web. These figures are substantiated and validated, and then compared with the figures from the price investigator from MAGAP.

Similarly, and although done individually, each market has been implementing improvement processes for various product lines. Measures have been taken to try to organize these opportunities to bring together supply and demand for agricultural products. Since 2014, the wholesale markets of Quito, Ambato, Riobamba, Latacunga, Cuenca, Ibarra, and Bolivar (in the province of Carchi) have been working together to organize the Chamber of Wholesale Markets of Ecuador (Cotopaxi Noticias 2015). This Chamber was created in August 2014, and was formally established through regulation from the Autonomous Decentralized Municipal Governments (GAD) and the MAGAP which provides technical assistance. The idea is that all the wholesale markets would be included in this entity and work in an articulated way.



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The creation of the Chamber was necessary for achieving, in a harmonized way, domestic agreements that seek, for example, to improve the marketing system, achieve greater transparency in the market, organize a national system for the standardization of packaging weights and measures, and deliver better quality products to the consumer.

The Chamber also provides assistance for agricultural surveys, and in the creation of a commission that supports the process of legalizing the merchants and promotes the sharing of commercial experiences among administrators and managers of wholesale markets throughout the country. Initially, 12 products were identified for attention at the national level, among them, potatoes, onions, fruits (such as blackberry and strawberry), green leafy vegetables, ear of sweet corn and dry smooth corn.

Likewise, jointly with the MAGAP, the markets within the Chamber of Wholesale Markets of Ecuador signed an agreement to help make information more transparent. To this end, the procurement of large electronic screens was promoted to display the official reference prices and the characteristics of the products that are traded in the market. Thus, the producer can know the margin of profitability that the intermediary has and the one which he can have with his product. The process is under way and is expected to be concluded this year, once the MAGAP has resolved a dispute with the supplier of the equipment.



Information systems of the MAGAP

The National Information System for Agriculture, Livestock, Aquaculture and Fisheries (SINAGAP)¹⁰

As part of its institutional framework, the MAGAP includes the CGSIN (General Coordination of the National Information System for Agriculture, Livestock, Aquaculture and Fisheries)¹¹, whose objective is to provide reliable, timely, and structured information, both to the public and private sectors so that they can make decisions that contribute to achieving greater well-being for all stakeholders in the agro-productive sector.

¹⁰ This section is based on the Website of the MAGAP <http://sinagap.agricultura.gob.ec> and on interviews conducted with personnel from the CGSIN, at the offices located in Quito, Ambato and Santo Domingo de los Tsáchilas, as well as producers and tradespeople in Santo Domingo de los Tsáchilas and Ambato.

¹¹ The CGSIN is part of the National Information System (SNI), which is coordinated by the National Secretariat of Planning and Development (SENPLADES) and represents the organized set of elements that enable interaction between stakeholders for the purpose of agreeing on, collecting, storing, and turning data into relevant information for development planning and the public finances (Code for Planning and Public Finance, Art. 33 Official Registry N.° 306, year 2010).



The CGSIN, in turn, is organized in a General Coordination Unit and four national technical directorates that work in an inter-related manner under its direction:

| Directorate of Research and Multi-sectoral Data Generation | Directorate of Information Analysis and Processing | Directorate of Information Evaluation, Control and Dissemination | Directorate of Information Infrastructure Support |
|---|---|--|--|
| <ul style="list-style-type: none"> • Statistical information • Geographical information • Information from remote sensors (satellite images) | <ul style="list-style-type: none"> • Agro-economic, national and zonal thematic bulletins • Agro-economic studies • Agro-economic indicators • Status bulletins for crops | <ul style="list-style-type: none"> • Web portals • SMS-MAGAP • Workshops and training sessions • “Ecuador Rural” program • <i>Infoproductor</i> | <ul style="list-style-type: none"> • Software development • IT security • Data center • Network infrastructure |

The CGSIN gathers, analyzes, and disseminates information on structural variables (geographical information) and situational variables (CGSIN 2016). It is the entity that generates primary information concerning the agricultural sector based on a subnational structure made up of seven zonal offices (in accordance with the planning regions of SENPLADES) that work in close coordination with the main office.

Additionally, the CGSIN generates and disseminates information, depending on the needs of the internal entities of the MAGAP and of other assigned entities or flagship programs of the ministry, such as AGROCALIDAD.

In order to comply with its mandate, the CGSIN is supported by the SINAGAP, the National Information Service for Agriculture, Livestock, Aquaculture and Fisheries, through which small and medium-sized producers, as well as government personnel and members of civil society (students, academics, merchants, among others) have access to information on the agricultural sector and its activities, through several means that the MAGAP has made available to the different users. The statistical information that is gathered and the analyses that are made are reliable and of good quality, in order to better facilitate decision-making at several levels (planning, production, marketing, among others).

Importantly, it should be noted that after moving through the stages established in the Statistical Quality Certification System, in the Code of Good Statistical Practices (CGSP), and in the of Statistical Production Model (SPM), the MAGAP, through the CGSIN, received its Certification of Statistical Operation of Wholesale Prices from the National Statistics and Census Institute (INEC).

This certification allows the MAGAP to carry out the following functions: certified statistical operation as an official entity, significant and long-lasting improvements in the process of statistical production. In

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the future, it is hoped that other statistics can be incorporated and certified as they are generated, such as producer prices or survey of production information, among others.

Responsibility for developing the SINAGAP, as well as for managing and maintaining the system is the responsibility of the Directorate of Information Infrastructure Support, which is in charge of the ICT management.

The SINAGAP platform can be moved or used from any mobile device or computer. The information generated is disseminated through several media: the Web page, the SMS-MAGAP service, digital and printed formats, and the information centers, among others.

The main characteristics of the system and its requirements are as follows:

- The SINAGAP operates on a Web platform that works in .NET with ASP. The database is in SQL.
- There are protocols and safety policies for access in *hardware, software, and data center*.
- The user profiles are differentiated in order to maintain the respective security levels.
- The Web platform operates 24/7/365.
- It has 99.999% operating capacity, without failure.
- Graphic reports are provided for analyses and decision making.
- It has parameterization slips.
- There are own work modules for each of the four directorates of the SINAGAP, which are interrelated.
- The user can change the information in one section and it goes directly to the system, which makes it easier to maintain up-to-date information and proper operation of the system.
- Entry to the system is facilitated through the collection of information and data on crops, topics, etc.





- For exit to the Internet, the SINAGAP is based on the CNT (National Telecommunications Corporation) that provides the respective operating platform.

The principal information products that the SINAGAP offers are:

- **Geoportal of the Ecuadorian agricultural sector:** This facilitates the search of and access to geospatial information, and shows thematic maps related to the multiple parts of the agricultural sector (agriculture, livestock, aquaculture, fisheries and forestry). It presents a geo-visualizer, a data catalog and offers geo-services.
- **Agroeconomic bulletins**
 - **Zonal thematic bulletins:** Monthly publications that contain information related to the agricultural sector, based on production from the area. They deal with topics such as public financial credit, wholesale prices, prices for producers, rainfall and temperature, agro-chemical products and fertilizers.
 - **Integrated zonal bulletins:** Monthly publications with national coverage that contain information related to the agricultural sector, based on production from the area. Topics such as surface area planted, macroeconomic indicator, climate and prices are analyzed.
 - **National thematic bulletins:** Monthly publications with national coverage that provide information about the agricultural sector from a macroeconomic perspective. Topics such as foreign trade, credit, fertilizers and prices are analyzed.
 - **Status-related crop bulletins:** Yearly information related to the agricultural sector. Specific agricultural products are analyzed in-depth. The bulletin includes information related to production, performance, production costs, phenological and sanitary status of crops, labor, agriclimate, prices (both national and international), public credit and foreign trade.
 - **Computer graphics:** Monthly publications that contain information related to the agricultural sector. They combine synthetic images that are explanatory and easy to understand, with texts, in order to graphically present a summary of statistical information that it is easily understood by users in the different areas.
 - **Printed edition:** Monthly information related to the agricultural sector. It sums up the national, area-based, integrated and thematic bulletins from the seven areas, which are then generated by the General Coordination Unit of the National Information System. Topics such as cultivated area, macroeconomic indicators, climate and prices are analyzed.

- **Prices of agricultural products:** Reference prices in wholesale markets, commercial warehouses, slaughterhouses and agricultural markets where products are monitored; data on ceiling, minimum, and average prices is provided, data on the second to last monitored price and on the current price, along with the date and the respective trend. Consultations can be done in two ways:
 - **Statistical module:** personalized consultation for users
 - **Dynamic module:** INFOPRODUCTOR; consultation system for easy access to the prices of products (rice, corn and banana).
- **Agrochemical product prices:** Reference prices of agricultural inputs applied by the traders; this includes active ingredients, brand names, and presentation.
- **Costs of production:** 10-year time spans, on average, with information on surface area of production and performance of 14 crops (rice, dry peas, tender peas, banana, cacao, coffee and potato, among others), land use, production cost structures, statistics.
- **Foreign trade:** Series of 14 products (ex. rice, sugar, cacao, shrimp, passion fruit, pineapple, fish, etc.). Information is provided on volumes, prices, origins and destination of exports and imports, as well as the balance of trade and trading partners (ex. comparative tables for the 2000-2015 period for the 50 main products that participate in foreign trade):
- **Credit:** Access to agricultural credit from public and private banks, and to financial products from the National Finance Corporation (CFN).
- **Censuses and surveys:** Specific studies such as the Third National Agricultural Census, sectoral censuses, such as the poultry and flower census, and the census of the impact of the 2012 winter. This task is carried out in coordination with the National Statistics and Census Institute.
- **Agroproduction chains:** Systematic, dynamic and comprehensive analysis of the agro-productive chains, from the process of production up to market demand. Information on inputs, production, industrialization, marketing and consumption for seven products (rice, cacao, sugarcane, corn, palm, potato and coffee).
- **Climatological monitoring:** Rainfall information is provided.
- **April 2016 earthquake - Areas affected:** Special diagnostic report of the area affected by the earthquake of 16 April 2016.



The main information services that the SINAGAP provides are of two types:

a. Geographical information with mapping on different scales:

Agro-ecological zoning, agricultural skills, soils, relief, agroclimatic–hydrology, use of land and plant coverage. The information is available in the Geoportal (the Web portal) which is used to search for geographic information (geospatial information) and in the associated geographical services (visualization, editing, analysis, etc.) via the Internet.



b. Statistical information

that makes it possible to generate the sectoral newsletters relating to topics such as international prices for agricultural products, agrochemicals, fertilizers, foreign trade, credit from the public and private banking sectors.

The SINAGAP provides the following agro-economic bulletins that are thematic, zonal, and situational:

- **National thematic bulletins:** 2014, 2015 and 2016
- **Zonal thematic bulletins (areas 1 to 7):** 2015 and 2016
- **Comprehensive zonal agricultural bulletins,** 2014, 2015 and 2016
- **Status bulletins for 15 crops:** 2014 and 2015
- **Computer graphics:** 2016
- **Printed editions** of national and zonal bulletins, which are also comprehensive and thematic, for 2015 and 2016.

SINAGAP also makes other online publications available to users, including methodological documents such as:

- **Slips (82 different types):** used to record and collect information (for example, to record weight and measurement parameters).

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- **Cards-slips:** cards, slips or logs to which codes are assigned to enable download; for instance, there are specific codes for field documents (41) as well as codes for research slips (8).
- **Technical specifications:** agro-ecological/economic zoning for 14 crops.
- **Market catalog:** catalogs are available for four types of market: a) terminal wholesale markets (3), b) wholesale collection markets (3), c) intermediate markets (5), and d) border markets (1-Peru).
- **Methodological and protocol manuals:** these documents regulate and unify the procedures and the manner in which the various data is collected and recorded in order to include it in the system (ex. agricultural and livestock prices).
- **Technical standard for statistical confidentiality and correct use of statistical information:** this standard is for compulsory compliance for the entities that make up the National Statistical System, and for the institutions and divisions of Government. It makes it possible to govern the use, exchange and transfer of statistical information of a confidential or sensitive nature that is collected, processed, analyzed, disseminated and administered by such entities.



All this information is updated on an ongoing basis and is available on the Web page of the MAGAP (www.agricultura.gob.ec), in the section relating to SINAGAP. To update it, the SINAGAP uses Zonal Information Units (UZI) at the area-based level, made up of a team of 80 technical personnel, agricultural and livestock professionals who are spread out over the 23 provinces of the country, and who are responsible for researching and compiling the information from the markets and the field, along with producers, collectors, traders and processors. In this way, data on the principal variables of production within the sector are compiled, notably:

- Product prices from the farmers, markets, commercial warehouses, livestock markets and slaughterhouses, agribusinesses, and prices of agricultural inputs;
- Status of crops;
- Production costs;
- Production outlook;



- Administrative records of urea beneficiaries, collection centers, sugar refineries, grinders, palm oil extractors; and
- Records of organizations and agro-production research as well as sectoral surveys of corn, banana, soybean and rice.

All the research carried out is backed by a detailed methodological plan and a system of input, validation and online dissemination that ensures reliability and provides access to information, through mass distribution technological platforms (internet-cellular phones).

Data distribution mechanisms

They are several mechanisms used by the SINAGAP to disseminate the data and information processed:

- a. SINAGAP Web page: <http://sinagap.agricultura.gob.ec>.
- b. Through this page, online searches can be done, documents downloaded, databases and documents exported, and reports or documents printed.
- c. Special publications.
- d. Monthly agro-economic bulletins.
- e. Free text messaging service via mobile telephone (SMS-MAGAP).

Collection, verification, and uploading of information

MAGAP has been a part of the MIOA since 2011, and its daily tasks include good practices for collection, analysis, and dissemination of data related to the market, as suggested by the MIOA.

At the area-based level, through its technical UZI team, the MAGAP/SINAGAP collects the following information:

- Daily information from the wholesale markets.
- Weekly information from the municipal slaughterhouses (bovine meat and pork) and commercial storerooms.
- Bimonthly information on crops and production in the field.

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The products that are monitored and assessed, and those for which information is generated in the wholesale markets, are selected from a list provided by the National Statistics and Census Institute (INEC). They are products that are part of the market basket and the analysis depends on seasonality, on some current situation, or on some request that is of political interest. Not all products are monitored, but rather the most relevant group of products from the direct zone of influence.



Each market has a specific catalog that includes the main products that are traded, their origin and their presentation. The parameterization is updated semi-annually.

Transaction data between the producer or intermediary and the wholesale market are monitored and collected for wholesale prices. Currently, data on volumes are not taken because of the difficulties that this process entails, even when the products enter the market (this is a matter to be resolved).

The methodology for obtaining the data that are then included in the system is as follows:

- Collection of the information in the field.
- Introduction of the data into the SINAGAP.
- Verification and validation of the data in the SINAGAP.
- Input of data into the data entry machine and then onto the SMS operators.
- Publication of the information on the Web and via SMS.

The information is collected via questionnaires or actual forms (on paper):

- The person responsible for collecting prices is a staff member of the UZI, a market research technician who also collects information in the field.
- The task is carried out on days with the greatest market transactions and, depending on the market, this can be done 1, 2 or 3 days per week.
- Price collection is done in the morning hours, between 5 and 11 a.m. when there is the highest volume of transactions.

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Some news or relevant observation, if there is any. For example, when there are important variations in prices, the cause is investigated and explained, similar to when there are climatic or agro-meteorological situations that affect or may affect the activity, etc.

If everything is fine, no report is made in the system and everything is processed. If a part of the information is incorrect, the “normal” parameters are not respected, or if it is incomplete, then the algorithm records:

- Fields in red, and the data for that product is not processed.
- Fields in light blue, in the case of products that were not included (perhaps because of seasonality).

Before publishing the data on the website or sending it by text message, it passes through several levels of verification and validation of the information according to the respective lower level. The SINAGAP centralizes the information and conducts a final validation. The procedure is as follows:

- Field researcher/ market price collector
- Person responsible for the UZI
- Central offices: Directorate of Research at the SINAGAP

Finally, the information approved by the SINAGAP is vetted by the Secretariat of Communication (which ensures that it does not contain political or promotional propaganda); with this endorsement, it is posted to the system (Web page and MSMS).



“SMS-MAGAP” messaging service

There are several elements that were brought together to enable the short messaging service (SMS) to be established as an information system for market prices directed toward farmers and agricultural product merchants, as well as toward other users.



The “SMS - MAGAP” mobile telephone text messaging service is a product that was designed, developed and set up by the Ministry of Agriculture, Livestock, Aquaculture and Fisheries (MAGAP) of Ecuador, through the General Coordination of the National Information System (CGSIN).

The CGSIN, through the National Information System for Agriculture, Livestock, Aquaculture and Fisheries (SINAGAP), which is part of its portfolio of information resources, developed the SMS-MAGAP service which was revealed in November 2013, and currently has more than 22 000 beneficiaries who check information relating to prices of agricultural products.

The service emerged as a result of a presidential commitment that obliged the Coordinating Ministry of Production, Employment, and Competitiveness (MCPEC) to disseminate information on health and agriculture, in order to improve the condition of the population in those areas. Thus, the MCPEC signed agreements with the Ministry of Telecommunications and Information (MINTEL) to support the sectors represented by the Ministry of Public Health and the Ministry of Agriculture, Livestock, Aquaculture and Fisheries (MAGAP), as mandated by the President.

In turn, this directive made it possible for the MAGAP to be linked to Objective 10 of the 2009-2013 National Well-Being Development Plan, notably, to Guarantee access to public and political participation, which meant breaking down barriers in order to provide access to information, and hasten the implementation of the production and market policy: information dissemination.

The emergence of the SMS service goes back to 2011, when a text messaging system was launched for information purposes. At that time, USD 3000 had to be invested to acquire the short number 62427, which was done directly through a private company. The service started on a large scale to support the Department of Marketing in its task of disseminating information among farmers for implementation of the 2012 National Seed Plan.

From October 2011 to October 2012, during the system’s first year in operation, 6,000 messages were sent. The messages reached users immediately and used a specific code for each product, based on INEC parameters and information. Each message cost USD 0.10. At that time, in addition to the text messages, brochures on markets, products and product presentations were used to disseminate price information, provided in dollars per kilogram (USD/kg.).

In 2013, resources were sought to improve the service, and it was called the SMS-MAGAP National Dissemination System. The service was reviewed and the cost per user was lowered to USD 0.04 per message. Messages started to be sent on wholesale reference prices for 16 products: avocado, peas, banana, white and red onion, beans, lettuce, lemon, passion fruit, naranjilla, red pepper, pineapple, ripe and green barraganete plantain, plum tomato and cassava (Executive Decree N. ° 1438).

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Additionally, there was a massive campaign in all the zones, with support from the regional managements of the MAGAP, in order to promote greater use of the service among those who already used it and to add more users to the system.

The current platform has also been improved: it can process more data, of better quality and of different types; it is friendlier, versatile, and safe. The service is free.

The number of users, farmers identified through different sections of the MAGAP and beneficiaries registered in the reference price information service in wholesale markets, and who registered by using a form available on the Internet (farmers, merchants and academics, among others), has surpassed 23 thousand in 2011-/2012, and is now 100 thousand in 2016.

Some 22 000 persons are users who request information on prices and can receive up to 36 messages per month, taking into account that once they are registered, they can select up to three products and request information on prices up to three days per week.

The SMS platform

- Provision of the SMS-SINAGAP service is based on a database of users who must have a cell phone number.
- The information, which is validated and approved by SINAGAP, is forwarded to the service platform of the integration company, a private company called Message Plus, which serves as a link between SINAGAP and text-messaging service operators.
- The integration company deals directly with the three service operators: Movistar and Claro, which are private, and CNT, which is State-owned. The company provides the information to the operators, so that they can forward it to users, and ensures that text messages are delivered and received.

The messages have the following characteristics:

- They are unidirectional, meaning it is one-way messaging (although the possibility of activating two-way messaging is being analyzed).
- They are limited to 150 characters, including spaces.
- They are not of a political or promotional nature.
- They are reviewed and approved by the Secretariat of Communication before they are uploaded to the institutional website or sent via cell phone.



To use the service, users themselves, or with the help of technical personnel from MAGAP, must register on the website http://sinagap.agricultura.gob.ec/pdf/sms/sms_registro.pdf. Each user can select up to three products and receive price information on a daily or weekly basis, as requested. Depending on the product and the market, they may request to receive price information between one to three days a week. Currently, at least 25,000 users wish to receive text messages with price information for wholesale markets.

As previously described, in 2012 each message cost USD 0.10; in 2014 the price was USD 0.04. The price has dropped even further in 2016 to USD 0.038 per message, but users receive the messages free because MAGAP covers the cost.

The number of sent text messages has been rapidly increasing:

- **2011-2012:** 6,000 messages were sent.
- **2013-2014:** 3,200,000 messages were sent.
- **2014-2016:** 4,260,000 messages were sent.
- **By August 2016,** a total of 6,000,000 messages had been recorded, which is equivalent to 12,000 to 16,000 messages per day.

The SMS-MAGAP system sends out the following types of messages:

- **Messages regarding the prices of agricultural products,** which are short and personalized. They are sent out on a daily basis for around 110 products, which are monitored at the national level for the main wholesale markets, commercial warehouses, livestock fairs and municipal butcheries. To obtain this service, beneficiaries must register and complete a registration form with their personal data on the SINAGAP website.
- **Massive informational text messages:** a specific database including the cell phone numbers to which the text messages must be sent is necessary.
 - These messages are constantly sent out throughout the year (on a weekly, biweekly, monthly, quarterly and yearly basis). The text messages allow users to get the official prices of rice, corn and banana; learn about places where they can purchase and store rice and corn as well as purchase and sell banana; and learn about the finalization of contracts, expiration of bonds, and the latest news regarding products. To access this information, users must confirm their subscription by replying to the text message they will receive from MAGAP.
 - This service is also available to all of MAGAP's departments or affiliated entities, as required; to this end, the interested parties must provide a specific database with the cell phone

numbers of users to whom the messages should be sent. The service can provide support for vaccination campaigns, notifications regarding agricultural insurance and the status of processes, information regarding places where users can purchase supplies and fertilizers, agricultural advice, and verification of receipts of products traded near borders in order to avoid contraband, among other things.

Evaluation of the “SMS-MAGAP” system

An evaluation process was undertaken in order to get the opinion of producers and traders who utilize the SMS-MAGAP service, by inquiring about the usefulness of price information for fruits and vegetables, and ways in which the system could be improved. Planning for the evaluation process began in Ecuador in June 2015.¹² The evaluation itself, led by the Directorate of Information Evaluation, Control and Dissemination (DECDI) of CGSIN, was carried out from November 17 to 27, 2015, after two years of providing the service.

The general objective was to “evaluate the quality of the SMS-MAGAP text-messaging service provided to producers and tradespeople in the top eight provinces in Ecuador with the greatest need for information on fruit and vegetable prices.”

The specific objectives were to: a) accomplish the goal of completing 255 surveys (the entire sample) in eight provinces in Ecuador for fruit and vegetable producers and tradespeople; b) identify and take note of the main problems shared by producers and tradespeople during the survey process; and c) prepare a brief action plan on ways to improve the quality of the service, the message content, and the technology platform of SINAGAP, notably the section on prices.

Evaluation methodology

The evaluation methodology included the following actions:

i. Preparing an Operating Plan for the Evaluation of the SMS-MAGAP Messaging System via Mobile Phones.

- **Segmentation of target audience:** The group of survey respondents, the geographic area in which the survey would be carried out, and the number of survey respondents were defined.
- **Research tools:** The survey would be applied at the provincial level, to be completed by producers and tradespeople who use the messaging system, in order to gain a better understanding of the usefulness of the service and necessary improvements, by means of techniques focused on the places where users live, by convening a large meeting in a specific place.

¹² This section is based on MAGAP 2015.



- **Variables on which to focus research:** Reliability, veracity, timeliness and precision of the information.
- **Technical and evaluation team:** Under the leadership of the MAGAP-CGSIN team (Research and Evaluation Directorates), as well as the coordination of the MIOA-IICA Technical Secretariat, the work team, persons responsible, and coordination and logistical support necessary were defined, in order to: a) direct and coordinate logistical aspects prior to the execution of the project; b) direct and coordinate the project during its execution; c) receive and analyze the information; and d) prepare and present the results.

To this end, two work groups were created, each comprising two officers, one of whom would be the person responsible. The work groups would carry out field work in each of the provinces.

These officers received support from technical personnel of the Zonal Information Units (UZI), who convened producers and tradespeople from the different territories to carry out the evaluation survey, based on a work schedule that was previously defined.

ii. Preparation of printed materials to encourage users to update information regarding their information needs by completing an online form.

A Guide for Entering and Updating Information for the SMS-MAGAP Free Messaging Service (prices of agricultural products) was created in two formats and promoted by UZI technical personnel prior to conducting the evaluation, to encourage users to update their information in the system.

iii. Preparation of the survey

An “SMS-MAGAP Evaluation Survey” with 15 semi-closed questions was prepared. The first section requested that respondents provide personal data. Another section, comprising 14 questions, asked about users’ level of satisfaction with the quality of the service, and a third section had open-ended questions to determine how likely it was that users would pay for the service, and where they could obtain the same type of information if MAGAP did not provide it.

The survey was carried out in eight provinces with the greatest demand for this type of information, which represented a total of 6,384 users (241 tradespeople and 6,143 producers) in the provinces of Tungurahua, Carchi, Cotopaxi, Santo Domingo de los Tsáchilas, Manabí, Chimborazo, Imbabura and Pichincha. A total of 255 users of the SMS-MAGAP service (4% of the total population of users) were expected to complete the survey; however, in the end, surveyors succeeded in interviewing 311 users.

iv. Preparation of a digital form, to transfer the information collected by means of the surveys carried out in the different provinces.

The UZI technical personnel who participated in the evaluation process transferred information from the surveys completed by users to the digital form, which then became part of a larger database that was gradually processed.

Analysis of the information

The evaluation yielded the following findings regarding the SMS-MAGAP service:

- The timeliness, reliability and usefulness of the SMS-MAGAP text-messaging service was evaluated with positive percentages: 75%, 88% and 70%, respectively.
- The majority of users, 90%, stated that text messages were the ideal method of communication for disseminating price information, followed by television and radio (55% and 50%, respectively), while the communication modes deemed least useful were the press (40%) and websites (15%).
- With respect to the frequency with which text messages are sent, the majority are sent once a week (44%), while 40% of survey respondents stated that they receive the messages three times a week (the frequency with which they are currently offered). Given the number of survey respondents, it is not possible to determine whether this difference is significant from a statistical point of view.
- A total of 95% of users learned about the service through a MAGAP officer who works in the territory; as a result, over 80% did not register directly in the Web portal, but rather through a printed form.
- There is a generalized lack of knowledge regarding the process to update or modify registration information for receiving price information. Out of the survey respondents who were familiar with the process, 50% considered it to be “easy” or “very easy.”

The evaluation yielded the following findings regarding the market information system:

- Survey respondents evaluated the information system on market prices positively: 70% of them felt satisfied and considered the system to be “ideal.” Therefore, it can be inferred that users agree with the established methodology and frequency.
- A large percentage (86%) would recommend the system to other producers or tradespeople, which confirms the level of reliability assigned to the system, which was 75%.



- The positive assessments for all of the questions surpassed 70%, which shows that 3 out of every 4 people are satisfied with the SMS-MAGAP service and the price information system. Users rated both the service and system as very useful for decision-making in the activities that both producers and tradespeople carry out.

Information needs and recommendations of survey respondents

Users stated that it was necessary to:

- Broaden the information to include prices at the agroindustry level, for example for coffee, cacao and milk.
- Broaden the service so that processes can be checked interactively.

Users stated that they would be willing to pay a certain sum for the service if the information were to be broadened.

While there is no doubt that the SMS-MAGAP service is of great importance to the users who were interviewed, the following elements should be taken into account to ensure that the service remains pertinent:

- The text-messaging service should continue to be provided to users for free, given that 85% of survey respondents stated that they would not be willing to pay for this information, primarily for economic reasons, but also because they believe it is MAGAP's obligation to maintain this subsidy.
- As a result of the workshops, it was possible to determine that users' opinions on the service were closely linked to the province in which they lived as well as their age, level of schooling and technological knowledge. Accordingly, in the Sierra provinces, farmers did not seem to be very comfortable with technology, while users in Santo Domingo de los Tsáchilas requested more information on agroindustries, international prices, and even asked that an application (app) be developed in order to have easier access to information.

The main recommendations made by survey respondents during the evaluation are summarized below:

- **To broaden** the text-messaging service to include price information at the agroindustry level and implement a two-way system to allow users to inquire about the status of processes.
- **To develop** and implement an APP-SINAGAP (price information for agricultural products).

- **To establish** an internal communication campaign geared toward MAGAP officers in order to raise awareness of the process for updating registration information and encourage new users to register.
- **To establish** strategic partnerships with the decentralized autonomous governments (DAG) in the provinces, in order to disseminate the tools implemented.
- **To promote** the use of the SMS-MAGAP and APP-SINAGAP among producers and associations.
- **To host** an event to explain the ways in which ICTs can be used in agriculture and share the new functionalities of the SMS-MAGAP and APP-SINAGAP services.

Lessons learned, good practices and recommendations

Lessons learned

- i. Success in adopting any information system, even a text-messaging service via mobile phones, greatly depends on being very familiar with the profile of users, in order to adapt technology to their conditions and offer a useful tool that provides solutions for their needs. From that point of view, differentiated actions could be implemented per region, addressing the specific characteristics of producers, to better take advantage of the benefits of the SMS-MAGAP and future applications developed within the framework of SINAGAP.
- ii. Success in using the information systems greatly depends on farmers knowing how to access these resources; to this end, it is important to consider carrying out massive campaigns that are well organized and that successfully reach the majority of target users/beneficiaries. In this regard, the work carried out by UZI personnel at the regional level, by encouraging producers to register in SINAGAP, has been critical to broadening the scope of the text-messaging strategy.
- iii. The text-messaging service platform has surpassed its initial objective, which was to share price information. The SMS-MAGAP service has been, and still is, useful to users, whether they are producers or tradespeople, because it enables them to learn about the prices of products they are interested in, as well as their prices in a specific market. But the service also represents an additional value, both for the institution and system users (agricultural producers in particular), given that MAGAP utilizes the service to share not only prices, but other information of interest to producers. Therefore, the platform serves as a training and guidance tool on good agricultural practices and good product management, issues risk warnings, announces upcoming meetings, and reports on the status of processes, among other activities.



- iv. A relevant factor that is key to ensuring the sustainability of the SMS-MAGAP service is the availability of resources in the form of an institutional budget that is available and has been allocated for this purpose, to ensure that the work plan will be executed and that the system will be able to grow and expand. In 2015, the service collapsed for almost four months through a lack of funding resulting from the government's budget crisis. This, in turn, lowered the institute's image and impacted the performance of users who no longer had access to the information they needed. Although the service is free of cost to users, it might be beneficial for users to make small monetary contributions geared toward ensuring its sustainability; these contributions would allow for creating a fund that would keep the service in operation, in such a way that it would not be as sensitive to economic fluctuations.
- v. Initially, companies were only interested in market information for large and medium-sized producers, because of their investment capacities and their openness to innovation. They were not interested in small producers. However, the main users of the SMS-MAGAP service are small and medium-sized producers. As the service has further developed and reached more users, service operators and companies have begun to notice that this is an important and substantial niche that can generate income.

Good practices

- i. In order to maintain the usefulness of the system, it is critical to not sidestep the process of periodically updating and validating the information of users who are registered in the database, by verifying telephone numbers and confirming that users are receiving the information adequately and on time. This information is provided by the integration company on a monthly basis by means of a report that details the sent messages, undelivered messages and the list of users who wish to exit the service (to do this, users must send a text message with the word "exit").
- ii. Guaranteeing the quality of the information is critical to generating credibility among users with respect to the information provided. The procedures established in the SINAGAP system for entering prices into the system from the market where they are generated, for validating and approving the information that is uploaded to the system, and for publishing data each day on the Internet and the SMS-MAGAP, demonstrate this commitment to guaranteeing the quality of the information.
- iii. Maintaining the frequency and timeliness of information that is sent is critical in order to enable users to stay abreast of the evolution of market prices for their own products as well as those of their competitors. In this way, users have at their disposal elements that make them feel empowered and more confident during negotiation processes to purchase and buy products, or decision-making processes in general.

Recommendations

- **Create a characterization of producers and tradespeople who use the SMS-MAGAP system:** It is important to create a user typology (by age, level of schooling, location, proximity to markets, etc.) in order to allow small and medium-sized producers to make better use of available technology, such as the text-messaging service, as well as any future applications that could be developed. This would allow for carrying out tailor-made training sessions, and to, wherever possible, adapt the technological resources to their needs.
- **Share experiences within the country:** Each wholesale market exhibits its own level of development. The sharing of knowledge and experiences among them would be very valuable, and would facilitate the implementation of better practices (in terms of information management, training for producers and tradespeople, weights and measurements, cleanliness of facilities, etc.) and work together toward unifying criteria that benefit producers and users of services offered in markets, as well as final consumers (higher-quality product that is safer).
- **Review and update the database:** With the aim of keeping the SMS-MAGAP user database updated, and keeping clients satisfied, UZI-MAGAP technical personnel must make an effort to continuously and regularly ascertain whether clients are receiving the requested information, and make the necessary adjustments by entering the system and verifying that the information the user had requested matches the information he or she expects to receive.
- **Broaden the list of products offered by the SMS-MAGAP service:** Although the system provides prices for a long list of products, users are interested in receiving other types of information, such as prices for agroindustries such as coffee, cacao and milk, prices for producers, prices of agricultural supplies, and prices in other markets. They also wish to be able to submit inquiries via a two-way system. Based on the results of the survey, users would be willing to provide monetary contributions to enable the service to broaden the information it provides.
- **User participation in funding the SMS-MAGAP:** Currently, the SMS-MAGAP service is entirely funded by MAGAP, and, as a result, is free to users, who seem to be uninterested in contributing to its financial sustainability. However, it would be ideal for a service like the SMS-MAGAP to be funded, at least in part, by users, to make it less vulnerable to the economic fluctuations of the central government, and to create a seed fund that could ensure its permanence. As users begin to receive better services and recognize its usefulness for decision-making, their interest could grow and they could become more open to the idea of contributing resources to maintain the service’s continuity.
- **Promote the sustainability of the SMS-MAGAP service:** The text-messaging service has made great strides since it was created, in terms of its design, accessibility, coverage and number of users, as well as the services provided through the platform. Nevertheless, the sustainability of the SMS-MAGAP service depends on several aspects, including:



- **Funding:** Because this is a free service, and users believe it is the State's obligation to provide the general or market intelligence information free of charge, it is important to ensure that the service will be funded by the State, to ensure that it will remain sustainable and will not be interrupted, as already happened once before.
- **Permanent dissemination of the service and registration of new users:** This task corresponds primarily to MAGAP, by means of the UZI personnel, who are closer to producers and markets. They must continue to constantly promote the service, assisting new users and producers in registering on the platform so that they can take full advantage of the information offered, and, in the case of registered users, verify and update their information in the system.
- **Strengthen communal information systems (overseen by the Ministry of Telecommunications and Information Society-MINTEL)** in parishes so that they continue disseminating information that is relevant to the sector and farmers, to encourage more producers to register in the MAGAP system, as well as to provide support in reviewing/updating the information of producers who have already registered.
- **Market improvements.** In general terms, common situations can be observed in markets, which should be gradually resolved for the benefit of users and final consumers. Each situation, however, requires a distinct type of intervention, depending on the matter at hand, given that the interests of specific groups, as well as cultural and economic aspects, among other things, must be considered.
 - a. **Standardization of product presentations:** Some markets have their own product presentations; therefore, it is important to carry out a training and persuasion process geared toward producers, with the aim of streamlining product presentations at the national level. This would facilitate the calculation of prices and would contribute to guaranteeing quality integrity of traded products.
 - b. **Standardization of product calibers:** In this regard, the provisions established by the Department of Measures and Standards must be respected. However, there are some important variations. For example, a product labeled "first-rate" in the market does not always correspond to the definition used by that entity for "first-rate." In markets, visual and verbal agreements define the quality level of a product. In the case of melons, watermelons and apples, set calibers are used.
 - c. **Standardization of weights and measurements:** Checking weighing scales is critical to guaranteeing the volume/quantity of the product being sold in the market.
 - d. **Training sessions on postharvest management and packaging of agricultural products for producers and tradespeople:** When work is adequately executed, product losses are reduced, product presentation improves, and greater durability is guaranteed. As a result, financial losses during the process are also reduced.

- e. Aspects related to hygiene, order and security in facilities:** Carefully overseeing these aspects is critical: first, to preserve the health of users in the markets, but also to improve the safety of products that are marketed and that reach final consumers. Likewise, maintaining order and security in the facilities creates a better work environment.

The establishment of partnerships and institutional rapprochement are vital in order to address these aspects, which have an effect not only on economic development and the capacities of agricultural producers and tradespeople, but also on food quality and human health.



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TRINIDAD AND TOBAGO

Use of the “SMS-NAMDEVCO”
text-messaging service

Introduction¹³

The Republic of Trinidad and Tobago, a Caribbean country, covers an area of 5,130 km² and has a population of 1,354,000 inhabitants (9.1% in urban areas) and a per capita gross domestic product (GDP) of USD 20,641 (ECLAC 2015). The country’s economy ranks sixteenth among countries in the Latin American and Caribbean region.

Trinidad and Tobago’s main export products, on which its economy is founded, are petroleum gas, refined petroleum, ammonia, alcohols and crude petroleum (OEC 2016). Over the past few months, the economy’s dependency on these products has forced the country to maintain austerity policies with regard to public spending, due to low international prices for petroleum.

Although the agricultural sector has exhibited a noticeable decline compared to other sectors, it is still considered to be strategic and one of the pillars needed to diversify Trinidad and Tobago’s economy. In 2012, the agricultural sector accounted for approximately 0.7% of the country’s GDP and represented approximately 3.2% of the total work force.

Over the years, the most important traditional sub-sectors, such as sugar, rice, cacao, citrus fruits and dairy products, have shrunk significantly, which has led the agricultural sector to take advantage of non-traditional crops, such as vegetables, roots, tubers and fruits, as well as livestock, poultry and pig farming. This structural change has been accompanied by a reduction in agricultural exports, which have relied heavily on traditional products.

In light of this situation, State programs geared toward increasing local production of some products to replace imports have gained importance over the past five years. The country has also emphasized the reactivation of more traditional industries, such as cacao, rice and citrus fruits, giving special attention to competitiveness and value-added issues.



¹³ This section is based on IICA 2014.



The following are some of the main agricultural subsectors:

- **Cacao:** Although its production has progressively decreased, the country's cacao is considered to be of high quality. Approximately 600,000 kg. are harvested per year. Over 90% of the local production is exported to Europe, Japan and the United States.
- **Vegetables:** Primarily tomato, bell pepper, cucumber, cabbage, hot pepper, lettuce, pak choy, eggplant, bodi beans, pumpkin and watermelon. The majority of these vegetables are produced in quantities that are large enough to supply the internal market, but in smaller quantities for export. A large part of production comes from farmers who own small plots of land spanning three to five hectares; some vegetables, primarily hot pepper, enter the export market through North America and Canada. Hot pepper is the leading subsector in local wholesale markets.
- **Roots:** Primarily cassava, sweet potato, eddoe, and, to a lesser degree, tannia and yam. These crops are primarily produced for the local market. Production takes place primarily on small fields of 3 to 5 hectares.
- **Rice:** Recently, the State has undertaken initiatives that seek to reactivate the rice subsector. For example, a Committee for the Development of Rice was established, and the State has also vowed to support all production aspects, including harvesting, the use of improved seeds and cutting-edge technology, as well as extension services. In the short term, the State plans to establish rice plantations over a total of 4,000 hectares.
- **Tree crops:** These crops include bananas and plantains, which are produced in relatively small quantities compared to imported quantities.
- **Fruits:** A wide range of fruits are produced, but not usually in large commercial plantations, except in the case of mango, citrus fruits, coconut, pineapple and papaya. Production of citrus fruits has gradually diminished over the years. In 2012, approximately 71,450 kg. of grapefruit and 146,904 kg. of oranges were produced.

The agricultural market in Trinidad y Tobago

In Trinidad and Tobago, the National Agricultural Marketing and Development Corporation (NAMDEVCO) was created by the Parliament to fulfill the mandate *“to create, facilitate and maintain an environment conducive to the efficient marketing of agricultural produce and food products through the provision of marketing services and the stimulation of business investment in the agro-industrial sector of Trinidad and Tobago.”*¹⁴.

¹⁴ Act of Parliament No. 16 of 1991.

Since its creation in 1991, NAMDEVCO has focused on driving the sustainable and competitive development of the agricultural sector by means of programs that allow for: (i) supplying local and international markets with safe and healthy agricultural products; (ii) strengthening the capacities of producers, and (iii) disseminating timely market information to facilitate decision-making.

To fulfill those objectives, NAMDEVCO provides market services to different stakeholders in the agricultural market, including providing facilities for wholesale and retail markets, located as follows:

- Northern Wholesale Market (Macoya)
- Southern Wholesale Market (Debe)
- Wholesale Fish Market (Port of Spain)
- Wholesale Fish Market (Orange Valley)
- Retail Market (Valencia)
- Farmers’ Markets (Macoya, Debe, Diego Martin, Chaguanas, Point Fortin).

NAMDEVCO information services and systems

In the past, stakeholders in the Trinidad and Tobago agricultural market have recognized that one of the main constraints they face in evolving is the lack of timely and binding agricultural information for decision-making. Despite the fact that even before 2007 there was a significant amount of market information available, the information was not easily accessible.

Some of the problems stakeholders faced were: (i) inadequate processing of data critical to decision-making, (ii) lack of useful information for users, (iii) information delivered in an untimely manner (for example, when the person interested received the information, the negotiation period had already passed), (iv) prices and volumes were collected manually, and were limited to information provided by the Wholesale Market of Macoya, and (v) little diversity and innovation with respect to products and services for disseminating market information. At that time, no reference points or standards were available to enable buyers and sellers to compare and negotiate; this situation was worsened by the lack of an organization that could provide elements that would contribute to greater market transparency. All of these factors, without a doubt, affected the timeliness and reliability of data generated.

Given this situation, the country recognized the need to implement a new, reliable, solid and sustainable system to provide greater security to Trinidad and Tobago’s agrifood sector. The system would need to be based on a methodology that is scientifically-backed by modern business management techniques, whereby market stakeholders, encouraged by timely access to market intelligence and information, would agree to provide, receive, analyze and disseminate information generated by the services provided.



To respond to this need, in January 2007, Trinidad and Tobago established the National Agricultural Market Information System of Trinidad and Tobago (NAMISTT), supported by an interactive structure of people, procedures and technologies that participate in the process of compiling, classifying, analyzing, evaluating and distributing information. The vision of NAMISTT is for the system to be used as a tool that provides reliable market intelligence and information in real time, to all interested parties, by compiling and organizing data by means of modern methods and techniques that precisely reflect the status of production, cost of supplies, and sale of agrifood products, both in wholesale and retail markets.

The National Agricultural Market Information System of Trinidad and Tobago (NAMISTT)

The NAMISTT is an online system designed by NAMDEVCO personnel. It began with the consolidation of five main databases:

- i. **Market information:** Price, volume, buyers, packagers, competitors, production data (supply), information on producers, harvested areas, certifications, projected harvest.
- ii. **Pest information:** Identification of pests and diseases, pest control mechanisms, active ingredients, local stakeholders and foreign manufacturers, application rates, re-entry/harvesting periods, emergency treatment, etc.
- iii. **Information on fertilizers.**
- iv. **Document repository:** Collection of electronic documents related to agriculture (production cost models, production profiles, GAP, grades and standards, commercial protocols, market analyses, post-harvest management protocols, investment profiles, etc.).
- v. **Database of contacts** in Trinidad and information on harvesting areas, creation of identifications for producers, etc.

The main sources for data collection are wholesale markets selling fresh and fisheries products, municipal retail markets, farmers' markets, supermarkets and vegetable markets.

Main beneficiaries of NAMISTT

- Farmers
- Exporters
- Supermarkets



- Fishermen
- Agro-processors
- Hotels and restaurants
- Suppliers
- Policymakers (of policies, plans and studies)
- General public

Information provided by NAMISTT

NAMISTT provides access to local market information (prices and volumes negotiated at wholesale and retail markets) in real time, and informs users about regional and international market opportunities. NAMISTT also provides data on national production, such as the number of hectares dedicated to production, estimated yields, harvesting times, production problems, harvesting stages, etc. It also facilitates informational media on business intelligence, to contribute to decision-making.

NAMISTT has also made available a virtual forum of buyers and sellers that uses an electronic database to disseminate information about products and requirements to a larger audience involved in online trade.

Methods used to disseminate data

- Large digital display boards.** At the entrance of the Macoya market, the prices of products that appear in the daily market report are displayed each day. This information allows buyers and sellers to make decisions regarding prices before market negotiations begin.
- The www.namistt.com Web page:** In addition to other information of interest, the Web page publishes daily reports on prices and volumes negotiated at the Northern Wholesale Market, weekly reports on prices and volumes negotiated at the Southern Wholesale Market, and monthly reports on wholesale prices negotiated at the Northern and Southern markets.
- Publications in newspapers:** There are two publications geared toward providing consumers with price information that can allow them to make business and purchasing decisions.
 - Market Watch** was published for the first time on December 9, 2006, featuring 14 fresh products that comprised a typical basic food basket. It is currently published every two weeks on Thursdays (total of 157 editions). The publication of Market Watch alternates among the





three newspapers distributed in the country. Market information personnel are responsible for ensuring that the publication fulfills the specifications and timeframes established by newspapers, and includes comparative information on prices in different marketing channels, such as supermarkets, municipal markets, farmers' markets and wholesale markets.

- b. Food basket:** The first edition was published in 2009, and it is distributed on the last Friday of each month. It details the prices of products that are typically consumed in the country, according to the Central Statistical Office of Trinidad and Tobago. Prices are collected at the same time as those for products featured in Market Watch. This publication compares prices in various supermarkets that sell the featured products.
- iv. Green Vine Newsletter:** This is a 12-page monthly publication, with 2,500 copies printed each month. It is distributed to producers, market users, buyers (including supermarkets, restaurants, suppliers, hotels, etc.), offices related to agriculture, and policymakers.
- v. Telephone and SMS:** In April 2010, the Information Technologies Unit introduced a text-messaging system via mobile phones, which allows users to send a text message requesting information on the price of a product that day, which is then sent to their mobile phone.
- vi. Other dissemination methods:** A large number of people call the different offices to inquire about daily prices. The offices also address special requests from agricultural entities such as CARDI and the Central Bank. These requests are processed by the Marketing Department.

Collection, organization, review, analysis and dissemination of information

The NAMISTT benefits from face-to-face personal exchanges conducted by a team of research assistants (RAs), who collect prices and volumes for over forty commodities that enter the country's wholesale markets. RAs interact with producers, intermediaries and buyers to obtain the information needed to guarantee data integrity.

NAMDEVCO provides facilities for the physical market, where about half of the country's fresh agricultural products are sold at wholesale prices. Prices are determined based on a supply-demand relationship, and are influenced by market information. Without this information, a perfectly competitive market model is not possible.

When evaluating volumes, quotes and trends, RAs resort to personal exchanges, which are very useful in interpreting strategies and making decisions; however, the position



held by the person providing information, as well as possible lack of honesty, can affect results. On the other hand, marketers and intermediaries enter the market to reach agreements regarding products, and that is where information becomes most relevant; through this information, it is possible to determine the profit margin that will be obtained.



To guarantee the reliability of the data, RAs receive training in the identification of different quality grades, sizes and standards for a series of fresh products. Additionally, given that data is recorded electronically using personal digital assistants (PDAs), RAs receive special training from the database administrator, as well as a detailed guide to learn how to use these devices to record prices and volumes.

PDAs are programmed with the name of each data collector and a list of all of the market distribution locations for which prices must be recorded. The PDAs have four drop-down menus: product, variety, category, and unit. Prices and volumes are entered using a digital pen and compiled using two different programs. All prices must be entered before opening the session to enter volumes (the two actions cannot be carried out simultaneously).

Type of data collected

- i. **Wholesale price:** The price that a buyer pays to a seller for a relatively large amount of product, generally to commercialize the product at the retail level.
- ii. **Wholesale volumes:** Product quantities that enter the market. Currently, wholesale volumes are recorded at the Northern Wholesale Market and the Southern Wholesale Market. Volumes are collected by examining vehicles before they enter the market; a visual inspection is carried out, and producers are also asked to detail the amount of product they are bringing into the market.
- iii. **Retail price:** Transactions involving quantities that are comparatively smaller to those of a wholesale transaction, and in which the final product consumers participate as buyers. Retail prices are important to final consumers, so that they can determine whether they are paying a fair price.

Procedure for collecting, verifying and loading data

Data is collected by the RAs, who visit the distribution centers on the designated dates and at the designated times, using the PDAs to directly enter the information as well as the time at which they obtained it. Data entry is conducted based on the Market Information and Dissemination Operational Procedures (NAMDEVCO 2016d).



Step 1. Entry of data into the PDA. The RA selects the market in the PDA to begin the data entry session, at which point the date and time are saved. RAs collect data by talking to producers, listening to transactions between buyers and sellers, and checking price tags in supermarkets. The price of a product is entered into the PDA by selecting the corresponding drop-down menu. Once the entire data has been collected, the RA closes the session in the PDA and the data is saved.

Step 2. Downloading and verification of data. Data saved in the PDA must be downloaded and transferred to the Central Office in Debe for verification before being loaded onto the database. Each RA then individually checks the data again before downloading it. Once this is done, the PDA is connected to the computer and the data files are saved.

Once the files have been downloaded, another type of RA conducts a cross-check and manual revision of the data to ensure it is correct; this RA verifies any questionable data and saves the changes to update the files. This RA then extracts the data to prepare a daily report that compares prices and volumes of fresh products negotiated that day with respect to the previous day.

Step 3. Data delivery to Central Office. The control RA sends an email with all of the compiled data to the Central Office for verification and processing. The Central Office also conducts a final revision before uploading the data to the Web page.

Step 4. Data verification. At the Central Office, an RA downloads and processes the information received via email. A program provides the RA with an interface in which gross data is tabulated and organized by the name of the price collector, product, variety, quality, local unit price, local unit, and the price per kilogram in each market that was visited.

Step 5. Data uploading. Once the data has been verified, it is uploaded to the NAMISTT database, where it can be used to generate reports.

Data assimilation

The NAMISTT database presents data by price or volume, and allows users to conduct searches by product and variety, or product variety and category. Minimum prices, maximum prices, mostly prices or all details for prices can be displayed. Likewise, total volume, minimum volume, maximum volume and average volume can be displayed on the database.

Prices can be obtained for individual markets (Southern Wholesale Market) or regionally by type of market (all vegetable markets of the Southern region). The database does not calculate averages for all inquiries of the same type; therefore, the average for the different regions would need to be calculated.

The Marketing Department analyzes the data collected to prepare special reports; for example, historic price trends, prices during the dry season compared to the rainy season, circulation of prices through the different markets, etc. Data may be presented on a weekly, monthly or annual basis or several months in a row.

Text-messaging project using mobile phones

Although NAMISTT's contribution had a significant impact on the market, by 2008 it became necessary to complement these informational products in a more innovative way, especially for users who still did not have access to the information available. A large part of this group included seniors (the average age of producers is over 50), who were not accustomed to using electronic devices and felt a certain level of distrust toward the virtual environment in which information is handled.

Resorting to the use of information technologies to meet information needs seemed to be the most viable response, but it was clear that not all producers in rural areas had a computer or portable device that they could use to access the information available online; furthermore, a large part of rural areas did not have Internet access.

According to recent data, Trinidad and Tobago has one of the highest indexes of cell phone use per capita in the Western Antilles and is one of the populations with the highest number of BlackBerry smartphone users in the world. A former Deputy Minister of Industry and Trade stated that, in a total population of 1.3 million inhabitants, the number of mobile phones was 1.8 million (Newsday 2012). The two main telecommunication providers are Digicel and TSTT, which provide 95% of the country's cell phone coverage.

Additionally, according to a survey carried out by NAMDEVCO in 2009, 90% of producers owned a cell phone and 85% of them were interested in the idea of obtaining price information via cell phones before negotiating production. During the interviews, it was determined that many of these producers are located in remote places with no Internet access.

There was, however, one constraint: of this 85% of users, only 15% was willing to pay for the service.



The “SMS-NAMDEVCO” platform

Once this constraint was identified, the main challenge consisted in generating price information (the type of information considered to be most important for producers) in an efficient and reliable manner and at a low cost, so that it could reach those who needed it most.

In light of this situation, in 2009, NAMDEVCO implemented a service for sending short text messages, commonly referred to as a Short Message System (SMS), to disseminate market information, with the aim of significantly benefiting a specific group of producers. This information would make it possible for them to obtain a fairer price for their agricultural products. One additional advantage of this system is that it can function by means of a telephone network (it does not depend on the Internet). Furthermore, according to information provided by NAMDEVCO, data downloading is not very common among producers, even though they own mobile phones.

The system operates in a very simple way; the person interested sends a message that says:

**‘GET <commodity name>’, to the number 46 - PRICE (467-7423).
For example, GET TOMATO**

Next, the software interprets the request, pulls the latest price information for the requested product, and sends the response in less than a second. The user then receives a text message with the prices for the different product presentations.

The system has the ability to detect cases in which a word, or even the name of the product, has been misspelled. It also provides responses when users enter local names, or even when they write the name of the product in another language. The response for daily prices is limited to 140 characters.

The technical platform that supports the text-messaging infrastructure is very simple; it is based on an adaptation made to smartphones (purchased in 2009), using a custom-made software designed by NAMDEVCO personnel. This was done in this way because it was determined that the solutions available in the market were inadequate: in some cases, they forced producers to use a numerical system to request product prices (for example, 1001 for tomato), and, in other cases, they were costly for both producers and NAMDEVCO. There were also some cases in which the solutions implied making a series of costly modifications to internal procedures.

When reviewing the cost of the system’s operation, only the USD 500 cost of the phones was recorded, given that the cost of the software, computers, and managerial human resources are covered by NAMDEVCO.

Operation costs are minimal, given that users pay for the messages they send, while NAMDEVCO covers the cost of the messages sent in response. For each regular text message, users pay TTD 0.56 or USD 0.08, and NAMDEVCO pays the same amount for the reply text message. On average, the costs covered by NAMDEVCO per month does not exceed USD 100.

Advantages of the text-messaging service via mobile phones

- It makes it possible to reach recipients who would otherwise not have access to the information that is sent to them.
- Short Message Services (SMS) are considered to be one of the most effective ways to reach users, since 90% of messages are read in just a few minutes.
- The system allows for quick responses, is user-friendly, and has a low cost. In terms of timeliness in delivery, text messages have the highest interaction rate compared to e-mail and other applications.
- Text messages are a universal solution that facilitates communication with any person via a cell phone.
- It is available to people who do not have a great deal of technical know-how.
- It is available twenty-four hours a day, seven days a week.
- It functions via an independent operator (it can have one or several operators).

The system has been used for over six years with no major drawbacks. In 2010, there were 500 users; by 2013, this figure climbed to 3,000 users, including producers, intermediaries, institutional buyers, supermarkets, and consumers.

On the night that the system was launched, 10,000 text messages were received from people wishing to experiment with the service. Once this initial enthusiasm died down, and following the establishment of the system, between 2,000 and 3,000 users per month have been recorded; this data is confirmed by the service’s monthly invoices, which range between TTD 500 and TTD 700. The monthly average of messages is obtained by dividing 500 by TTD 0.25, the price per message.

The system’s operation to date has been optimal. In fact, if 3,000 regular users were to request the service at the same time, this would not significantly affect the system’s response capacity.

The system is monitored daily. According to the operating company, responses are provided almost immediately (within 9 microseconds, on average). Spelling mistakes increase delivery time by approximately 7 seconds in load peaks. Usually, the products for which prices are most often requested are those for which prices fluctuate greatly; at the top of this list are tomato and bell pepper.



Evaluation of the “SMS-NAMDEVCO” service

This section highlights the main findings of the evaluation report prepared by consultant Govind Seepersad (Seepersad 2016). Mr. Seepersad provided consultancy services to evaluate the text-messaging service of the National Agricultural Marketing and Development Corporation (NAMDEVCO) of Trinidad and Tobago. The evaluation focused on the service’s business model, sustainability and its effectiveness in providing timely and reliable market information to small and medium-scale farmers. This consultancy was carried out in coordination with the IICA Delegation in Trinidad and Tobago, which also supervised the evaluation.

Evaluation methodology

The purpose of this evaluation was to show the results of a survey that was conducted, carry out a case study of experiences with NAMDEVCO’s Short Message Service (SMS), and prepare two instruments that would allow for creating linkages between the NAMISTT and the private sector, based on the study’s findings.

The survey was carried out in May 2016 among farmers, intermediaries at the Northern and Southern wholesale markets, and packagers who supply products to supermarkets, restaurants, and hotels. The methodology used an adequate sample of survey respondents based on the small number of participants available and the limited time available during days of commercial activity in wholesale markets.

This study, which was conducted at the main vegetable markets, utilized a survey made up of 19 guided questions to facilitate the interviews with stakeholders in the industrial sector, and an appropriate sampling was used.

The Likert scale was used to determine respondents’ opinions regarding hurricanes and other factors that affect their operations. This scale uses questions with fixed responses, designed to measure attitudes or opinions; additionally, a five-point scale was used, given that the lack of intermediate values (even scales) can distort results.

To conduct the survey, the consultant used NAMDEVCO’s user database and the Registry of Market Users and Suppliers. A representative sampling of producers, intermediaries, suppliers, supermarkets, restaurants, and hotels was used.

Analysis of the information

A total of 182 valid responses were obtained, of which 162 (89%) correspond to men and 20 to women, of ages ranging between 19 and 73 years of age. The median was 47 years of age. With respect to

occupations, 141 (77%) of survey respondents were producers, 25 (14%) were intermediaries, 11 (6%) were supermarkets, two were food service providers, two were hotel proprietors, and one was a restaurant.

Out of the total number of respondents, 162 (89%) survey respondents stated that they had access to cell phones, of which 70 (38%) stated that they had a data plan.

Regarding the most frequently requested prices, 178 respondents (98%) said they were interested in wholesale prices, while 138 (76%) said they were more interested in retail prices. Additionally, 113 (62%) respondents said they were interested in receiving information regarding prices on farms.

The survey indicated that the most popular way of obtaining price information was inquiries to other producers (36%), followed by inquiries to intermediaries (21%), the text-messaging service (15%) and inquiries to personnel in the field (11%). With respect to the consistency of the information, most respondents stated that all four of those sources provided consistent or very consistent information.

With respect to precision, producers and the text-messaging service received the highest scores, while intermediaries received the lowest score.

When surveyors requested an opinion regarding the text-messaging service via mobile phones, only 94 (51%) of the 182 people who were surveyed were aware that the service existed, while 88 (49%) were not aware that the service was provided. Of the 94 people who were familiar with the service, 29 (31%) stated that they had never used it, 51 (54%) said they used it occasionally, 11 (12%) said they used it often and 3 (3%) said they always used it. Therefore, only 15% of the survey sample used the text messaging service regularly.

Regarding how user-friendly the service is, 73 (46%) out of 157 people answered that they were able to use the service, while the other 84 (54%) respondents said that they were unable to use the service. Upon further inquiry, 41% answered that the survey was easy to use, 49% said it could be used, and only 10% said that it was difficult to use. This confirms that the tool is considered to be user-friendly.

With respect to the importance of the information provided via text messages, 74 (56%) of respondents said it does not influence their pricing, while 58 (44%) said the information had made pricing a more complicated task. In general, respondents believe the service does not have an additional effect on pricing.

Despite low use of the system, 76% of respondents said they supported maintenance of the service, while the remaining 24% said that they did not support it. Ironically, upon inquiring about the importance of the type of market information that the system provides, respondents said they consider it to be of critical importance to their businesses: out of 181 respondents, 48% stated that the information was very important, 27% said it was essential, 19% considered it to be important, and only 6% stated that it had little relevance.



Regarding the cost of the service, only 50 respondents (31%) said they would be willing to pay for the service; among those who were most reluctant to pay a certain rate for the service, 80 (49%) stated that it was the government's obligation to provide this service, regardless of circumstances, 12 (7%) considered that it was unfair to have to pay a certain rate and 20 (12%) pointed out that information was a public good.

Combining the actual costs and opportunity costs, and considering the fact that the messaging service is provided to users free of charge, the benefit for society significantly compensates for the cost involved in providing the service. This involves an annual direct cost of TTD 34,000 to develop and maintain the hardware and software. Using the contingent valuation method, the consultant estimated that the benefit of the text messaging service is TTD 480,000 per year (with 2,000 users). As a result, the cost-benefit ratio is 14:1.

Success stories, lessons learned and recommendations

Business success stories

In his report, consultant Seepersad collected a number of testimonies that highlight the importance of the NAMISTT and the SMS-NAMDEVCO system:

- **Agricultural producer 1:** *The NAMISTT provides producers with practical information regarding agricultural activity, enabling them to conduct harvesting when prices are better, to adequately select crops and make plans for the future.*
- **Agricultural producer 2:** *I was able to examine market trends, and as a result, I decided to invest in greenhouses to get better prices during different seasons. Now I work intelligently, more so than arduously.*
- **Agricultural producer 3:** *I know how hard it is for me to produce; therefore, I now choose what and when to plant, to be able to cover the costs and make greater profit.*
- **Agricultural producer 4:** *If I had used the NAMISTT, I would still have my business.*
- **Supermarket 1:** *The system made it possible for us to better handle the margin between retail and wholesale rates, and to remain a competitive option in the live animal retail market.*
- **University farms:** *We use the NAMISTT to negotiate fair prices for the farm and to ensure that we are selling crops at a reasonable price.*

Effects of the NAMISTT – SMS

The NAMISTT is a source of information that provides greater market transparency, by creating equality between buyers and sellers. Users receive information that allows them to make better decisions regarding production and marketing aspects, and to take better advantage of business opportunities.

With respect to producers and intermediaries, the NAMISTT provides a reference point for negotiating prices that reduces the speculation margin. On the other hand, it gives consumers access to greater and better information regarding places that sell the most inexpensive products while still respecting desired quality criteria.

According to calculations made by NAMDEVCO, since the NAMISTT was implemented, prices in supermarkets and other retail points of sale have diminished between 150% and 700%, which has contributed to a reduction in the consumer price index and, in turn, the associated inflation.

Furthermore, the virtual forum of buyers and sellers has facilitated the creation of business opportunities for producers, intermediaries, and buyers. Indeed, the disseminated information has proven to be valuable, since it has facilitated programming of production based on projected demand and historical trends, and has fostered production and collaborative marketing among producers.

The NAMISTT serves as a primary source of information for government agencies, such as the Central Bank of Trinidad and Tobago. The data provided by the system serves as input for decision-making at the highest level, since it enables policymakers to make better use of limited resources and create adequate strategies geared toward the development of the agricultural sector. The system also provides statistics that are useful to ministries, public institutions and academic institutions such as the University of the West Indies.

NAMDEVCO has received awards and recognition from many international organizations for its Market Information System and portable technology. Furthermore, the Caribbean Community (CARICOM) believes that the system can serve as a model for the implementation of other systems across the region. In 2009, NAMDEVCO received a request to become a member of the MIOA, and in 2010 it was selected to form part of the Executive Committee of the organization, serving as the representative for the Caribbean region.

NAMDEVCO has provided visible technical support to Caribbean colleagues to develop market information systems in Jamaica, Barbados, Saint Lucia, and Guyana, and is considered to be the most reliable source of this type of information.

In the future, NAMDEVCO hopes to improve and expand its products and services. The main innovations would include:



- increasing stakeholder participation;
- optimizing the farmer registration system;
- setting up a system for monitoring production;
- setting up an incentives system;
- developing a safety portal;
- developing interactive, online access;
- expanding the Green Vine magazine;
- strengthening the electronic market portal; and
- linking the NAMISTT to other agricultural information systems.

Lessons learned

- It is not only about using the most up-to-date technology to improve processes; instead, all technologies available must be taken into account and the one that best adapts to users' needs must be selected. It is clear that there are more efficient technologies available that can provide a lot more information than the text-messaging system, but this system is successful because it is practical, simple, and inexpensive.
- Having the best computer systems and the best information possible to support decision-making is not enough if the sector is not committed to promoting and disseminating this information in an efficient and timely manner. Extension workers and public officers must participate more actively in promoting the usefulness of NAMISTT products and services. It is clear that NAMDEVCO has a robust database, but its products do not effectively reach as many users as would be desirable. If the system does not successfully support decision-making processes, a large part of the institutional mission is yet to be fulfilled.

Recommendations

Train instructors to effectively use market information

In addition to generating more—and increasingly modern—products and services, it is important to work with information users at various levels, in order to meet the final objective of making better market decisions. Among producers especially, there is still a great deal of resistance toward incorporating external elements to facilitate decision-making, often due to their customs, culture or opinions.

It is important to take advantage of investments made in producers who have adapted to new technologies, so that they can serve as a voice for promoting these technologies among other producers and, in this way, increase the number of participants who truly use the products and services made available to them. At the same time, these producers, who would serve as agents for change, in addition to those who become part of the process, would be able to provide NAMDEVCO with feedback regarding the type of product or service that best caters to their needs.

The University of the West Indies possesses human and technical resources that could be made available to producers and be used to generate studies geared toward identifying practical and adequate solutions to fulfill the needs that arise from the abovementioned processes.

In this regard, internationally-renowned non-governmental institutions with experience, such as IICA, can play a very important role in triggering and coordinating processes, serving as a link between producers, public institutions, and the academic sector.

Evaluate the mechanisms used to disseminate information

As was previously mentioned, NAMDEVCO offers a broad range of products and services, some of which are very popular and well-known, and others which are not. In light of the limited human, technological and financial resources, it is critical to evaluate the different products—text-messaging platform (SMS), applications for smartphones, journals, periodic reports, etc.—to measure their impact on target audiences. The speed with which technology develops represents a challenge for agricultural producers, especially senior citizens; as a result, it is important to take into account the demographic composition of producers, and come up with attractive and practical ways to ensure that they have access to relevant information.

Implement a strategy to provide training and disseminate products and services

There are many producers who are unaware of the products and services offered by NAMDEVCO, including the text-messaging service (SMS). Clearly, it is necessary to implement a strategy for promoting these products and services among potential users.



Carry out an awareness-raising campaign in the public sector

NAMDEVCO has not managed to sufficiently influence public officers involved in supporting the agricultural sector, in such a way that they can serve as a means for disseminating the knowledge and market information that the Corporation makes available to anyone interested. It would be advisable to carry out a training and awareness-raising campaign among public officers who are linked to the sector, with support from non-governmental organizations like IICA, as well as the academic sector.

Develop a strategy to strengthen the SMS system

Despite the system's success—in view of its low running cost— and based on the evaluation that was carried out, it is recommended that an improvement plan be implemented to increase its effectiveness, and especially its coverage. A significant number of producers would likely take advantage of the system if they had greater trust in the information it provides. Currently, there is a lot of confusion regarding who generates the information that the system provides, and many people are unaware that the information is generated by the Corporation itself (NAMDEVCO).

Hold an SMS training course

Concretely, in the case of the SMS technology, it is clear that the system presents some difficulties, as can be inferred from the survey's inconsistent responses. In many cases, producers did not understand what the reported price represented, even though the majority of them deemed the information received to be highly important in several parts of the evaluation. Therefore, NAMDEVCO should prepare a simple training module to teach users and interested stakeholders how to use the service.

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URUGUAY:

use of text messaging
services in Montevideo's
Mercado Modelo

Introduction

The Oriental Republic of Uruguay, located in South America, has a surface area of 176,220 km², a total population of 3.42 million people (94.2% in urban areas) and a per capita GDP of USD 15,580 (ECLAC, 2015), with an economy based predominantly on agricultural exports¹⁵ and industry. As of 2015, the World Bank reported for Uruguay a rural population of less than 5% of the total population. The agricultural EAP accounts for 9% (nearly 150,000 people) of the total national EAP (1.7 million). Agriculture is one of the top three employment sectors in the country.



Data on agricultural GDP shows a decrease from USD 4.11 billion in 2012 to almost 4.03 billion in 2014. Its share in the total GDP has remained stable at between 7% and 8% (MGAP 2015).

Uruguayan agribusiness has grown steadily since the beginning of 2000, and is internationally renowned for its high-quality bovine, cereal and oilseed production. Exports are worth USD 5 billion and their main destinations are China, the United States and neighboring countries in the South. On the other hand, imports are worth USD 1.3 billion and are mostly focused on oils.

In a globalized context, Uruguayan agriculture is also characterized by a dynamic domestic trade known as the “farming sector”, with an ample variety of products, which provides livelihood to the productive structure of family farmers. Farms are exposed to market dynamics and are not limited to self-support or self-consumption activities.

The most recent annual statistical report from 2015 points out that livestock farming accounts for 47.4%, of which 46.9% corresponds to agriculture and 5.7% to forestry. When compared to the 2007-2014 period, there was a reduction in agriculture and an increase in livestock production. As for the agricultural surface area, 40% is dedicated to cattle farming, 30% to dry farming, 11% to rice, 15% to forestry and the rest (4%) to milk and intensive agriculture. According to data provided by DIGEGRA and based on the General Agricultural Census, there are more than 10,000 productive farms, accounting for 19% of the national total. More than 5,200 of these farming units produce vegetables, while more than 1,500 produce fruit, mostly marketed at the Mercado Modelo (Model Market).

¹⁵ Exports include rice, wheat, corn, sunflower, sorghum, soybean, barley and sugarcane, as well as livestock products.



The Mercado Modelo of Montevideo

Farmers' markets in Uruguay were created along with the creation of Montevideo in 1720. From that moment on, markets such as Sostoa, Mercado de la Abundancia, Mercado del Puerto, Central, el Viejo, el Agrícola and the Mercado Modelo have accompanied the development of the country. The history of this process was described in detail when commemorating the 75th anniversary of the Mercado Modelo, in a book called "De la granja a la mesa" (From the Farm to the Table), (Montevideo Municipality, 2013).

Before the Mercado Modelo became the main wholesale concentration point for fruits and vegetables, there was the Mercado Agrícola. Established in 1912, this market began to show limitations over time due to population growth, lack of commercial spaces, maintenance and hygiene issues, and difficult access to urban areas. It is remarkable to notice that even in these markets, there were already problems associated with lack of commercial space and lack of information between farmers and consumers.

The Mercado Modelo opened its doors in the Barrio Bolivar of Montevideo in 1936. It is currently the main wholesale point in the country, and a national pricing reference for fruits and vegetables. Its main goal is to "provide the infrastructure and services for the development of the fruit and vegetable trade, in a context of transparency and equal opportunities".

The market is currently co-managed by the Municipality of Montevideo, the Ministry of Agriculture, Livestock and Fisheries (MGAP) and market operators. The main entity in charge of the market's management is the Administrative Commission of the Mercado Modelo (CAMM). Its main activities include the management of stands and stores inside the market. In order to sell a space to farmers or merchants, the CAMM must intervene, whether these are fixed stands owned by them or floating stands (temporary), which are supervised by the Commission or by merchants not using them, and who therefore



rent them out by the day. The total surface area of the market is 70,000 square meters, divided into three parts: the central hall, covering close to 19,000 square meters, and two lateral warehouses built in 1996, adding 15,000 square meters to the market and allowing most of the trading to take place indoors. The loading and unloading activities are differentiated, and sales take place from a very early hour in the morning.

The Mercado Modelo is the largest fruit and vegetable supply center in Uruguay. At least 500 farmers and merchants come in on a

URUGUAY: use of text messaging services in Montevideo's Mercado Modelo

daily basis either with their own production, with products purchased from a third party, commissioned or on consignment, so that other intermediaries or end consumers can fulfill their needs and purchase their produce.

More than 300,000 tons of fruits and vegetables enter this site every year. This calculation was made using an entry log that collects this data upon entering the market. Most products are handles in returnable packages or duly packed in bulk to establish minimum sales units. Considering that storage space is limited, and the costs involved in maintaining products stored for more than two days, whatever is registered as an incoming product is a fair representation of the sales that take place in this market.



The Mercado Modelo and the CAMM have an important role in promoting safe consumption of farm products, hosting a variety of national events, seminars, visits and training sessions. Other activities involve surveillance, logistics, infrastructure and systems.

The information service: Observatorio Granjero

At the beginning of the 90's, two relevant events took place: i) the Montevideo Municipality once again took over the administration of the Mercado Modelo¹⁶, creating a co-management system for the market and specialized entities for information collection; and ii) the signing of the Asunción Treaty, which resulted in the creation of the Southern Common Market (MERCOSUR) which established, among other commitments, the exchange of price and volume information between the countries¹⁷.

The purpose of the *Observatorio Granjero* (Farming Observatory) is to “improve the availability and access to information on the national fruit and vegetable trade, thus improving the decision-making process”. Its aim is to contribute to the planning process for crops, market transparency and studies on exported products.

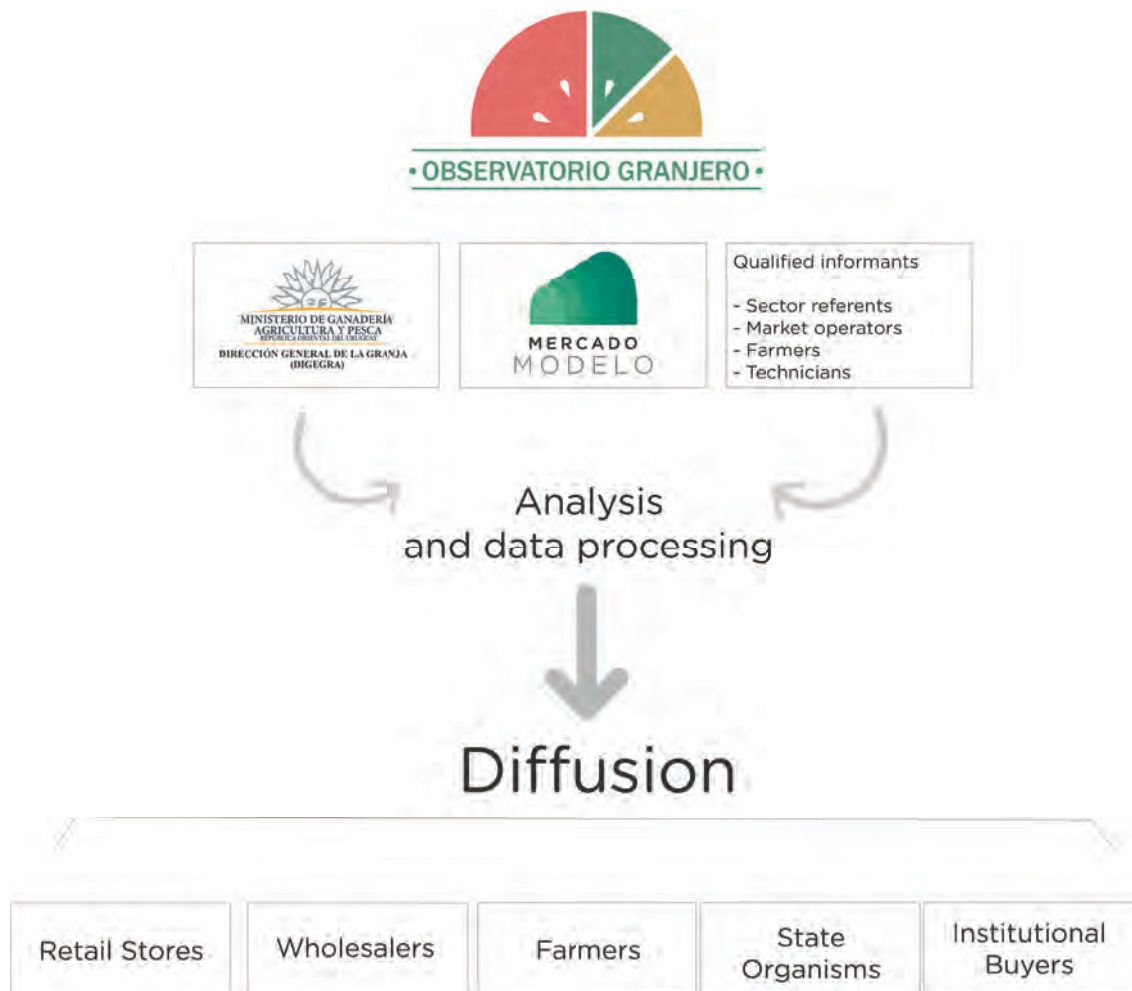
The coordination of actions to generate and collect information, as shown below, allows retailers, wholesalers, farmers and State organizations meet their food needs, including those who need to make institutional purchases.

¹⁶ During the three previous decades, the market was under the direction of the National Association of Agricultural Products (CNPA).

¹⁷ Result of the first meeting of Wholesale Markets of Mercosur, where the Wholesale Market Information System was created as a platform to exchange information using available technologies at the time.



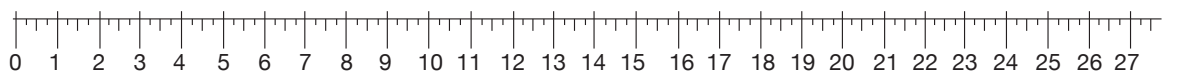
Figure 1. Organizational chart of the Observatorio Granjero.



Source: Taken from <http://www.mercadomodelo.net/>.

Information collection for approximately 60 products takes place after each operation, usually in the morning at the end of the sales hours. Price surveys take approximately two hours, and are carried out by six experts from the Commercial Development Unit with a background on agriculture or food engineering. Through a visual inspection, they proceed to categorize the products and extract information from operators on minimum and maximum prices. The data is collected in the context of an honest, respectful and friendly conversation with farmers along the aisles and in the different commercial spaces. Mutual trust between operators and price collectors is essential, since it is not mandatory for merchants or intermediaries to provide information. The data is collected on paper with no electronic or handheld devices.

Figure 2. Form used to collect market prices.





Fecha _____ RELEVAMIENTO DE PRECIOS MAYORISTAS EN EL MERCADO


| Producto | Tipo o Sub tipo | Origen | Calibre | Extra | I | I | Comentarios |
|----------------|-----------------|--------|--|-------|---|---|-------------|
| Acelga | | UY | Largo hoja >30 cm (G) | | | | |
| | | UY | Largo hoja 20/30 cm (M) | | | | |
| Albaca | Planta | UY | | | | | |
| | Sobre | UY | | | | | |
| Alcaucil | | UY | | | | | |
| Apio | hoja | UY | Peso atado >900g (G) | | | | |
| | | UY | Peso atado 600-900g (M) | | | | |
| | planta | UY | Peso atado >900 g (G) | | | | |
| | | UY | Peso atado 600-900g (M) | | | | |
| Berro | | UY | | | | | |
| Brócoli | | UY | Diámetro 18/15 cm (G) | | | | |
| | | UY | Diámetro 12/15 cm (M) | | | | |
| Cebolla Verdeo | | UY | | | | | |
| Choclo | | UY | >30 cm de largo (G) | | | | |
| | | UY | 20-30 cm de largo (M) | | | | |
| Coliflor | | UY | Diámetro >20 cm (G) | | | | |
| | | UY | Diámetro 15/20 cm (M) | | | | |
| Espinaca | | UY | Largo hoja >15 cm (G) | | | | |
| | | UY | Largo hoja 10/15 cm (M) | | | | |
| Esparrago | | UY | | | | | |
| Lechuga | Mantecosa | UY | Peso 400-550 g (G) | | | | |
| | Crespa | UY | Peso 250-400 g (M) | | | | |
| Nabo | | UY | Peso atado > 1800 g; < 6 pl/atado (G) | | | | |
| | | UY | Peso atado 1300-1800 g; 9-6 pl/atado (M) | | | | |
| Perejil | | UY | Largo atado 40/50 cm (G) | | | | |
| | | UY | Largo atado 30/40 cm (M) | | | | |
| | | UY | Largo atado 30/40 cm (M) | | | | |
| Puerro | | UY | Peso atado 800-1000 g; diam 40-50mm (G) | | | | |
| | | UY | Peso atado diam 25-40mm (M) | | | | |

Providing information is known to help make markets more transparent, although certain differences are observed between prices according to the needs of merchants selling to retailers (supermarkets and mini-markets, among others) or those of farmers, who will request that dealers provide them with compensation. Afterwards, the entire team analyzes and assesses the different sources and opinions collected, the purpose of which is to somewhat eliminate any possible bias.


On the other hand, volume data collection takes place at entry points, using a required form that the different users observe and follow.



Figure 3. Record of volume, weight and origin of fruits and vegetables.



Intendencia de Montevideo
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Comisión Administradora del Mercado Modelo
MGAP - Dirección General de la Granja



N° 112106

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| Día | Mes | Año |
| | | |

Marque el número correspondiente para país y departamento de origen y para tipo de vehículo. Escriba la fecha, la matrícula del vehículo y el nombre del destinatario de la mercadería

País de Origen

| | |
|-----------|---|
| Uruguay | 1 |
| Argentina | 2 |
| Braail | 3 |
| Paraguay | 4 |
| Chile | 5 |
| Otros | 6 |

Departamento de Origen

| | | | |
|-------------|----|--------------|----|
| Artigas | 1 | Paysandú | 11 |
| Canelones | 2 | Río Alegre | 12 |
| Cerro Largo | 3 | Rivera | 13 |
| Colonia | 4 | Rocha | 14 |
| Durazno | 5 | Salto | 15 |
| Flores | e | San José | 16 |
| Florida | 7 | Soriano | 17 |
| Lavalleja | 8 | Tacuarembó | 18 |
| Maldonado | 9 | Trona y Tres | 19 |
| Montevideo | 10 | | |

Matrícula

| | |
|-------|--------|
| Letra | Número |
| | |

Destinatario de la mercadería

| |
|--|
| |
|--|

Tipo de vehículo

| | |
|--------------------------|---|
| Camioneta Rueda Sencilla | 1 |
| Camionetas Rueda Doble | 2 |
| Camión Doble Eje | 3 |
| Camión y Zorra o Tractor | 4 |

| codigo | ESPECIE | TIPO | CANTIDAD DE ENVASES | KILO/ ENVASE | CANTIDAD ENVASE | KILO/ ENVASE |
|---------|-----------|---------------|---------------------|--------------|-----------------|--------------|
| 5000-13 | ANANA | | | | | |
| 5010-5 | BANANA | | | | | |
| 3006-7 | CIRUELA | BLANCA | | | | |
| 3001-5 | | ROJA | | | | |
| 5030-3 | COCO | | | | | |
| 3010-4 | DAMASCO | | | | | |
| 3020-1 | DURAZNO | | | | | |
| 2050-8 | FRUTILLA | | | | | |
| 3040-6 | KIWI | | | | | |
| 4010-2 | LIMON | | | | | |
| 3060-0 | MEMBRILLO | | | | | |
| 4020,7 | MANDARINA | COMUN | | | | |
| 4021-5 | | ELENDALE | | | | |
| 4022-3 | | HIBRIDA | | | | |
| 4023-1 | | SATSUMA | | | | |
| 40243 | | MURCOTT | | | | |
| 4025-8 | | OTRAS | | | | |
| 5050-4 | MANGO | | | | | |
| 3058-0 | MANZANA | RED DELICIOUS | | | | |
| 3055-2 | | GALA | | | | |
| 3055-3 | | FUJI | | | | |
| 3051-1 | | VERDE | | | | |
| 3039-4 | | OTRAS | | | | |
| 2070-2 | MELON | | | | | |
| 4030-4 | NARANJA | NAVEL | | | | |
| 4031-2 | | VALENCIA | | | | |
| 4032-0 | | OTRAS | | | | |
| 3080-5 | PALTA | | | | | |
| 5020-2 | PAPAYA | | | | | |
| 3090-2 | PELON | | | | | |
| 3100-3 | PERA | WILLIAMS | | | | |
| 3103-8 | | PACAMS | | | | |
| 3101-1 | | OTRAS | | | | |
| 4040-1 | POMELO | BLANCO | | | | |
| 4041-3 | | ROJO | | | | |
| 210 -E | SANDIA | | | | | |
| 3110-0 | LIVA | BLANCA | | | | |
| 1111-9 | | NEGRA | | | | |
| 3112-7 | | ROSADA | | | | |
| 10006 | AJO | | | | | |
| 2140-7 | AJI | | | | | |
| 2000-1 | ARVEJA | | | | | |
| 2020-5 | BERENUENA | | | | | |
| 1015-5 | BONIATO | ARAPEY | | | | |
| 1014-0 | | ZANAHORIA | | | | |
| 1021-1 | | OTROS | | | | |
| 1020-0 | CALABAZA | | | | | |
| 1130-4 | CALABACIN | | | | | |

| codigo | ESPECIE | TIPO | CANTIDAD DE ENVASES | KILO/ ENVASE | CANTIDAD ENVASE | KILO/ ENVASE |
|---------|------------|-----------|---------------------|-----------------|-----------------|--------------|
| 1050-8 | CEBOLLA | Dry | | | | |
| 20303 | CHAUCHA | | | | | |
| 0070-1 | ENDIVA | | | | | |
| U080-9 | ESCAROLA | | | | | |
| 2056-5 | HABAS | | | | | |
| 0150-1 | LECHUGA | MANTECOSA | | | | |
| 0151-4 | | OTRAS | | | | |
| 2080-3 | MORRON | ROJO | | | | |
| 2051-43 | | VERDE | | | | |
| 2082-4 | | AMARILLO | | | | |
| 1054-5 | PAPA | BLANCA | | | | |
| 1055-9 | | ROSADA | | | | |
| 2090-7 | PEPINO | | | | | |
| 0143-0 | REPOLLO | BRUCEIAS | | | | |
| 2110-5 | ZUCCHINI | | | | | |
| 2122-9 | TOMATE | AMERICANO | | | | |
| 2123-7 | | LARGAVIDA | | | | |
| 2121-0 | | PERITA | | | | |
| 2124-6 | | CHERRY | | | | |
| 1110-1 | ZANAHORIA | | | | | |
| 2130-2 | ZAPALLILLO | | | | | |
| 1120-7 | ZAPALLO | CRIOLLO | | | | |
| 1121-5 | | KABUTIA | | | | |
| CODIGO | ESPECIE | TIPO | DOCENAS | PESO POR UNIDAD | | |
| 06004 | ACELGA | | | | | |
| 0010-8 | ALBAHACA | | | | | |
| 0031-0 | APIO | HOJA | | | | |
| 0030-2 | | PLANTA | | | | |
| 0020-5 | ALCAUCIL | | | | | |
| 00411-1 | BERRO | | | | | |
| 00547 | BROCOLI | | | | | |
| 1033-2 | CEBOLLA | VERDEO | | | | |
| 00611-4 | COLIFLOR | | | | | |
| 2040-9 | CHOCCLO | | | | | |
| 0000-6 | ESPARRAGO | | | | | |
| 0100-7 | ESPINACA | | | | | |
| 1040-5 | NABIZA | | | | | |
| 1050-2 | NABO | | | | | |
| 0130-9 | PEREJIL | | | | | |
| 1140-1 | PUERRO | | | | | |
| 1070,7 | RABANITO | | | | | |
| 1080-4 | RADICHA | | | | | |
| 1090-1 | REMOLACHA | | | | | |
| 0140-6 | REPOLLO | BLANCO | | | | |
| 0141-4 | | COLORADO | | | | |
| 0142-2 | | CRESPO | | | | |
| 0142-2 | | | | | | |

LOS DATOS DE ESTE FORMULARIO TIENEN CARACTER CONFIDENCIAL
SU USO SERA EXCLUSIVAMENTE ESTADISTICO

Firma _____

URUGUAY: use of text messaging services in Montevideo's Mercado Modelo

The data analysis is conducted by a group of surveyors, including officials from the Ministry of Agriculture and the Municipality, who act as a team in the Mercado Modelo and check each of the products, their size and price, an adjust this to standard measuring units. This verification is followed by the creation of a price list, using a spreadsheet and an official newsletter that is later published.



Communication of this information takes place after operations every Monday and Thursday, using different media, including a weekly newsletter (see Figure 4). It is then distributed via email to subscribers and is available on the market's website (www.mercadomodelo.net).



The data is also available in audio format online, and is shared with radio stations using *Soundcloud*. Finally, there is a Facebook page: <https://www.facebook.com/mercadomodelouruguay> and a YouTube channel: https://www.youtube.com/channel/UC1R7gswiAEG7RDqaN7tSn_A.

At this stage, the system begins to receive alerts generated by the market using short messaging, to notify the existence of a recent newsletter, or invite market stakeholders to visit the website.

The information provided by the Observatory includes:

- Wholesale prices (current and historical) for fruits and vegetables.
- Incoming fruits and vegetables and volume (current and historical).
- Research and technical studies (supply, status and outlook, quality, climate impact, commercial trends, among others).
- Recipes.
- Import and export statistics.
- Services, schedule and rates.
- Opportunities (bidding, contracts and agreements).
- Other institutional information.



Figure 4. Example of weekly price newsletter.



Short text messaging service (SMS)

One of the channels used by the market to alert different operators to new website content, available space, collections or others is the short text messaging system or SMS, which is an efficient and inclusive tool for the market’s target population. SMS is a system known for reaching a higher number of stakeholders, irrespective of internet service, appropriate mobile devices, good reception or service included by a specific provider.

As originally intended, SMS use has enabled the delivery of notifications and alerts to direct and indirect clients in the different market units (Commercial Development, Space management, Surveillance, Maintenance and Administration) in an official and organized manner.

The platform used currently is provided by Cálculo Comunicaciones S.A., a local company specialized in providing mobile services and SMS, MMS and WAP messaging, among others. This platform enables officers in charge of collecting prices, and the IT team, to have and administer access to Cálculo servers, which in turn allows them to enter phone numbers, create target groups (operators, merchants, general public) and include the text to be sent. Due to the limitations of short messaging, the number of characters cannot exceed 140. The cost of each message is 1 Uruguayan peso (USD 0.036) and is borne by Mercado Modelo, which receives “available credit” provided by the company to send massive messages.

IT technicians who work at the CAMM are aware of how useful SMS can be to promote the use of information, since they have confirmed the positive effects of this communication method by counting the number of downloads from the web that takes place after sending a short message, either to consult the newsletter, find out about debt regulation for the services provided by the market or to update the registered data.

The widespread use of cell phones could result in alternative future solutions such as WhatsApp, Telegram or chat, as long as there is some type of acknowledgment indicating the information was received and avoid repeating notifications. One of the limitations of SMS is that there is no certainty that the message has been read. Exploring new platforms would allow a two-way communication and a reduction of current costs, which involve paying a broker to send the information to different operators.

Evaluation of the SMS service

In March 2016, the MIOA entrusted IICA's Delegation in Uruguay with the conduct of an impact and effectiveness evaluation of mobile text messages (SMS), in order to determine the information needs of users of the Market Information System in Uruguay. The Institute consulted Julio E. Brin Costa, an agricultural engineer specialized in agricultural marketing, who included in his report a general description of the fruit and vegetable trading system, from an institutional perspective and considering the most important chains in the country (Brin 2016). He also described the information system of the Mercado Modelo and its current status, as well as the methodology, results, conclusions and recommendations to evaluate the services. What follows is a summary of this assessment, systematizing the most relevant issues as presented by the consultant, and highlighting common elements with other studies conducted by the MIOA in Costa Rica, Ecuador and Trinidad and Tobago.

Brin begins his report by mentioning that the Mercado Modelo "is the most significant concentration point for domestic trade of fresh fruits and vegetables, with an annual volume of about 300,000 tons of products [...] In this market, exchange takes place in an organized [and] centralized manner, with buyers and sellers, communication, negotiation, existence of the product and delivery at the agreed location".

After carefully surveying, processing and disseminating information, the issue that remained unresolved regarding market information services was identifying the most suitable channels to ensure messages were received by its recipients. Several options were considered, including fax, voice message, and more recently, the web.

Operators who work in the market are typified as wholesalers, divided into farmers, agents, commission merchants, second-hand merchants and importers. As mentioned before, the Observatorio Granjero is a public portal within the Mercado Modelo, available at <http://www.mercadomodelo.net/observatorio->



[granjero](#). These two elements -the stakeholders and the information system- are especially important, given that they were the main object of this research.

Evaluation methodology

Operators at the Mercado Modelo were evaluated by conducting a descriptive research and taking a stratified randomized sample based on the size of each enterprise, and measured based on the number of space units (2 square meters) contracted with CAMM. Operators were assigned numbers and potential informants were chosen in a random, simple manner. A 5% was added to each segment of operators (more than 51, between 25 and 50, between 12 and 24 and between 1 and 11 space units) when selected informants were unavailable. Since the total population of operators at the Mercado Modelo was 496, the sample had a total of 35 according to the above mentioned criteria.



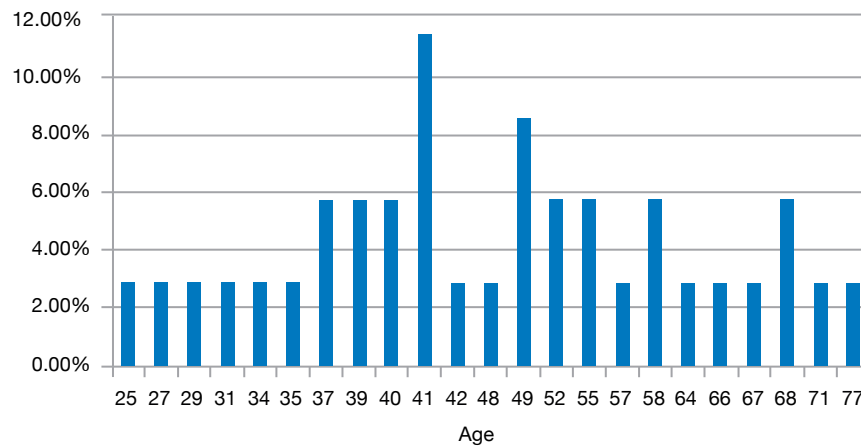
Analysis of information

The chosen questionnaire allowed for the collection of anonymous responses that included data such as gender, educational level, type of technology used, years in the commercial activity and productive sectors. More specifically, this study analyzed the knowledge and use of the Observatorio Granjero, ways to access information, benefits deriving from its use, impact of this short messaging system (SMS) and satisfaction level with this service. Finally, respondents were asked about their information needs: what information the Mercado Modelo failed to provide, and new content that could be offered in the future through different media.

URUGUAY:
use of text messaging services in Montevideo's Mercado Modelo

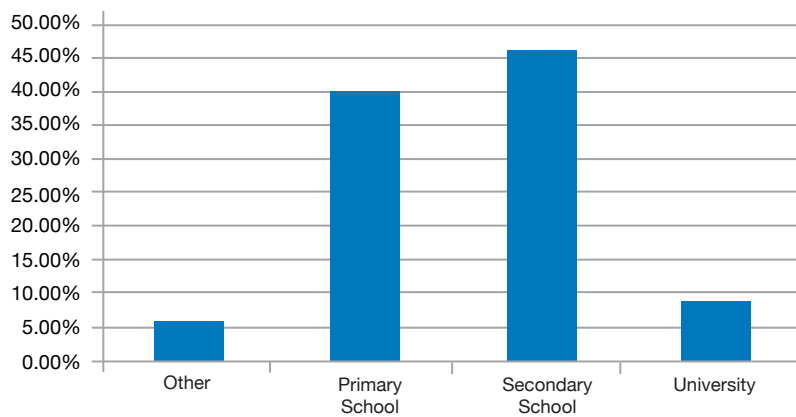
The description of the operator sample is shown in charts 7, 8 and 9:

Chart 7. Distribution by age (between 25 and 77 years of age).



Source: Taken from Brin (2016).

Chart 8. Educational level



Source: Taken from Brin (2016).

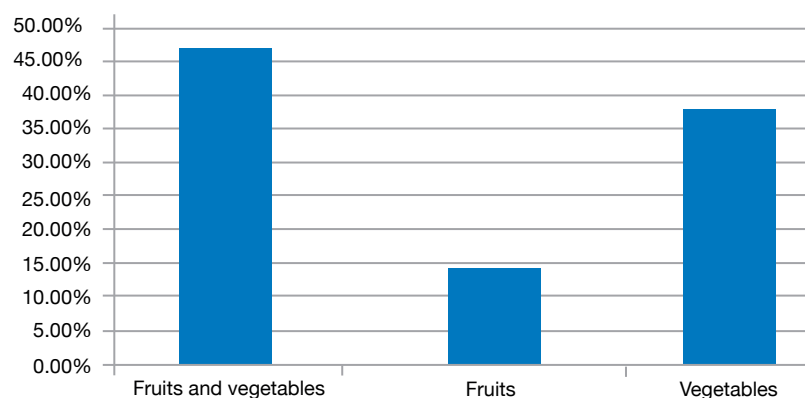


Referring to the use of technology, the study revealed that operators with primary and secondary school level preferred cellular phones (more than 60%). These same operators, with primary and secondary school level, claimed they used landlines, computers and internet to a lesser extent. Operators with college education used all four media indiscriminately; that is, they use them all at 100%.

With respect to seniority in the market, the research showed that the distribution covered a very ample range, between 1 and 59 years. In general terms, the average for various data is 3%; however, it is worth highlighting that groups with 8, 11 and 17 years of seniority account for 18% of the total, and the group with more than 35 years in operation account for 35%.

Finally, the study showed different levels of specialization for these operators. More than 35% specialized in vegetables and 15% in fruits. Operators who carry out both activities accounted for more than 45%.

Chart 9. Productive sector or commercial activity of each operator.



Source: Taken from Brin (2016).

Regarding the market information system, known as Observatorio Granjero (Farming Observatory, OG), 54% of the operators are aware of its existence and 34% claim they have used it. Regarding ways to access information, email and website are the preferred methods, with over 80%, with almost 30% accessing information via their mobile devices. Although a vast majority stated that they were satisfied with the information received, few respondents said they were satisfied with the usefulness of said information. The study also showed a positive correlation between the level of education of operators and how much they used commercial information.

When considering information needs, operators request statistical information on fruit and vegetable imports, as well as existing amounts in refrigeration chambers. Respondents insisted on the importance of

training for issues such as use of information, decision-making or web technology, including farmers, based on the proven efficacy of the "farmer to farmer" communication channel.

Other suggestions for the information service included the need to:

- **Segment** the universe of users and the different content based on each need.
- **Expand** content to include product description and the reason for price variability.
- **Define** a communication strategy that includes information communicators on the one hand, and users on the other. Using as many local media as possible -radio or television-, with short messages and an intensive use of ICTs.
- **Provide** a generational follow-up on operators in their enterprises, so that new generations can better understand new strategies.

The Observatorio Granjero was associated with strengths such as availability, reliability, transparency and updated information, together with a trend-setting ability and use of tools such as SMS and WhatsApp. Weaknesses, on the other hand, included a certain level of mistrust, differences in clearance prices and insufficient training. Lack of information at the OG was mentioned repeatedly.

Success stories, lessons learned and recommendations

- **Provide the service with a clear identity:** Operators recognize the Farming Observatory developed by the Mercado Modelo Administrative Commission (CAMM) as a reliable, positive source, which web statistics show to be on the rise. They also appreciate price information provided by merchants, although this is not a requirement or obligation. This shows the interest of users in reliable information, which in turn helps administrators to "professionalize the market".
- **Share a common goal and include inter-institutional efforts:** A positive step in the collection and dissemination of market information had to do with the timely decision to coordinate actions between the Municipality of Montevideo and the Ministry of Agriculture, to conduct one single process of information collection and analysis. This led to the establishment of a specialized unit and an official communication mechanism to avoid confusions.
- **Price surveys twice a week:** Price surveying requires seasoned and technically skilled professionals to accurately identify different product types. Moreover, price surveyors must have strong communication skills because the rapport, dialogue and confidence built within the market and with their informants is what facilitates their surveying tasks twice a week, which is the most suitable frequency according



to administrators. The time of day for price surveying is also important –in Uruguay it is normally done at sales closing early in the morning– to avoid interruptions, thus leading to a friendlier conversation and giving more time to the informant to report on the day’s activities.

- **Leverage internet high penetration rates:** Uruguay has made significant investments in ICTs in order to intensify use of the Internet. The idea is not to rule out other communication channels or media, but rather, to supplement them with the development of mobile apps, for instance. An example of a good investment is the “Plan Senda” funded by Canada and supported by IICA, which provided the market with equipment, created communities for practice and developed an ICT training process. This and other experiences have been very beneficial to the market, bringing about innovations that can be applied to the different services and products offered.
- **Identify useful SMS methods to access market information:** Some prior experiences with mobile phones included the use of numeric code lists to differentiate products. This method, which is used in other text messaging services (SMS) within the region, matches each code to an agricultural product, so users can order items based on this list. The Mercado Modelo considered this practice but then immediately disregarded it due to the difficulty and complexity for users to keep records and request information based on the list.
- **Standardize and promote quality levels:** The use of a “Quality Guide” allows merchants to expand their knowledge of the different types of products and understand the advantage of having world class produce. Moreover, price surveyors can also help farmers better distinguish their products if they are knowledgeable on quality.
- **Promote the use of the system through training programs:** Systems are not widely used, even though they are quite simple. This is why it is necessary to train different operators –mainly young, well-educated operators– because they are more open to the use of technology to satisfy their information needs. This must be supported by a well-implemented communication strategy.

The main recommendations are as follows:

Develop a strategic plan for the Observatorio Granjero allowing for a longer term projection, the identification of investments and the design of communication, IT and training strategies, among others.

Assess the different possibilities facilitated by mobile telephones, in addition to being an unparalleled service to send notifications or alerts. Other experiences show that the entire country could access product information through a short code. This is a low-cost service that could work with different carriers by simply texting the name of the product to receive the relevant information, the cost of which would be debited from the account of prepaid users or added to the monthly bill of prepaid/postpaid users. Increasing the use of SMS with a specific text per product would make the system more universal.

Partner with institutions and information sources that can contribute to increasing the product range according to the different operators' interests. The Mercado Modelo is a hub for agribusiness, which makes it the best spot to exchange (i.e., supply and receive) information. Telephone companies are another significant partner that could play an even greater role, considering the socio-economic context of the market, instead of restricting their involvement to only providing a service.

Assess the impact of information services based on their significance, efficiency, efficacy and sustainability so as to determine an initial value as the starting point to introduce the necessary changes and record the importance, outcomes and impacts of information services. After over two decades of information services and the efforts made by a country to collect agricultural information, it is worth going the extra mile to work out how to measure such effort and identify the strategies that should be adopted in the future for further improvement.



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CLOSING REMARKS

**on the Use of Text Messaging
Services in Four Countries**

The development of production systems is possible, either in the territory as a whole or as separate links in the production chain, by including wholesalers and retailers. The ultimate goal of promoting innovation, added value and knowledge is to ensure an income that can improve the quality of life for farming families, especially young farmers; encourage future farmers to become deeply rooted in this culture; and promote the socio-economic empowerment of women through agricultural ventures. Moreover, this should contribute to preventing young farmers from migrating to other production or commercial activities that are not related to the agricultural industry. Farmers' markets are essential players in pursuing this goal. This is why they are the focus of attention and cooperation from different countries under the MIOA's framework and with IICA's support.

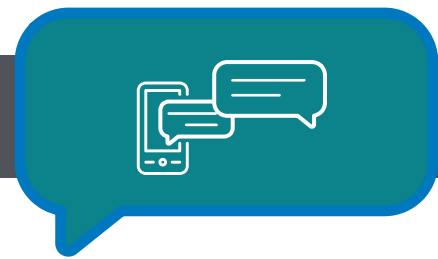
The relationship between markets and information plays a major role, as evidenced by the experiences described in this document, which highlights the need to bridge information access gaps and enable the different actors to analyze their transactions more accurately, reduce costs and increase the efficiency of their purchases and sales thanks to the availability of information about prices and volumes. A good information system helps improve pricing and data disclosure, among other things, especially in remote rural areas. Needless to say, the efforts made by any government, administration or institution to improve information access are to no avail if such information is not used.

The ICTs have been the main ally of these efforts, which date back to the 1990s and have been intensified at the pace of technology development. The initial investment was made in computers, Internet and websites, but they presented some limitations for universalization. Market information systems have already moved onto second-generation technologies, which allow for two-way communication and more interaction. Nowadays, mobile phones, text messaging and Internet are the most widespread solutions, ranging from sophisticated apps for smartphones to short 140-character messages for relatively simple cell phones.

The fact that text messaging services (SMS) can transmit text regardless of Internet connection turns them into a feasible solution for developing countries, although this does not rule out the use of more comprehensive solutions. Text messaging is very reliable since it ensures both message reception wherever there is mobile service and the delivery of "official communications" by an authorized source such as market administrators.

Countries that resort to text messaging as a tool to communicate with farmers and merchants, contributing to their decision-making process, have their own individual contexts. Sharing their





experiences with other peers will definitely help them expand their knowledge and make the necessary adjustments, if any.

However, it is worth noting that the common challenges faced by the markets must be addressed, taking into account individual cultural backgrounds and interests. The most relevant ones are:

- Standardization of product presentation.
- Standardization of product sizes (to define quality).
- Standardization of weights and measures.
- Agricultural product postharvest handling and packaging.
- Health & safety and good housekeeping of the facilities.
- Training for farmers and users in the abovementioned topics.
- Promotion of knowledge sharing activities with other countries.

The teams entrusted with gathering and analyzing the data on agricultural information systems include heavily committed, high-flying members who are willing to work jointly. This is evidenced by the myriad of media options and resources made available to users to keep them abreast of agricultural affairs, make market relationships more transparent, provide reliable and timely information and, last but not least, to make these new information tools accessible to all users.

The new information systems furnish farmers, merchants, intermediaries and other users with tools available every day at all hours and all year round, which allows them to make more informed decisions.

Text messaging solutions (SMS) are becoming increasingly versatile yet simple, which makes them extremely useful and universal. They are used not only to provide the prices or information on products sold in wholesale markets, but also to give advice, send reminders (payment, collection, meetings, etc.) and alerts (weather, for instance), or to inform on the status of a transaction or request (for example, with institutions), among other activities. It is worth noting, however, that this method might be overshadowed by future social media and apps.

Text messaging services are low cost or free and quite user-friendly, since they do not require any specific IT skill or knowledge. It merely requires sending a text message to a short number or signing-up for automatic updates. These have wide coverage and those countries with more than one carrier can furnish all subscribers with information at the national level.

It is also worth noting that the use of text messaging services (SMS) to disseminate agricultural information has not been adopted everywhere, so it is still necessary to increase the number of users and the content of the messages.

More training in negotiation techniques and how to use price information is also required. Even though the use of ICTs and mobile phones has steadily increased, the information culture has not kept pace with such growth. Digital illiteracy must be defeated in every country and institution to provide better services. Users need support to overcome digital barriers and access quality information in a timely manner, and know how to profit from this information.



International support can contribute to making the agricultural trade more transparent, democratic and fair based on the specialization level of the markets. Many times, the focal point of wholesalers is only known by their peers, who are often in other countries; therefore, engaging in dialogue and sharing experiences is key to development and cooperation.

The MIOA and IICA can continue providing countries with technical and horizontal cooperation to further develop and strengthen markets and agricultural information systems. They can also foster a closer relationship between stakeholders, contributing to the creation of partnerships and providing institutional support, all of which are essential aspects to ensuring the evolution of agricultural markets and information systems, economic development and skill building for farmers and agricultural merchants.

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