



Food systems and COVID-19 in Latin America and the Caribbean: The opportunity for digital transformation

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1. Editorial



The impacts of COVID-19 are growing daily. The pandemic has triggered not only a health crisis, but also an economic one. Its consequences and duration are still unknown, but we know, for example, that its impact on poverty rates and food security has no recent precedent. According to some estimates, global poverty will increase by 548 million as a result of the COVID-19. There will also be an increase in the number of food insecure people, estimated at 183 million. Poverty in our region is expected to increase by 4.4 percent, that is, an additional 30 million people.

In such a scenario – in which achieving economic, social and environmental sustainability is increasingly indispensable for the planet – the agrifood system needs urgent and innovative solutions. In this respect, digitalization is a recommendable path to follow.

Digitization has become a key driver for rural transformation, creating new opportunities for farmers. The future of agrifood systems will depend, to a large extent, on how agricultural stakeholders will be able to take advantage of the digital transformation to improve inclusiveness, efficiency and environmental impacts.

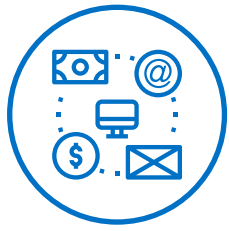


2. Key messages



- The digitalization of agriculture and food systems can have positive impacts in economic, social, environmental and institutional terms, especially in the post-pandemic recovery process.
- Currently, the adoption of digital technologies among small producers is low, so they may be excluded during the post-pandemic recovery process.
- The lack of specific public policies, low e-literacy, poor connectivity, lack of advice or actionable services, and low capacity are some of the factors hindering the transition.
- However, the pandemic has accelerated the digitalization processes, with *e-commerce* being the most visible.
- The digital transformation of the agrifood sector should take an inclusive, efficient and sustainable approach. This approach requires significant action by governments to establish enabling policy frameworks and incentives.
- Governments' efforts to achieve a digital transformation of the agrifood sector should focus on infrastructure and connectivity, accessibility, the level of education and institutional support, designing services for the unconnected.
- A general framework of incentives that could be used by governments could include (i) smart demand and supply subsidies; (ii) support for incubators, accelerators, innovation clusters; and (iii) better access to appropriate financial products (angel investors, venture capital, debt, equity, quasi-equity, crowdfunding) for new enterprises, micro, small and medium-sized enterprises (MSMEs) and service providers.
- Digital transformation in the agrifood sector can occur at any link in the value chain. Opportunities exist at the on-farm and off-farm levels.

3. The role of technologies in food systems development



3.1. Digitalization to improve the agrifood system

Digitalization contributes to improving the efficiency and management of agrifood supply chains, and to bridging the urban-rural division by increasing public awareness and participation (World Bank, 2019). Hence, the application of specific digital technologies can have a significant impact on the productivity of crops, livestock, forestry, fisheries and aquaculture, improving farmers' incomes and welfare.

Digitalization benefits all actors in agrifood systems, as its implementation can help reduce crop losses, decrease herd deaths, improve yields, manage risks, optimize product storage, avoid food spoilage, and maximize profits. The use of technology throughout the value chain translates into tangible improvements in food security, being especially relevant in the most vulnerable populations (USAID, 2018); for example, it helps to reduce production losses, due to better risk management, or to allow better farm product marketing.

The use of digital technology, at the farm level, helps farmers make evidence-based decisions and alerts. Data on soil, climate, irrigation, markets, diseases and pests, as well as the availability of private loans or government subsidies, form part of the information available for decision-making at the on-farm level. Decision-makers will have real-time (or near real-time) information on market prices, projected end-of-season yields, the number of beneficiaries of government programmes and subsidies, the effectiveness of preventive actions to protect against diseases and pests or of disaster mitigation measures (FAO and ITU, 2019). Traders and wholesalers should also have a better understanding of the quantity of products available and plan appropriate activities to improve prices and product quality based on the available evidence. Banks, insurance and other financial institutions will also be able to better design their products, customizing them for rural communities. Finally, consumers will benefit from traceability, food safety, quality and price of food products.

In short, digitalization is an important advance for the agrifood system. It is also a particularly relevant advance in times of pandemic, when decisions need to be taken that will allow the process of recovery and adaptation to a new scenario to begin quickly. In other words, data analysis and management will make it possible to take more informed decisions about the changes or corrections that need to be made in the private sector, or the most appropriate way to focus measures and policies in the public sector.

Figure 1/ The role of digitalization in agriculture



Source: FAO, based on FAO-ITU (2016).

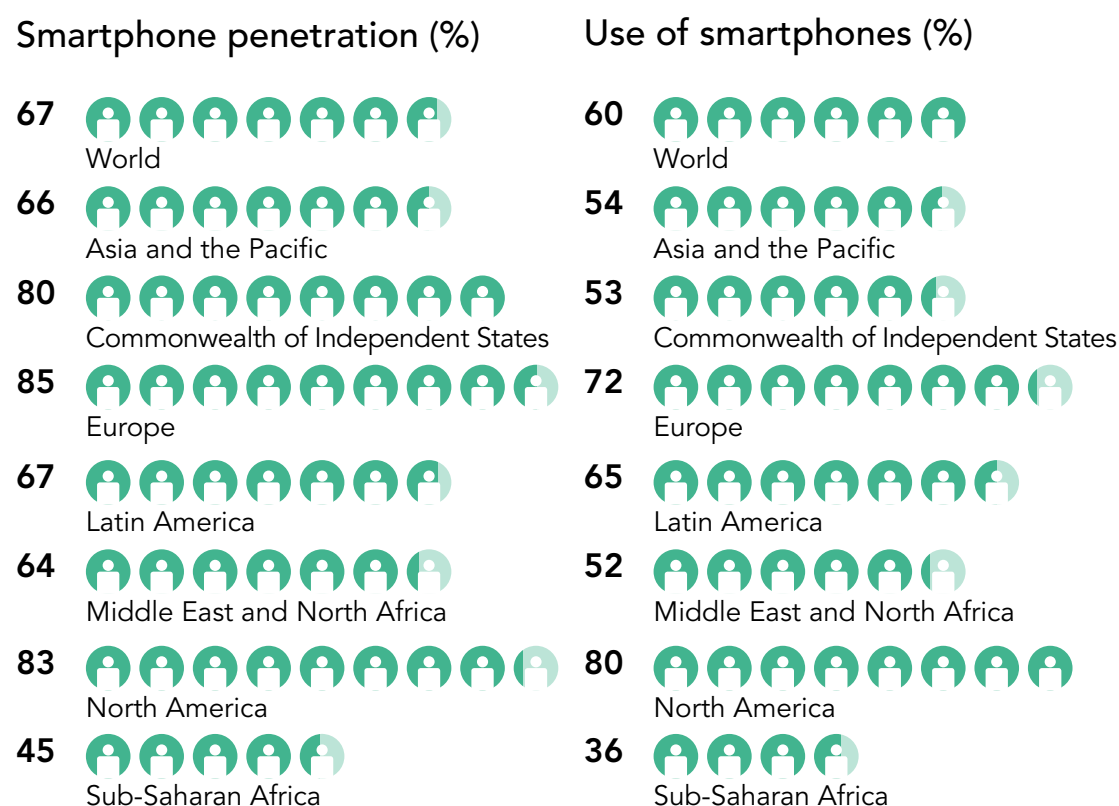
The post-pandemic world will require technology and information systems to become even more efficient and accessible, namely, digital services will have to be targeted at vulnerable groups (such as women, youth, indigenous people and those living in more isolated rural areas); the required digital skills will also have to be strengthened to reap the full benefits of these technologies.

3.2. Challenges in the digital transformation

Digital transformation can be defined as the migration of companies and societies to a stage in which digital technologies become the backbone of their products and services, giving rise to the development of new forms of operation and new business models. It has also been called the Fourth Industrial Revolution (Oliver, 2020). However, certain basic conditions must be met for the use of digital technologies and, therefore, for the digital transformation of the agrifood sector. These include changes in infrastructure and connectivity – mobile subscriptions, network coverage, Internet access and electricity supply –, accessibility, education level – literacy, Information and Communication Technology (ICT) education –, as well as changes at institutional support levels (FAO, 2019a).

The mobile ecosystem¹ in Latin America and the Caribbean is conducive to the development of digital services. The region has a unique mobile subscriber base, more than 416 million, of which 78 percent (326 million) have access to the mobile Internet. It is projected that by 2025, 90 percent of mobile subscribers will be mobile Internet users (GSMA, 2019a).

Figure 2/ Smartphone penetration and use (%) by region, 2018



Source: (GSMA, 2019b)

In the region, 66 percent of women use mobile Internet, a rate higher than the global average of 48 percent. Thus, the gender gap in mobile internet use is only 2 percent, well below the global 23 percent (GSMA, 2019c).

In rural areas, however, the reality is different. To begin with, network coverage is still limited. While globally 90 percent of people have access to the Internet (through the third-generation network – 3G – or higher quality), only one third of rural populations in the Least Developed Countries (LDCs) enjoy similar coverage (GSMA, 2019b).

¹ Business model through which mobile devices coexist with an interdependent series of applications, services, accessories and software.

On the other hand, in emerging economies and rural areas, poor technological infrastructure, high technology costs, low levels of e-literacy and digital skills, and limited access to services are a significant barrier to the use of digital technologies (FAO, 2019a). Today, with new demands due to COVID-19, this gap between rural and urban areas is even more evident.

To achieve an inclusive digital transformation requires all parties to do their best. In the region, the Digital Agenda for Latin America and the Caribbean (eLAC, 2020) was drawn up to catalyse regional cooperation on digital issues. This agenda provides focused technical assistance on inclusion, digitalization of production, skills development in the population; it establishes a framework for the promotion of open government and governance that stimulates collaboration among countries.

However, the development of public e-services has been particularly slow in the agricultural and rural sector, and there are still few countries providing e-farming services. It should be noted that those countries that prioritize the use of ICT in agriculture generally have an improved business environment and a better policy and regulatory framework for agribusiness. This seems to be a relevant factor in achieving the goal (FAO, 2019a).

Still, about 80 percent of "digital transformation" projects fail. Other assessments – by Forbes, McKinsey Digital, and Tony Saldanha – arrive at similar figures and all agree that companies, for one reason or another, fail to transform themselves digitally (Oliver, 2020).

There is no single path to achieve digital transformation, which does not prevent, of course, evaluating the processes of digital transformation on their merits, in terms of design and accessibility. A common mistake is to rely blindly on digital technologies, dismissing the human factor. A hybrid approach is required that combines the digital and the human, particularly in rural areas, where – at least in the early stages of implementation – people tend to distrust digital technologies.

In addition, companies and state bodies should focus on interoperability (infrastructure, platform, application, service and data) for the provision of enhanced and customised services. This requires harmonization of data collection, storage, management and retrieval.

A general incentive framework that governments could use could focus on:

- provide smart subsidies on both demand and supply;
- support incubators, accelerators, innovation groups; and
- improve access to appropriate financial products (angel investors, venture capital, debt, equity, quasi-equity, crowdfunding) for start-ups, small and medium-sized enterprises (SMEs) and service providers.

For the agrifood sector, it is essential to expand universal access to digital services, for example by developing digital skills and capabilities to foster a stronger digital ecosystem and by designing services for the unconnected.

4. On-farm digital technologies



4.1. Digital extension and agricultural advisory services

Agricultural Extension and Advisory Services (AEAS) refers to any public or private organization (farmers' organizations, private companies, etc.) that facilitates the access of farmers and other rural actors to knowledge, information and technologies, enabling interaction with other actors and helping them to develop their own organizational and management skills, practices and techniques in order to improve their livelihoods and well-being (Christoplos, 2010).

The AEAS system is quite pluralistic. It includes a diverse network of actors, often present in communities: formal and informal; public extension agents, advisors and private companies; producer and community organizations, and Non-Governmental Organizations (NGOs).

One trend in AEAS is the use of emerging digital technologies and tools, which enable more efficient communication between people and organizations. These include a wide range of digital services, tools and technologies, which are used according to local needs and capabilities: from simple message services (SMS) and radios, to drones and artificial intelligence. The "state of the art" technology is generally used by private actors and agritech companies; public extension systems and advisory services, on the other hand, usually use tools – based on ICTs – to facilitate communication between producers and advisors.

Agricultural extension and advisory services can improve the agricultural sector's access to digital innovations – through both established and emerging technologies – benefiting family farming, especially its most vulnerable sectors. digitalization, in turn, can facilitate inclusion by providing vulnerable groups, such as youth and women, with the possibility of becoming important actors in the digital transformation or new rural entrepreneurs.

Finally, AEAS can contribute to minimizing the impact of COVID-19 through the following areas of action (FAO, 2020d):

- **Raising awareness of COVID-19 in rural areas:** to help reduce the spread of the virus and to ensure that rural producers are adequately supported in terms of production, protection and compliance with new standards.
- **Assessing the situation in the field and advocating for solutions to farmers' needs:** this will allow governments to be kept informed and thus provide personalized services that enable rapid and appropriate decision-making to ensure health and food supply.
- **Ensuring continued support to rural producers in a situation of physical distancing:** AEAS can provide reliable sources of contacts and critical elements to ensure food production and improved access to inputs, seeds, transport and finance during the pandemic.
- **Building partnerships to overcome market disruptions and ensure supply chain functioning:** agricultural extension and advisory services can improve farmers' access to e-commerce, facilitating the promotion of short value chains and local production.
- **Helping to address emerging social problems:** by facilitating access to social protection services through the development of social safety nets, consultancy on alternative income generation opportunities, and local conflict resolution.

In this context, AEAS are in a unique position to promote increased production and quality of agricultural products, as well as to assess the situation in the field, raise awareness among farmers, and inform governments during and after the pandemic.

We believe that the success factors for ensuring digital extension services are:

- **Coordination of actions among AEAS actors:** the COVID-19 crisis requires the timely and concentrated provision of a wide range of services, which will be easier to achieve if there is a close collaboration between public, private, NGO, and community actors with health organizations. In practice, this can mean anything from using online platforms to WhatsApp groups, even call centres.
- **Digitalization:** response measures to the novel coronavirus have opened up opportunities for innovation in farmer support. Thus, digital tools and technologies have been used to facilitate and complement face-to-face extension and advisory services.
- **Community contacts:** such as cooperatives, producer organizations, community and farmer leaders, self-help and religious groups, are crucial to ensure timely and widespread information and advice when measures limiting mobility are implemented.
- **Online platforms and virtual communities:** these provide a timely space to facilitate links with other ongoing mechanisms, such as social protection, insurance schemes, self-help and community savings groups, and cross-sectoral partnership, in pursuit of a common goal.
- **Safety and welfare of extension service providers:** in the midst of this health crisis, it is essential to train front-line providers in prevention measures, use of ICTs, conflict management, and effective communication, given that their work involves high levels of stress.
- **Going local:** disruptions in the lack of markets and inputs, increased food loss, limited labour force and logistics, require locally appropriate and innovative solutions to address local challenges. In this scenario, AEAS provide locally appropriate advice and services, enable the promotion of locally available products and training for food production.
- **Inclusion v/s exclusion:** while digital tools and technologies provide an opportunity to close the gap with the most vulnerable, access to such digital services is not automatic and the risk of exclusion of poor and disadvantaged rural groups is high. Local AEAS providers can play a key role in helping rural producers' access and interpret the services and information provided through digital tools and technologies.
- **Co-creation of innovation:** two-way dialogue and co-creation of innovation through digital tools and communication technologies is key to a sustainable transformation of the agrifood system that is resistant to future crises. Therefore, it is urgent to involve rural producers to shape an enabling environment and to integrate local and indigenous knowledge into innovation processes.
- **Empowerment of rural producers:** when technology is used by capable and empowered people, including youth and women, it can have a profound impact on social, economic, institutional, organizational and policy processes, and thus on the lives of family farmers. Hence the importance of investing in the development of an appropriate skill set, capacity building and digital literacy of rural producers with a view to expanding the positive impact of digitalization.
- Public-private partnership: the partnership with the private sector must be strengthened to:
 - ensure adequate infrastructure;
 - improve access to digital services for small farmers and the rural poor; and
 - create an enabling environment.

However, technical training requires robust policies to enable the development of AEAS, particularly among small-scale farmers. In Brazil, for example, 80 percent of the largest farms (more than 10 000 hectares) reported having received technological training. In contrast, 6 percent of the smallest establishments (less than one hectare) reported the same (Census, 2017).

4.2. Online business management tools and services

The business world has been revolutionized by the use of online management tools and services. Despite the advantages in profitability and efficiency, the adoption of these tools by developing countries has been slow, and especially slow for rural agriculture. Notwithstanding the above, the adaptation of tools for land/farm management represents an opportunity for a qualitative leap in terms of performance and efficiency in the use of resources.

There is a great battery of online tools and services to help with business management. Farm management software is very useful, as it not only helps with account and cash flow management, but also with regulatory compliance and tax payment. Additionally, some software can help with logistics, tracking and minimizing production costs, and improving farm profitability. The price/quality ratio of such tools has improved over time, in accordance with Moore's law.²

The management of new digital tools requires administrative capacity and access to funding for the purchase of hardware (FAO, 2019a). In the developed world, high rates of tool use are reported in agriculture. In the United Kingdom of Great Britain and Northern Ireland, for example, in 2015, 49 percent of farms reported the use of tools for strategic decision-making, a proportion that is likely to have increased in recent years. Users value their usability, cost-effectiveness, relevance and compatibility with other systems and regulations (Rose *et al.*, 2016).

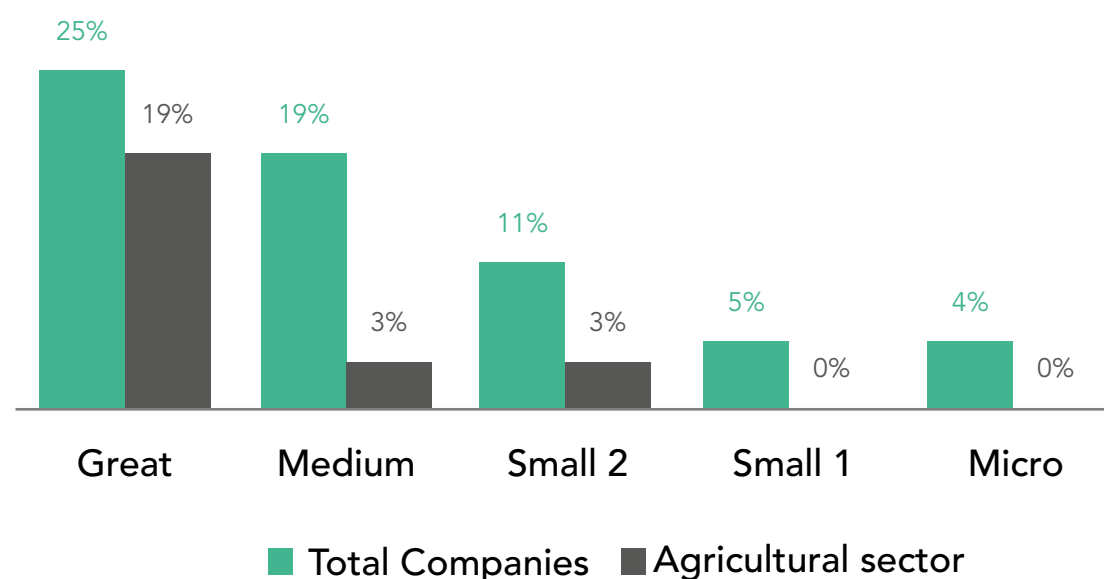
In the implementation of this type of tool, it is important that online procedures – such as digital banking, online tax payments, municipal procedures, access to state subsidies, and electronic invoicing, among others – allow for the bridging of access gaps (distance and cultural).

To ensure that no one is left behind, it is necessary to ensure that small agricultural producers, despite poor technological infrastructure, high costs of technology, low levels of e-literacy, digital skills and limited access to services, are able to access this software (FAO, 2019a).

In Chile, for example, the improvements to software reported by national companies can be seen. The larger the company, the greater the improvements it reports (INE, 2015).

There is no doubt that the challenge in the coming years will be to generate and analyse massive data. This is also the next step for the agrifood system (Lezoche *et al.*, 2020).

Figure 3/ Companies reporting software improvements by size in Chile (%), 2015



Source: FAO, based on data from the Chilean National Institute of Statistics (INE, 2020)

² The direct consequence of Moore's Law is that prices go down while performance goes up.

5. Off-farm digital technologies



5.1. Electronic commerce (e-commerce)

Agricultural e-commerce has been on the rise worldwide, stimulated by an increased use of mobile devices, access and improvements in Internet connectivity and, to a large extent, process innovation. The phenomenon is causing positive disruptions in value chains, allowing, on the one hand, better access to markets and better prices for producers; and, on the other, consumers to access fresh products at better prices. Before the pandemic, a sustained growth in e-commerce could be observed in Latin America and the Caribbean. It is estimated that the consumer market under this mode in the region reached an average of 17 percent of the population, highlighting the cases of Argentina (29 percent), Chile (28 percent) and Brazil (26 percent) (Bravo, 2018).

Agricultural e-commerce and "hyperlocal" supply chains have increased sharply during the COVID-19 pandemic, primarily to fill the gap in essential food supplies. During the pandemic, business-to-consumer (B2C) and business-to-business (B2B) e-commerce platforms have partly addressed access to perishable products such as fruits, vegetables, dairy products, meat, fish, and semi-prepared and prepared foods. In fact, B2C e-commerce has had a special increase, both in its mobile e-commerce modalities – meaning, carried out from web platforms or applications dedicated to this end – and social e-commerce, which uses a social network as a marketing platform. This type of food requires a very agile process that is logistically efficient.

The four main components of the e-commerce ecosystem are:

- platforms (Amazon Fresh, JD.com, for example);
- electronic payment systems or payment transfer intermediation (via credit/debit card, cash);
- the logistics; and
- the legal and regulatory frameworks in force.

In addition to these four factors, as a challenge, the states should promote a fair and healthy e-commerce in the current global context.

Investing in the creation of digital platforms with related services (inputs, finance, storage, logistics) will help keep e-commerce solutions active. To facilitate linked services, it is essential to work with the diversity of stakeholders, designing platforms that have multiple access routes, which must interoperate and concentrate data from various types of devices and information systems in real time.

With respect to legislation and/or regulations, two of the main e-commerce regulatory challenges lie in payment processes and mechanisms, and the development and implementation of logistics. In this last aspect, the application of food safety and traceability standards are particularly sensitive. Enabling policies and regulations on "mobile money" or digital payment systems will help expand digital markets and e-commerce for agriculture. In addition, the legal frameworks regulating the activity must be adapted and modernized to encourage the adoption of e-commerce by stakeholders in the food system.

On the other hand, the capacity of various actors in the agricultural value chain needs to be strengthened, particularly in the addition of on-farm and off-farm value, including packaging. It is important to invest in capacity building to manage fresh produce logistics, a critical point in the process.

In the current context, states and governments can be strong promoters of inclusive e-commerce by taking some measures such as those detailed below.

- **Implement information monitoring systems**, such as meta-search for price comparisons between different online food suppliers, or directories of Micro, Small and Medium Enterprises (MSMEs). This will help consumers make correct decisions, inhibiting episodes of price speculation.
- **Develop programs for conversion to e-commerce – online to offline migration (O2O) of micro, medium and small enterprises (MSMEs) in the food sector**, including, as well, producer organizations (production cooperatives, trade associations) and consumer organizations (consumer cooperatives).

Its design must address the main gaps to add this type of sales: lack of investment in logistics, deficit in processes, and organizational structure, coupled with a low qualification of human resources, low availability and high cost of investment in technology to implement the systems, maintenance, among others (IDB, 2020). This must be accompanied by initiatives to improve processes associated with e-commerce, at critical points such as customer information, product tracking, real-time information on stock availability; hygiene and cleaning measures taken in relation to the pandemic, and diversification of the supplier portfolio, among others. Another necessary action is to create incentives for the formalization of intermediary companies, especially those under the e-commerce social modality.

- **Concerning large retail companies** linked to the electronic food market, it is recommended that the states advise, train and provide nutritional guidance to discourage the supply of processed and ultra-processed foods, to the detriment of fresh foods. The food guides that many countries have can be a useful tool for these purposes. This aspect is also very relevant to be addressed with food e-commerce intermediary platforms (such as UberEats, Rappi and other delivery platforms), since there has been an increase in the demand for food considered unhealthy in some countries (La Tercera and The New York Times, 2020). The state should also create incentives for large retail companies to integrate MSMEs and small family farmers into their supply chain. Public-private partnerships can be a good way to support these processes.

5.2. Logistics

The use of digital technology applied to logistics management in the agrifood system chain requires precise interactions, since the profitability of the sector depends largely on the ability to accurately place a product in space and time.

Digital applications in logistics include those technologies that allow real-time quantification of stocks, product tracking throughout the chain, and contributions to the efficiency in transport, among others.

Blockchain or decentralised accounting systems have great potential for application in agrifood system logistics, in the use of intelligent contracts, traceability, certification and digital payments, for example. Blockchains can improve traceability in supply chains, through connections between inputs, producers and buyers (AIMS, 2019).

Some improvement methods in logistics are the two-phase solution approach, capacity analysis, multi-target optimization, two-tier location routing problem, sustainable supply chain network design, quality security control systems, enterprise resource planning (ERP) systems, automated information systems, and digital control systems, among others (Lezoche *et al.*, 2020).

The application of digital technologies in logistics represents an opportunity for entrepreneurship. In Indonesia, for example, the KARGO company offers logistics services to improve the resilience of supply chains, using state-of-the-art technology to connect more than 50 thousand transport vehicles (Oxford Business Group, 2020). During the current pandemic, KARGO has worked to ensure the health of workers in the sector, establishing sanitation sites and the use of electronic vouchers to minimize human contact (Oxford Business Group, 2020).

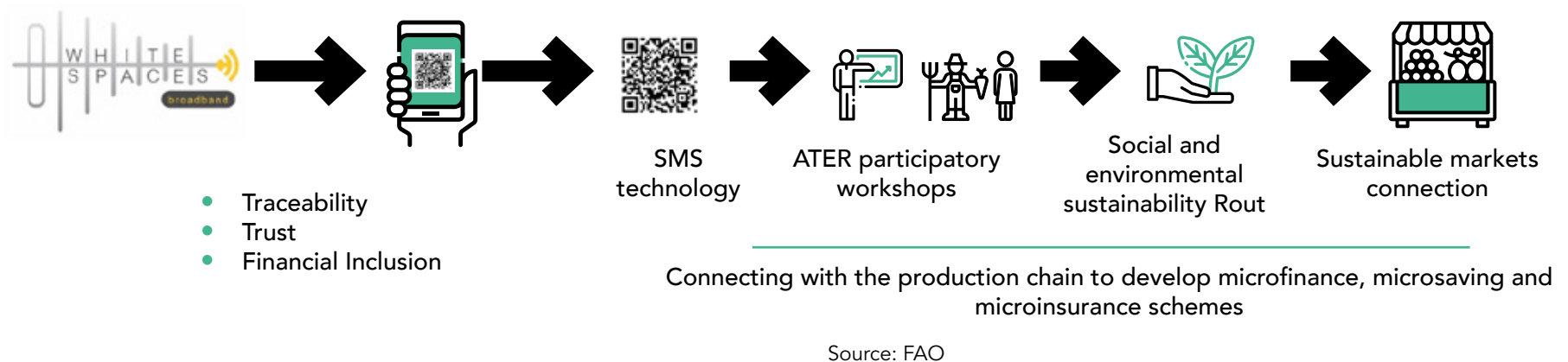
5.3. Digital financial services and insurance

Digital Financial Services (DFS) can help address chronic challenges in the value chain, especially when solutions are needed that the traditional sector cannot fully address, as in the case of rural markets. This is due to high infrastructure costs and lack of incentives to adapt products to the unique needs of farmers. Digital finance improves access to the formal financial system, taking advantage of digital and cellular infrastructure and the advent of branchless banking (USAID, 2016). This can be particularly useful in rural areas and when external situations, such as the COVID-19 pandemic, prevent access to financial branches.

Digitalization of agricultural value chain actors is the first step towards achieving financial inclusion in communities. When farmer profiles are combined with satellite images, weather stations, innovative sensor networks, digital warnings and big data analysis, innovative insurance and financing products can be created. However, poor financial education makes it difficult to include smallholder farmers in financial systems, an issue even more prevalent among women. The Latin American Development Bank, (CAF) warns that financial institutions often do not offer products appropriate to women's needs and that women have low levels of financial education compared to men. Therefore, it is essential to invest in the creation of entrepreneurs or rural agents who help producers and rural communities to digitize the last mile in agricultural value chains. This also requires the participation of a variety of commercial and non-commercial actors, including

commercial banks and rural savings and credit banks or cooperatives, as well as private equity funds with smart money or angel investment for rural ventures, including crowdfunding initiatives.

Figure 4/ Integration of Mobile Network Operators and the Internet via White Spaces



Mobile Network Operators (MNOs) generate the appropriate ecosystem for DFS initiatives to be incorporated into the region's rural territories, providing solutions to the "digital blackout" of family farming. The main efforts must be governmental, and these include, among other actions, promoting free end-to-end messages or reverse charge SMS on mobile terminals via text messages, a channel that has motivated the digitalization of financial services. Innovations in rural connections are also recognized, such as the *White Spaces TV* (TVWS), where companies like Microsoft have promoted and achieved, together with governments, greater connectivity in countries like Jamaica and Colombia.

There are more innovative solutions, such as FinTech's, which develops peer-to-peer (P2P) loans that link online lenders and borrowers. Crowdfunding or microlending initiatives are pending regulation and expansion in the region's countries. A2CENSO has been a milestone in the formalization of the strategy in Colombia, where financing is done on a profit-sharing basis depending on the project.

As agriculture is a sector highly exposed to climate threats, the digitalization of agro-climatic risks has been a major advance for the development of agricultural insurance and risk definition in agrifood businesses. Parametric agricultural insurance illustrates this point with low premium cost that uses satellite images, drones and validation for agricultural producers to manage their agricultural risks through risk maps, such as those offered by Mapfre and designed with brokers such as AON.

COVID-19 can be seen as an opportunity to accelerate the digitalization of the microfinance industry and the insurance sector, and to consider pandemics as part of a risk that the industry could face more frequently.

5.4. Building blocks to sustain a digital ecosystem

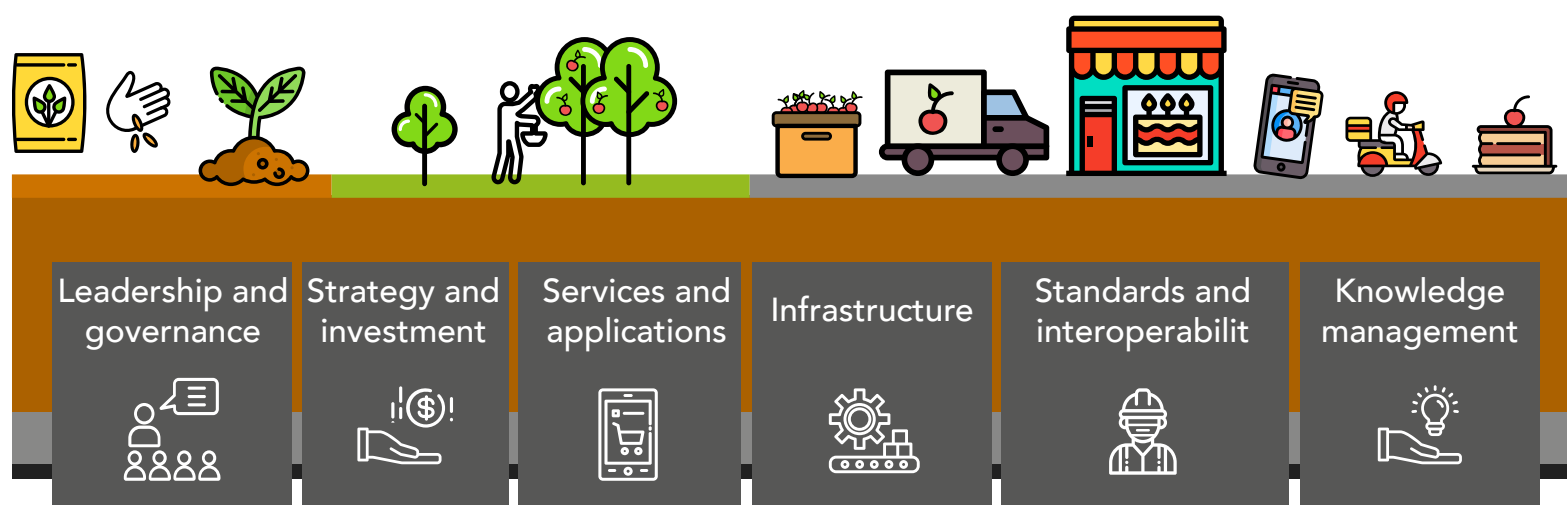
The digital transformation needs a People, Process and Technology (PPT) approach to help organize the key building blocks needed to maintain solutions for agrifood value chain actors.

The COVID-19 crisis forces companies to examine suppliers, assess which ones are most likely to be affected, which ones are vital to ongoing business operations and where to urgently reduce any risks posed by these connections. The crisis is fertile ground for misinformation and rumours, so agribusiness actors need to ensure that they are clear about the measures they are taking to manage the impact of the pandemic, which requires scenario planning.

A study by the Food and Agriculture Organization of the United Nations (FAO) entitled *Blockchain for agriculture. Opportunities and Challenges*, part of the *E-Agriculture in Action* series, reports on sixty projects that are using blockchain technologies in agriculture that can be applied in this crisis. It mentions EthicHub, an initiative to give small producers in Mexico access to financial services, supported by BIDLab, which in turn is an innovation platform that brings together public and private interest and technical cooperation.

Digital agriculture strategies are helping to rationalize resources (both financial and human) and comprehensively address the opportunities and challenges of ICT, mainly as a support for decision-making. Artificial intelligence such as ec2ce seeks to integrate agricultural ecosystems in Peru and Argentina with proposals based on mathematics, predicting production, crop quality and commodity prices. Everything is based on a technology that learns from the past and from current situations in order to predict the future, with the aim of increasing profit, moving from a precision agriculture, with a lot of redundant data, to an agriculture of decision-making.

Figure 5/ Building blocks for a sustainable digital agroecosystem



Source: FAO

The pandemic has required farmers, food processors and distribution channels to comply with protocols to reduce transmission routes and ensure consumer protection. Adding digital partnerships allows auditing and origin processes in seconds instead of days, contributing to compliance, safety and confidence among users and consumers.

In Central America, the *Civitas* app by startup Emerge would potentially improve security and reduce waiting times in stores by reducing meetings in small spaces, which reduces the likelihood of contagion. IBM is working on building a resilient food distribution model, called IBM-Food Trust, which will allow origin logistics tracking at no cost until 20 August 2020.

The capacities to implement building blocks, in addition to requiring the tool development or acquisition, requires investment in human capital, and improving the capacities of all those involved in agricultural value chains. Developing digital and financial literacy is key to bringing rural communities into the digital ecosystem.

6. On-going initiatives in the region



The following are some of the experiences and conversations that have taken place with actors in charge of outstanding initiatives in the region. Some of them have been in place for years; others have emerged because of COVID-19.

Costa Rica

Cooper Borbón Consumer Cooperative
(<https://mercadoborbon.odoo.com/>)

Keywords: cooperativism, supply chain, fair trade, e-commerce

Cooper Borbón started its activities as a cooperative in 2015. To date it has 150 members and has an urban supply market called Mercado Borbón – which has 270 stores and 900 employees – located in San José, the capital of Costa Rica. Mercado Borbón has a history of more than 60 years and has been a pioneer in the country's supply chain. In 2018 it started an e-commerce pilot project through a web platform, which was consolidated at the end of 2019. Currently, as a result of the contingency caused by COVID-19, they have been protagonists in the Costa Rican supply chain: their online sales system offers fresh products (produced by members of the cooperative and external suppliers), respecting existing sanitary restrictions. The platform also expanded its marketing channels to telephone and WhatsApp, to serve an older population that preferred that mode of service. In these times of COVID-19, the Mercado Borbón Virtual platform has become a valuable tool not only at the associative level, but also at the country level; being part of the food supply solution of many Costa Rican families.

Colombia

La Canasta agroecological direct-to-home market
(<https://la-canasta.org/>)

Keywords: agroecology, fair trade, supply chain, family farming, sustainable development, e-commerce

This initiative arises in 2012 as a connection between rural producers and urban clients who need to supply themselves at home, based on sustainable food production as a generator of good living. Therefore, they promote agroecology, protection of biodiversity and its ecosystems, conscious, local consumption of native food. The network connects small producers and consumers through a virtual platform, facilitating access to agroecological food in the city, generating minimal food and packaging waste, and seeking alternatives for the value chain to have a low carbon footprint. The price they charge per basket considers home delivery, logistics, accompaniment and training for producers. In La Canasta, unlike most other offers in the market, the producers in the network are part of the organization and receive permanent accompaniment and advice from the team. Besides, they promote participatory dialogues through a Participatory Guarantee System (SPG, by its initials in Spanish), in which members are part of a feedback process in agroecological production. This means that there is a close relationship between the producer, the consumer, and the market promoters, to generate common language and objectives, work for the common welfare and the sustainability of the production, consumption and marketing processes. At present, they are a supply option that promotes fair trade, family farming and solidarity economy.

Chile

Online farmers' market

(<https://www.indap.gob.cl/covid-19/mercados-campesinos-online>)

Keywords: family farming, supply chain, fair trade

Virtual platform for promoting family farmers' enterprises promoted by the Agricultural Development Institute (INDAP, by its initials in Spanish) of the Chilean Ministry of Agriculture as a result of the current COVID-19 contingency. The platform has the function of promoting contact details of family farmers through a specific directory for each region of the country. The initiative aims to connect family farming producers with potential customers by sharing the directory on its website, becoming an innovative option for supply through fair trade and the promotion of family farming. It should be noted that the platform is not designed for online marketing, but for the dissemination and promotion of family farmers. The logistics and management of the purchase is in charge of each farmer.

Argentina

Del Beep al Click digital services platform, GS1

(www.gs1.org.ar/Site/delbeepalclick.html)

Gabriel Melchior

Communication and Marketing Manager
GS1 Argentina



delbeepalclick
Preparate para lo que viene

Excerpt from Interview: *"I believe that the COVID-19 contingency has mobilized a sum of actors who want to help SMEs, harshly affected by the pandemic. The way forward in the face of this reality is adaptation and preparation for what will follow, working in collaboration to provide new services, and speed up migration to e-commerce, which will ensure business continuity and maintain the main economic income".*

Brazil

AgroTrace agricultural solutions

(www.biosistemico.org.br/es/)

Keywords: agricultural production, sustainable agriculture, traceability, smart agriculture

AgroTrace was founded in 2016 by the Brazilian Biosystemic Institute to support the qualification and development of producers, offering a digital service technology solution for rural producers interested in good agricultural production practices. AgroTrace provides reliability to the production process, delivering data accuracy, information speed and practicality for the technical advisor. In 2018, at the request of private companies, they implemented the qualification functionality for agricultural product suppliers, structured on the basis of sustainability and quality programs, which serve more than 200 farms in Brazil annually. This functionality makes it possible to monitor activities based on a production standard and good practices defined by the client or project and can be used for any culture. The most updated versions allow producers to self-assess and therefore provide remote assistance to guide the correction of observed non-conformities. AgroTrace is a technological tool that can help technical advisors to do their job more efficiently; project managers to visualize the whole system, standardize processes, identify problems more assertively, and develop action plans more quickly and efficiently; producers can have a quick access to problem solving and security for production development.

Priscila Callegari e Luis Henrichsen
Director of Agriculture and Corporate Director
Agrotrace - Instituto Biosistêmico

Extract Interview *"We note that the pandemic is accelerating access and consultation for the implementation of remote services. Because of our experience and based on this established platform, we were able to meet the needs of other production chains based on supplier qualification programs, such as milk producers. Agrotrace is a tool that supports field assistance for the qualification and development of producers. It allows the identification of problems in a more assertive way and the development of action plans, provides reliability to the process, data accuracy, information speed, and practicality for the technical advisor. With the use of mobile applications, data are obtained and processed with greater speed and reliability".*



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©Luis Henrichsen

Priscila Callegari - Director of Agriculture - IBS
y Luis Henrichsen Corporate Director

Mexico

Preemar aquaculture solutions
(<https://preemar.mx/>)

Keywords: aquaculture, smart agriculture, sustainable agriculture

Young Mexican entrepreneurs developed a device to monitor water quality in aquaculture ponds in real time. This device measures pH, temperature, oxygen, and up to 14 other water parameters, in order to promote early reaction to changes in water quality and prevent the growth of bacteria in the cultures, helping fish farmers to maintain a disease-free environment and prevent production losses. The fish farmer can access this information at any time and remotely through a mobile application and the web platform. Moreover, when a variation in any of the parameters is detected, the system sends the fish farmer a preventive alert so that he can take the necessary actions. This initiative has just won special recognition in the innovation contest #SinDespicioMéxico (<http://sindesperdicio.net/concursos/es/>).

Ecuador

Climate-smart livestock (GCI, by its initials in Spanish) El Ordeño
(www.elordeno.com/)

Keywords: climate-smart livestock, greenhouse gases, carbon footprint, climate change resilience, dairy industry, inclusive model, sustainable development, smart agriculture

Since the beginning of 2019, FAO has established a partnership with El Ordeño, which is being developed under the Climate-Smart Livestock (CSL) approach, with the aim of promoting the capacity development of small and medium sized farmers and their technical teams, to make milk production more productive and sustainable. It also seeks to reduce greenhouse gas (GHG) emissions and to adopt, refine and validate methods and practices that enhance the GCI approach, promoting its national and international scaling up. To this end, El Ordeño has used a series of technological tools that allow for the collection and storage of information in real time, such as Open Data Kit (ODK) and Mobile Data Collection (ONA), which allows for the generation of databases and the conversion of the Excel form to a mobile ODK application to facilitate the collection of information.

Based on the methodology considered for the calculation of direct emissions, the Global Livestock Environmental Assessment Model (GLEAM) developed by FAO and adapted to the reality of Ecuador, the

technical team used R programming language to automate the calculation of GHG emissions at the farm level. For El Ordeño, the adoption of the GCI approach has been a factor enabling it to strengthen its certification as a company that generates a triple positive impact – economic, social and environmental (Company B) – and allowed it to enter the market with a new generation of sustainable food. The experience also allows for the consolidation of knowledge generation and management on the GCI approach in Ecuador, which constitutes a solid platform to influence the sustainability of the Ecuadorian livestock chain.

Ecuador

EAS Think Tank Cacao

Keywords: cocoa production, value chain, communication between actors

Think Tank Cacao is a WhatsApp group created in 2018 to facilitate the circulation of information between stakeholders during the process of formulating the Cocoa Chain Competitive Improvement Plan. This group is coordinated from a European cooperation project that works with the Ministry of Production and the Ministry of Agriculture and Livestock. It is made up of 230 professionals, union leaders, producers, government officials, exporters, industrialists and chocolate makers, all of whom participate individually. Think Tank Cacao is open to all members of the chain and to access it, all that is needed is an interest in participating and respect for certain minimum internal rules. Before the pandemic, the group had been very useful in sharing information on different topics relevant to the development of the chain (prices, technology, traceability, value addition, support to small producers, among others). Today, in the face of the COVID-19 crisis, the group has played a relevant role in coordinating the response of the cocoa chain to the contingency caused by the pandemic. The frequency of messages increased four to five times after 15 March this year.

Panama

Building blocks Food Chain (www.agchain.farm)

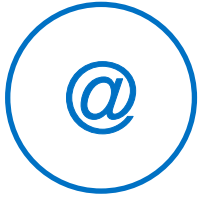
David Proenza
CEO
Foodchain

Extract Interview *"Digitalization has motivated companies to apply technology in order to survive in many cases and, in other cases, to grow and continue to advance in the market, in particular for agriculture. COVID-19 is transforming the way many companies will operate in the future, especially in the primary sector. Many entrepreneurs have started small businesses to deliver food directly to consumers, either through a catalogue via Whatsapp or Instagram, which we consider very positive. The Foodchain is a marketing ecosystem that provides producers with all the mechanisms, services and products to make commercial transactions efficient and transparent for all parties involved, including the final consumer, who will have access to product traceability, will be able to know the producer, his history, and how he produced the product, from seed to final product. It uses blockchain technology to solve the current problems faced by producers such as the many intermediaries, to receive more money for their products, faster payments, trust, total transparency in the entire supply chain, and a reliable and secure traceability to obtain better markets, whether in domestic marketing or agricultural export. The biggest challenge we have is to try to bridge the digital divide with producers of all sizes; however, the percentage of producers who have a smartphone is very high, so we can use it as a tool for producers to access their benefits.*



David Proenza, CEO of Food Chain

7. Resources



In this section, we provide readers with some initiatives available on the web that may be useful to deepen the topics covered in this issue.

La Canasta

<https://la-canasta.org>

Initiative that aims to connect small producers and consumers, facilitating access to agroecological food in the city, following the principles of solidarity economy and fair trade, generating minimal waste of food and packaging, seeking alternatives for the value chain to have a low carbon footprint.



Online Farmers' Market

<https://www.indap.gob.cl/covid-19/mercados-campesinos-online>

Created in 2020 by the Agricultural Development Institute (INDAP, by its initials in Spanish) in response to the COVID-19 contingency, it seeks to promote and publish contact information for family farmers who have products for sale.



Novagric

<https://www.novagric.com/es/>

Providing integrated services for smart agriculture. Novagric can present projects with all the leading agricultural technology that requires an intensive crop equipment with high production, with total respect for the environment, continuous improvements, and transmitting knowledge to human capital and producers.



Cooperative Foods

<https://alimentoscooperativos.com>

Network of family farming organizations and cooperatives that seeks to build solidarity value chains, where producers sell their products, and consumers access the products from their homes.



FREXCO

<https://frexco.com.br>

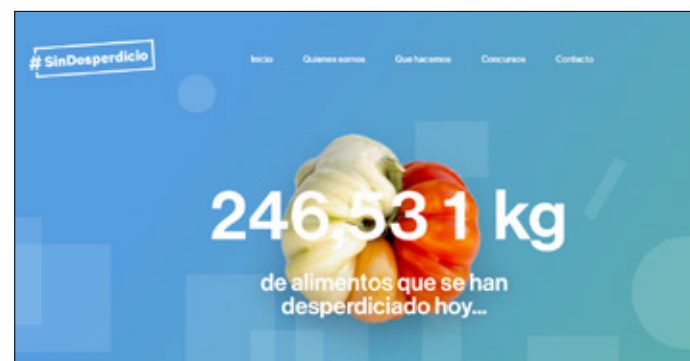
An initiative that brings the city closer to the countryside through technology, establishing a connection between restaurants or individual consumers and local producers, where the restaurants ask for the amount of product they need, the producers harvest, and the product is sent to the consumer.



#SinDesperdicio (NoWaste)

<http://sindesperdicio.net/>

A platform of partners committed to working for a Latin American and Caribbean region without food loss or waste. The region needs more innovation, better public policies and greater capacity and knowledge on the subject. #SinDesperdicio can be part of the solution.



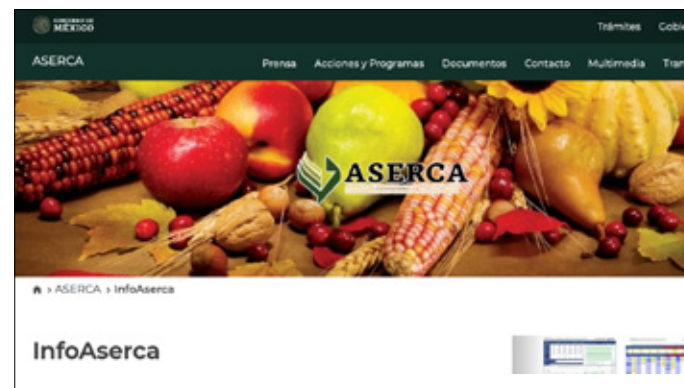
Agricultural information website
<https://portaldeinformacoes.conab.gov.br/>

It aims to provide, in an online and multi-institutional platform, relevant information related to agriculture, food and nutritional security and supply, produced by various agencies and institutions in the sector.



InfoAserca
<https://info.aserca.gob.mx/>

Every day we provide reliable, useful and timely information on the behaviour of national and international agricultural markets in its various forms, as a tool for decision-making by producers, traders and consumers.



Extension and advisory services
<http://www.fao.org/documents/card/en/c/ca8710en>

Agricultural extension and advisory services (AES) play an indispensable role in the frontline response to the pandemic in rural areas. However, to adapt to the emergency context within government regulations, EAS providers must rapidly change the way they operate.



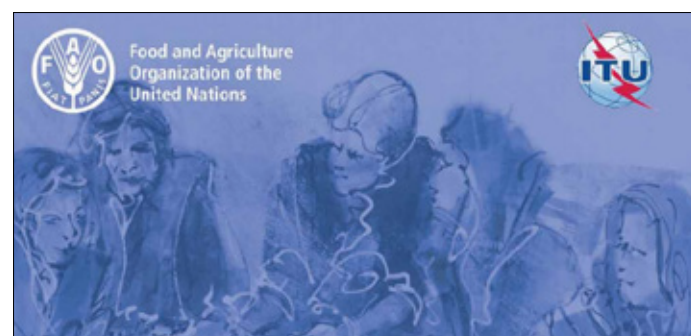
Digital technologies in agriculture and rural areas
<http://www.fao.org/3/ca4887es/ca4887es.pdf>

The so-called "Fourth Industrial Revolution" (Industry 4.0) is causing a rapid transformation in various sectors due to revolutionary digital innovations such as blockchain technology, the Internet of things, artificial intelligence and immersive reality.



E-agriculture strategy guide
<http://www.fao.org/3/a-i5564e.pdf>

This publication provides a framework for countries to develop their national e-agriculture strategies. These strategies would include an e-Agriculture vision, an action plan and a framework so that results can be monitored and evaluated. Like all strategies and plans, the results of these processes are not static and change in the strategic context of a country. It will require a dynamic approach to updating the strategy, to keep it relevant.



Business Roundtable
www.redca.sieca.int

Virtual business roundtable conducted by FAO with the support of SIECA, ALADI and IICA. It is a good way to use digital technology to bring producers, rural SMEs, FF cooperatives, etc. to new markets, and to generate opportunities and promote exports.



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