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TECHNICAL BRIEF

Digital Ecosystem in Guatemala

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Abstract This technical brief provides an overview of the digital development gaps and challenges in Guatemala's agrifood systems. Based on the USAID Digital Ecosystem Framework, 323 actors across 14 types of organizations were identified as digital agrifood innovators in the country. In-depth assessments on challenges and opportunities were conducted on 50 select actors using a new survey instrument, Rapid Screening Tool. We find that Guatemala has a good mix of founders, technical resources, an educated workforce, and a growing tech industry. The government's substantial efforts toward digital society, rights, and data governance were remarkable. However, major challenges constraining digital ecosystems were weak digital literacy, inadequate infrastructure, and low affordability of digital technologies and solutions for both users and service providers in rural areas. We recommend specific actions for CGIAR to support partners in realizing the transformative potential of digital innovations.

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Strengthening Digital Ecosystem in Guatemala

Satish Nagaraji and Andrea Gardeazabal

Data and Methods

This assessment is based on the Digital Ecosystem Framework developed by USAID (2022). The system-level framework allows one to gain a basic understanding of the three pillars of the digital ecosystem: 1) digital infrastructure and adoption, 2) digital society, rights, and governance, and 3) digital economy. The framework also covers cross-cutting topics, such as inclusion, cybersecurity, emerging technologies, and geopolitical positioning. Using the framework, one can evaluate the operating environment of digital innovations and inform the process of designing inclusive, effective, and sustainable digital development activities.

In addition, to understand what types of digital ecosystem actors operate in Guatemala, we interviewed prominent digital innovators in the country, developed a list of digital organizations, and analyzed the content of their organizational websites to extract digital-relevant keywords. Through the combined approach (i.e., key stakeholders interviews and the analysis of their organizational website contents), we identified 323 digital ecosystem actors (See Annex 1) across 14 types of organizations (Table 1).

Finally, we designed a new survey instrument, Rapid Screening Tool (RST), and used it to conduct an in-depth digital innovator-level assessment of 50 select

organizations (Annex 2) on their data needs, analytics skills, existing digital innovations and impacts, collaboration incentives, and perceptions about the digital transformation process in the country.

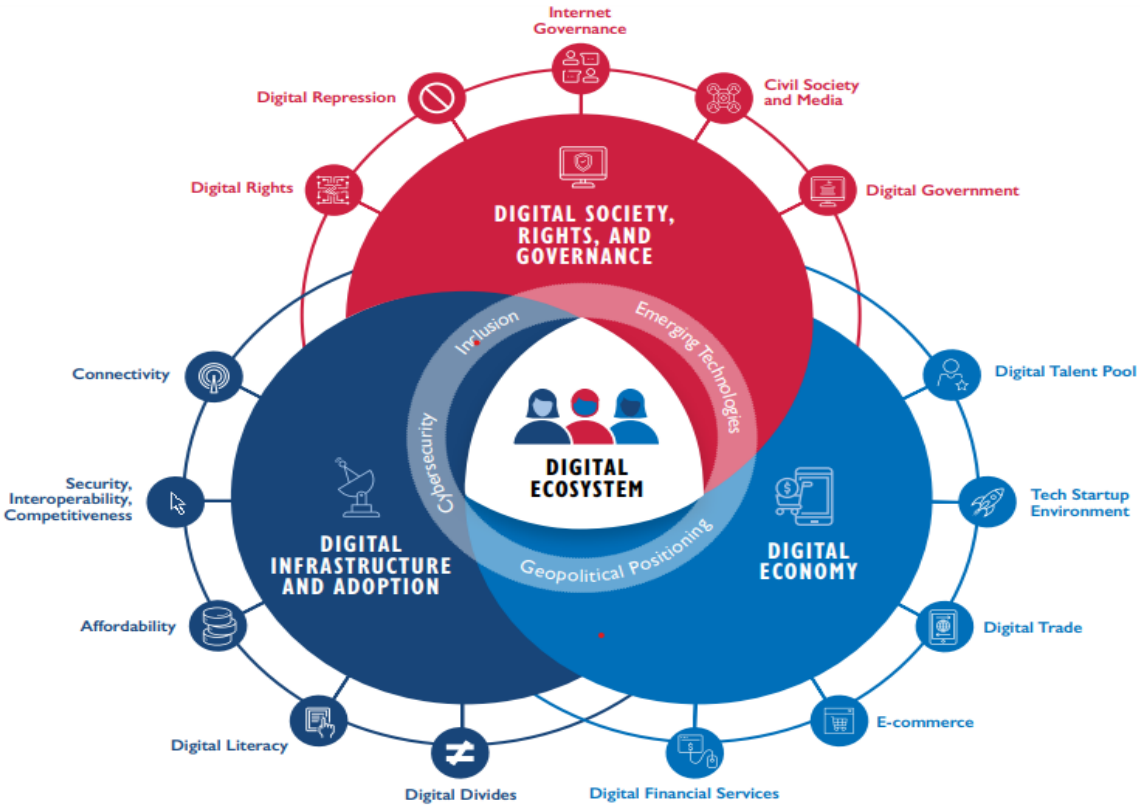

Figure 1 USAID Digital Ecosystem Framework (Source: USAID, 2022)

Table 1 Types of digital ecosystem actors Identified In Guatemala through the RST analysis (Source: authors)

Actor type	Number	Percentage (%)
International agencies and research organizations	35	10.8%
Government (Ministry of Agriculture)	4	1.2%
Government (Other Ministries and Agencies)	26	8.0%
Private Extension Services	17	5.3%
NGOs/CSOs	131	40.6%
Farmer organizations	24	7.4%
Startups (Digital Ag, Fintech)	6	1.9%
Small and Medium Enterprises	5	1.5%
Large industry enterprises	15	4.6%
Financial Institutions	27	8.4%
Input and service providers	11	3.4%
Commodity processors/dealers	7	2.2%
Local universities	12	3.7%
Other	3	0.9%

Digital Ecosystem Characteristics

Digital infrastructure and adoption

Connectivity infrastructure

Guatemala has about 22 million mobile phone subscribers (ITU, 2022). About half of the population (50.8%) uses the internet. Per 100 inhabitants, 3.5 use fixed broadband, and 17 use mobile-broadband internet (ITU, 2022). About 87% of households own mobile phones (ITU, 2022). Guatemala is lagging in the expansion of broadband Internet connections. Only 4% of internet users have their own fast Internet connection.

With an average download speed of 26.01 Mbit/second for fixed network broadband Internet, Guatemala ranks 119th. However, the upload speed was significantly lower, at only 9.4 Mbit/second (130th place). In mobile internet, that is, connection with tablets and smartphones, Guatemala ranked 78th with 24.19 Mbit/second in download. The upload speed of about 16 Mbit was enough for 20th place. This ranking is conducted by the Speedtest Global Index published by Ookla in October 2022 for 180 countries (Datosmundial.com, 2022).

Guatemala is lagging in the expansion of broadband Internet connections. Only 4% of internet users have their own fast Internet connection, which is at least faster than the old ISDN (more than 256 kBit/s). Here all permanent connections via DSL, cable, or satellite have been counted, but not those connecting to the internet via mobile radio (Datosmundial.com, 2022).

Among the interviews conducted with key stakeholders, the lack of infrastructure came out as the more frequently mentioned challenge (19%) to overcome in order to achieve the digital transformation required in Guatemala.

Security, interoperability, and competitiveness

This topic addresses the basic features of a healthy telecommunications market, where government regulation is used to ensure secure, trustworthy networks and to promote competition that drives innovation and lowers costs. In the case of Guatemala, after Telefónica left the country, the telco operation remained in the hands of América Móvil, and the outpost of Tigo (Millicom), which was left with full control of Comcel by the end of 2021, the Guatemalan market once again faces a process of rearrangement where Claro (América Móvil) and Tigo will compete practically on an equal footing in the different services. Claro now concentrates 44.1 percent of mobile users, while Millicom continues to lead the market with 55.9

percent of mobile lines. The same competitive scenario will also occur in the fixed segment, although in this case, it is América Móvil that dominates the market.

The promise to launch the auction of spectrum in AWS continues to be delayed. The delivery of additional spectrum is key for a market that has few frequencies assigned to mobile operators. Until now, Guatemala had 210 MHz delivered for mobile services, less than 16 percent of what is recommended by the International Telecommunication Union (ITU).

Affordability

Affordability measures the cost of connectivity relative to local income. Data plans and internet-enabled devices are not affordable for the poor in Latin America. In Guatemala, 1GB of mobile data costs somewhere around 4% of the average monthly income, well above the International Telecommunication Union's 2% affordability threshold. In addition, the cheapest basic smartphone available costs between 4 and 12% of the average household income in much of the region and as much as 31-34% for people in Guatemala and Nicaragua (Alliance for Affordable Internet, 2017). With these cost burdens weighing disproportionately on vulnerable populations, uneven digital access could give rise to new forms of inequality in what is already the world's most unequal region (World Bank, 2021).

The third challenge identified (11%) within the conducted interviews was the cost and affordability of digital services for both users (farmers) and service providers (startups, small and medium private companies, etc.).

Digital literacy

Guatemala, with a population of 15.47 million, has an illiteracy rate of 17% (World Bank, 2021) and 68% of digital illiteracy (Cronica, 2016). Three main challenges were

identified within the conducted interviews related to digital literacy: analytics capacity (12%), local capacity (14%), and awareness (10%), which together sum 36%, meaning this is the major challenge identified by local stakeholders in Guatemala. Very little information can be found related to metrics on digital literacy. However, several programs, available materials for training, and non-profit organizations fully dedicated to this issue are very common. Some examples of these include

Digital divides

According to the Digital Quality of Life Index (2022), Guatemala was the country where Internet access grew the least during the COVID-19 pandemic. Tackling the digital divide is imperative and will require policy actions to reduce cost, expand access, and incentivize greater private-sector and citizen participation (World Bank, 2021).

Common rural difficulties are made even more difficult for female producers by the fact that, in comparison to their male counterparts, they face greater informality, lower market access, and greater information gaps, which are made worse by stifling social norms and a lack of empowerment. In rural Guatemala, traditional gender roles predominate, and the probability that women are the ones preparing/transforming food is very high, but not for a commercial purpose. Although women are increasingly involved in all agricultural tasks, their participation in them is often informal and unpaid (World Bank, 2022).

Regarding digital, Guatemala registers one of the largest gender gaps (over 10 percentage points) in Internet access and mobile phone ownership and use (UN/CPAL, 2022). Data from the 2018 census showed that the gender gap in rural sectors, where there is less penetration of digital technologies, is even greater than in urban areas. In the Department of Guatemala, 80% of men and 78% of women

use cell phones, and the differences in favor of men regarding computer use (47% compared to 42% for women) and Internet access (57 % compared to 52% women) are not very big. In contrast, in Verapaz, a highly rural department, 50% of men use cell phones, while this is the case for only 32% of women, and the gap is further exacerbated for indigenous peoples (IICA and IDB, 2020). The lower income of women —or the lack of their own income— is a relevant factor in explaining the digital divide. A study carried out in six countries in the region (Argentina, Colombia, Ecuador, Guatemala, Paraguay, and Peru) showed that the cost of these technologies is the most relevant obstacle for more than half of the women (52%) and a figure somewhat lower in the case of men (46%) (Agüero et al., 2020).

Digital society, rights, and governance

Digital rights and digital repression

There is no specific legislation in Guatemala regarding digital rights; however, the Guatemalan Constitution protects the inviolability of correspondence, documents, or books (Art. 24) where digital documents are considered; access to state files and records (Art 31); and freedom of thought (Art. 35). copyright is also regulated regionally, and Guatemala has basic telecommunication dynamics regulated by the General Law of Telecommunications (Dec 94-96). Cybercrime is considered under copyright law, including misuse of historical information and existing software.

Internet governance

At the regional level (Latin America and the Caribbean), the key organizations regarding Internet Governance are LACNIC, the Internet Address Registry for Latin America and the Caribbean; LACIGF – Latin American and Caribbean Internet Governance Forum and the LACTLD, the regional organization coordinating joint

policies, as well as strategies for the development of domain names at the regional level. Specifically, in Guatemala, most of these activities move around forums, workshops, and materials to create awareness, start conversations on how this should look in the future, and share existing knowledge.

 Digital government

Guatemala adhered to the Open Government Partnership -OGP- established on July 27, 2011. Since then, the government has kept the commitment to set up Digital Government plans and dedicate resources to them. As stated in the End-of-Term Report 2016-2018, after seven years of implementation, the greatest advances were registered regarding fiscal and budgetary transparency, as well as in the commitments that were implemented at the local level. However, the process of monitoring and implementing the commitments was affected by tensions between the government and civil society organizations. Improving collaborative relationships, as well as strengthening the design and impact potential of the commitments, are challenges that remain pending.

Digital economy

 Digital talent Pool

In a regional study conducted by Microsoft, among small and medium enterprises, Guatemala stands out slightly as one of the countries with the highest prioritization of digital skills and skills for remote work, with 54% and 51%, respectively. As a result of the pandemic, the situation has altered the format and content of the training, focusing on the digitization of employees and remote operations. The education, manufacturing, and health industries are those that report the greatest change in training (Microsoft, 2022).

Four departments and agencies from the Ministry of Agriculture (MoA) were interviewed, including extension services and national research. All of them confirmed they work with primary and secondary data and collect data on paper, which is then transferred to EXCEL. They work with data related to weather, remote sensing, pest and diseases, agronomic and input-related prices, other market data, and socio-economic farmer data. Identified challenges are standardization of formats for data collection, data access, identifying relevant sources, integration of data sources, and trust/reliability/quality of the data. Regarding data analysis, they mainly conduct descriptive and diagnostic analytics, and, in some cases, they can generate predictive outputs.

Similar answers on the type of data and challenges were gathered from other Agencies and Ministries of the government, yet not all of them collect data directly and work a lot more with secondary data.

Regarding private extension services, they all work with primary and secondary data on weather, remote sensing, pest and diseases, agronomic and input-related data, as well as socio-economic farmer data. Also, one of the interviewees reported they work with prices and other market-related data. They all collect high-frequency data. Some of them collect on paper, and three of them use customized digital tools

Finally, farmer organizations reported they work with both primary and secondary data, with very similar data types to private extension services (weather, remote sensing, pest and diseases, agronomic and input-related data, as well as socio-economic farmer data). They collect high frequency on ODK, KoBo, and paper. The interviewees were required to support related to better tools for prescriptive analytics and close connection with cost-benefit dynamics, scenario simulation with risk management, and training to strengthen farmers' ability to make decisions

based on traceability information systems. The main identified barriers are local capacity, digital readiness/infrastructure, awareness, and data collection costs.

Tech startup environment

The Guatemalan entrepreneurial ecosystem presents a good mix of experienced founders, resources, an educated workforce, and a growing tech industry. The recent generation of more refined support programs and the government working actively to coordinate efforts in the entrepreneurial ecosystem has led to a new generation of more sophisticated startups with growth potential. Yet, the country still faces several macro challenges, such as inequality, corruption, malnutrition, and criminality. Interestingly, this is what provides an extra "edge" to Guatemalan-born startups: They're always seeking innovative ways to solve human and social issues that affect bottom-of-the-pyramid (BOP) populations and have enormous expansion potential all over the world. Plus, prototypes and MVPs can be developed at competitive costs as the country has enough critical mass to make pilots representative without breaking the bank. Regarding opportunities, healthcare, insurance, logistics, and tourism are interesting fields where startups are dabbling. With an average of 2M tourist visits per year, the hospitality industry presents a clear business opportunity for economic growth (Startup Universal, 2022).

Guatemala is the second country in Central America (after Panama), with 43% of companies that define themselves as digital natives. In Central America, the food and beverage and construction industries are the ones with the fewest digital native companies. The use of data for business intelligence is becoming increasingly relevant in the work of small and medium enterprises. This is revealed by the Microsoft study, where 88% of Guatemalan companies declared that they

had accelerated the use of data for business intelligence, showing that this trend is greater in larger organizations. It should be noted that 90% of these companies make decisions based on data and implement or plan to implement business intelligence technologies (Microsoft, 2022).

With resources and programs such as Pomona Impact, and the fact that a big part of the economy depends on agriculture, there's an emerging movement to create and support the development of tech startups that resolve agricultural problems through technology. The same sector also supports clean energy-based startups (Startups Universal, 2022). From a recent top10 of Guatemalan startups in 2023 (https://cuantico.la/guatemala-las-10-startups-mas-prometedoras-para-2023), five of them are related to FinTech, and two with food security and agronomic production. Several programs from International Organizations and foreign governments are present in the country to foster local innovation related to agrifood and digital businesses.

Regarding agrifood systems, the following startups were identified as key stakeholders based on their growth and vision for the next five years:

- Red de Empresarios Indígenas (Indigenous Entrepreneur Network): https://reiguatemala.org
- Digital Twin Corporation: https://digitaltwincorporation.com
- Organic Well: https://organicwell.com.gt
- Kilimo+FUNDEA: https://kilimo.com
- SiembraCo: https://siembraco.com