Survey and Workshop on Interconnecting Family Farmers with Consumers through Innovative and Inclusive Digital Platforms

APEC Agricultural Technical Cooperation Working Group

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Acronym list

ACPC	Agricultural Credit Policy Council
ACEF	Agro Climate and Economic Forecast
AEIDL	European Association for Information on Local Development
APEC	Asia-Pacific Economic Cooperation
APP	Application
APTC	Asia Pacific Telecommunity
APV2040	Putrajaya Vision 2040
ATCWG	Agricultural Technical Cooperation Working Group
AUS	Australia
AVA	Agri-Food and Veterinary Authority of Singapore
BAAC	Bank for Agriculture and Agricultural Cooperatives
BCCH	Blockchain Chamber of Commerce
BD	Brunei Darussalam
CAD	Citizens of day
CAS	Certified Agricultural Standards
CC	Climate Change
CDA	Canada
CEPAL	Economic Commission for Latin America and the Caribbean
CGIAR	Consultative Group on International Agricultural Research
CHL	Chile
CT	Chinese Taipei
DCP	Data Collection Platform
DVI	Digital Villages Initiative
FAMA	Federal Agricultural Marketing Authority
FAO	Food and Agriculture Organization
FFEDIS	Farmers and Fisherfolk Enterprise Development Information System
FMNZ	Farmers' Markets New Zealand
GAO	Government Accountability Office
GDP	Gross Domestic Product
GIIN	Global Impact Investing Network
GSMA	Global System for Mobile Communications Association

HKC	Hong Kong, China
ICT	Information and Communications Technology
INDAP	The National Institute for Agricultural Development
IFAD	International Fund for Agricultural Development
IICA	Inter American Institute for Cooperation on Agriculture
INA	Indonesia
INDAP	Institute of Agricultural Development
IPB	Institute of Agriculture
IPCC	Intergovernmental Panel on Climate Change
IPSARD	Institute of Policy and Strategy for Agriculture and Rural Development
JPN	Japan
MARA	Ministry of Agriculture and Rural Affairs
MAS	Malaysia
MDEC	Malaysia Digital Economy Corporation
MEX	Mexico
MIDAGRI	Ministry of Agrarian Development and Irrigation
MoST	Ministry of Science and Technology
NARI	National Agricultural Research Institute
NBSC	National Bureau of Statistics of China
NDRC	National Development and Reform Commission
NZ	New Zealand
ODEPA	Oficina de Estudios y Políticas Agrarias
OECD	Organization for Economic Co-operation and Development
PE	Peru
PH	The Republic of the Philippines
PNG	Papua New Guinea
PPP	Public-private partnerships
PRC	People’s Republic of China
PSAV	Partnership for Sustainable Agriculture of Viet Nam
RDA	Rural Development Administration
RDC	Rural Research and Development Corporations
ROK	Republic of Korea

RSBSA	Registry System for Basic Sectors in Agriculture
RUS	The Russian Federation
SAFEF	Singapore Agri-Food Federation
SAMR	State Administration for Market Regulation
SDG	Sustainable Development Goals
SGP	Singapore
SITMA	System for Traceability of Agricultural, Aquaculture, and Fisheries Merchandise
SNAP	Supplemental Nutrition Assistance Program
SISAP	Supply System and Prices
SSP	Small-scale producers
THA	Thailand
UNDFF	UN's Decade of Family Farming
US	The United States
USDA	United States Department of Agriculture
VMO	Vegetable Marketing Organization
VN	Viet Nam
YA	Young Agrarians

1. Introduction

Currently, there are global trends that influence food security, poverty and the sustainability of food systems. Global hunger -measured by the prevalence of undernourishment- affected around 9.2 % of the world population in 2022 compared with 7.9 % in 2019. That means that between 691 and 783 million people in the world faced hunger in 2022 (FAO et al.,2023a). The population in the world is expected to increase to around 10 billion by 2050 and is also growing older. These new patterns promote pressure on agricultural production, especially in response to the big cities where now more people live (FAO, 2017). Urbanization and ageing have great impacts on food production processes and triggers important repercussions on the agricultural labor force and the socio-economic fabric of rural communities (FAO, 2017).

The pressure in agricultural production is exacerbated by the degradation of natural resources, massive deforestation, water scarcities, soil depletion, high levels of greenhouse gas emissions, shocks and stresses, and loss of biodiversity. There are disproportionate effects of climate change (CC) that affect food security at different levels by disrupting food availability, decreasing access to food, and making food utilization more difficult for the most vulnerable (Brown et al., 2015). Usually, the most affected regions by CC also suffer from high rates of food insecurity, where hunger and extreme poverty are major problems to face (FAO, 2017). Indeed, the Intergovernmental Panel on Climate Change (IPCC, 2022) reported that most of the population in poverty are smallholder farmers whose livelihoods usually depend on climate-sensitive natural ecosystems. They practice semi-subsistence agriculture and extreme natural events can result in hunger and poverty traps keeping farmers poor or making them poorer.

Therefore, food systems face increasing demand to provide sufficient, affordable and nutritious food for a growing population (FAO & IFAD, 2019) and to achieve this goal, agriculture in 2050 will need to produce almost 50 % more food (FAO, 2017). As the Organization for Economic Co-operation and Development (OECD, 2021) pointed out, food systems are expected to deliver on a formidable triple challenge related to ensuring food security and nutrition for all, providing livelihoods to farmers and others in the food chain with rural development, and ensuring environmental sustainability. In spite of this triple challenge in food systems, family farming appears as the predominant form of food and agricultural production in both developed and developing economies, producing over 80 % of the world's food in value terms (FAO, 2014).

Family farmers hold a unique potential to promote transformative changes in how food is grown, produced, processed and distributed, which enhances territorial development (FAO & IFAD, 2019). The world needs family farms to ensure global food security, to care for and protect the natural environment and to face poverty, undernourishment and malnutrition (FAO, 2014). But who are smallholder farmers? Definitions of smallholder farmers vary significantly due to the heterogeneity of the target group. In general, they are a family-owned enterprise that manage small areas of land characterized by family-focused motives such as favoring the stability of the farm household system, family labor for production, and using part of the produce for family consumption (FAO, 2024a). The UN's Decade of Family Farming 2019-2028 (UNDFF, FAO & IFAD, 2019) considers family farming as all types of family-based production models in agriculture, fishery forestry, pastoral and aquaculture, and include peasants, indigenous peoples, traditional communities, fisher folks, mountain farmers, forest users and pastoralists.

Considering the relevant role of family farming in food production, innovation and digitization could be a good ally for the modernization of their systems because it can reduce risks to CC's effect, improve productivity, increase incomes, empower women and youth, and help solve the impending challenge of producing nutritious food for the world's rapidly growing population

(Chandra & Collis, 2021). Although innovation implies a complex process because it means changes and involves many actors as it cannot function in isolation (FAO, 2014). It also keeps farmers informed about weather conditions, input availability, financial services and market prices, and connects them with new customers.

However, the application and dissemination of technologies is changing very fast and represents many challenges as well. It is important to underline that they still carry the risk of aggravating disparities between high income and low- and middle-income economies (FAO, 2017). It requires investing in research and development to respond to real necessities in the field because family farmers are very diverse, and innovations systems must take this diversity into account. It should ensure research, advisory services, market institutions and infrastructure are flexible and inclusive (FAO, 2014). The adoption of technologies in family farming must involves the interest and the action of multiple actors as a combination of: (i) Scientific, entrepreneurial, managerial, knowledge and resources; (ii) Partnerships, alliances and networks; (iii) Routines, organizational culture and traditional practices that encourage the propensity to innovate; (iv) An ability for continuously learning and using knowledge effectively; and (v) Clusters of supportive policies and other incentives, governance structures and a conducive policy process (Hall & Dijkman, 2009).

In this context, this document is part of the Asia-Pacific Economic Cooperation (APEC) and the Agricultural Technical Cooperation Working Group (ATCWG) project 'Survey and Workshop on Interconnecting Family Farmers with Consumers through Innovative and Inclusive Digital Platforms' implemented in Peru in 2024. The aim of the project is to generate information and knowledge on technological platforms that promote and facilitate digital trade, particularly for small-scale producers in the 21 APEC member economies. Overall, the project has 3 main components: i) The develop and application of a survey to collect information on tools and platforms that promote digital commerce for smallholder farmers, ii) The organization of a workshop to showcase tools and platforms promoting the use of information and communication technologies (ICT) among smallholder farmers in APEC economies, and iii) The development of a final report that systematizes, secondary information, the findings from the questionnaire and the workshop results and as an outcome. This systematizes the results achieved throughout the project and fulfils component three.

The methodology followed three methods based on two types of data: secondary and primary. For the secondary data it applied a literature review and consultation of official websites and other platforms to collect and analyze general information about family farmers and digital platforms to have a better understanding of the global context and pre-defined some challenges and opportunities in this regard. In parallel, for the primary data, the methods applied were a survey and a workshop. At the end, the report systematizes the findings of the literature review, the survey and the workshop, concluding with a participatory process to have conclusions and recommendations. Although the document shares important findings about the opportunities in the adoption of digital tools and platforms in small-scale agriculture, such as access to information, reduction of risks and effects of CC, improved production, increased income, empowerment of women and youth, and others. It also shows the challenges in this process, such as barriers in connectivity, access to information, affordability, limited skills, regulatory frameworks, and others.

It is also important to note that the report presented some limitations in the process. Since it tried to promote a participatory approach among APEC economies, active participation of the focal points was expected. However, the survey was unable to obtain responses from the total 21 economies despite the multi communications sent seeking their responses. It also tried to analyze economies that are very different from each other, thus there were challenges related to the contexts and languages barriers. It was complicated to find official secondary information

to complement the analysis because data was in their native languages. In some cases, this problem was solved by direct interviews with the focal points of the APEC economies. But as I mentioned before, communication did not flow in the same way in all cases.

The report's structure is divided into six main sections. First, it presents the introduction of the topic and some insights around the adoption of digital technologies in family farming. Second, it introduces the background of the topic in the APEC's frameworks and then, it explains an overview based on literature review about the common challenges adopting digital platforms in APEC regions. Third, it shows some examples of platforms that the APEC economies are using to promote digital tools in family farming. After that, the report shares the survey's results analyzing the principal trends and findings captured as primary data from APEC's respondents. Furthermore, it presents the workshop outcome held in Trujillo- Peru on 14 August 2024, with key actors and stakeholders in the topic. Finally, the report concludes with some recommendations.

2. Background and Overview of Common Challenges in the APEC region

2.1 APEC background

APEC is keenly aware of the importance of digitalization and promotion of small-scale farmer inclusive digital platforms in the APEC Economies. In this vein, APEC developed the Putrajaya Vision 2040 (APV2040) to define 3 main economic drivers within its members' economies: i) Trade and Investment, ii) Innovation and Digitalization, and iii) Strong, Balanced, Secure, Sustainable and Inclusive Growth. The second driver underlines the importance of the empowerment of all their people and businesses to participate and grow in an interconnected global economy, fostering an enabling environment that is, among others, market-driven and supported by digital economy and innovation.

Besides the APV2040, APEC also developed The Food Security Roadmap Towards 2030[2] to recognize the need for a whole food systems approach along the agri-food value chain, and that all areas are interdependent and need to be enabled to work together to deliver food security. Leveraging the public- private sector partnership to achieve food security in the APEC region. This instrument defines 3 key actions as follows: i) Productivity, ii) Inclusivity, and iii) Sustainability; and other 2 cross-cutting elements: Digitalization and Innovation, and Smart Goals and Implementation. The Digitalization and Innovation section pointed out that technologies have the potential to transform the food system and enhance food security by increasing productivity and efficiency; minimizing food loss and waste; mitigating and adapting to climate change; and reducing costs and facilitating food trade.

Additionally, The Food Security Roadmap Towards 2030 highlights the importance of the Public Private Partnerships (PPP) committed to working in partnership with the private sector to shape and enhance the functioning of the APEC food system, recognizing the central role of the private sector throughout the food value chain in food production and processing, distribution, trade and investment.

In this regard, this report contributes to the implementation of both frameworks generating evidence about the opportunities and challenges in the adoption of digital tools and platforms for the commercialization of family farmers productions in APEC economies.

[2] APEC (2021) The Food Security Roadmap Towards 2030. https://www.apec.org/meeting-papers/sectoral-ministerial-meetings/food-security/2021_food_security/annex

2.2 Overall Challenges in the APEC Region

This section starts with the statement that family farmers are a very diverse group, and this applies to the APEC region, where smallholder farmers have different dynamics and any decision making that involves changes for them, must take this diversity into account (FAO, 2014). Hence, a one-size-fits-all approach can't work with family farmers and their systems. It is fundamental to consider how they are experimenting with innovation in their territories, what resources they have and for sure, what are their limitations (Raggi, 2021). Because family farmers are adapting, developing and adopting sustainable, affordable, and context specific technologies to cope with complex challenges (FAO, 2024c). But, for any innovation to become widely adopted by smallholders, there must be a good match between the properties of the innovation and the goals, objectives, and constraints faced by farmers (Rural 21, 2021).

Agricultural innovation systems are defined as "a network of actors or organizations, and individuals, together with supporting institutions and policies in the agricultural and related sectors that brings existing or new products, processes, and forms of organization into social and economic use" (FAO, 2019). Digital platform is defined as any digital interface that generates economic and/or social value that intermediates between three distinctive agents (the owner of the platform, the provider of labor services, and the final user of the goods and services produced) and it provides services and/or tools (OECD, 2023). Both seem to be complex initiatives that involve interaction between various actors. They encompass relationships between organizations, institutions and socio-economic structures at different levels. These include the private sector, producer organizations, research organizations, extension and advisory services, universities, tertiary and vocational education institutions, governments, civil society organizations and others (FAO, 2019).

Digital tools have demonstrated their potential to provide food systems with timely insights and services that can improve productivity and profitability, increase resilience to climate shocks, and promote environmental sustainability (CGIAR, 2023). They can cover many aspects of food systems and help households to fight hunger and poverty (FAO, 2024c). However, there are concerns around the digital divide, inadequate information systems, and limited capabilities in low- and middle-income economies to fully benefit from these initiatives (CGIAR, 2023). Some experts stressed the need to "democratize" access to new technologies, ensuring that they are not exclusively available to large agribusiness corporations or companies (IICA, 2021). To achieve a real democratization of digitalization in family farming there are many challenges to deal with.

In this regard, a set of broad common challenges in APEC economies is provided in the lines below to organize five categories as barriers that smallholder farmers face using or implementing digital platforms or tools.

2.2.1 Connectivity and Access

The potential of digital technologies is clear, yet their reach is not universal. The Global South — and especially women and rural areas — is underserved by digital technologies and infrastructure (CGIAR, 2023). The usage gap represents people who live in areas with mobile coverage but do not have access, often due to handset or subscription costs, digital skills, literacy, trust, and safety, which are even bigger barriers to adoption amongst women (The mobile gender gap report GSMA, 2020). What is needed? New flexible technology solutions with low-cost Internet access Chandra & Collis, 2021). For doing that, access to affordable technology and interconnectivity is needed in the territories.

2.2.2 Affordability

Smallholder farmers are financially constrained. Consequently, digital solutions for them need to be affordable. Furthermore, digital solutions must be easy to use and intuitive to access. What is needed? New techniques need to be developed to accomplish the same task as expensive devices but at a low cost. In some cases, technology can be replaced using less-costly manual components or adopting creative service-delivery business models (Chandra & Collis, 2021).

2.2.3 Literacy and Skills

Digital literacy and skill levels across the Global South remain low, particularly for the most food insecure communities, such as rural women and youth (CGIAR, 2023). Many farmers in Low- and Middle-Income Economies (LMIC) are still not literate, and their technology skills are low. The GSMA (2020) cites literacy and digital skills continues to be the main barrier to use devices and platforms. What is needed? Technologies to translate insights and to make them usable by smallholder farmers (Chandra & Collis, 2021).

2.2.4 Timely and Relevant Information

Access to timely, reliable, and actionable information is a major challenge faced by decision makers in the different economies. Information systems often lack integration with pertinent analytics, resulting in limited utilization of data and knowledge for decision-making and impact (CGIAR, 2023). Relevance is one of the barriers to adoption of services. One way to ensure information services are more relevant is to base them on timely and spatially relevant data. What is needed? Higher resolution and more timely data, information, and insights at an affordable cost, are required to enable smallholder farmers to be more precise in their operations and more resilient to climate-induced and other shocks.

2.2.5 Data Trust and Security

Despite the need to obtain more data about smallholder farmers, there are stakeholders collecting information about agriculture in LMIC. This information must be protected and backed up by secure systems that ensure its proper use. What is needed? Research into secure data platforms, peer-to-peer and privacy-preserving data-sharing models, and data marketplaces will provide stakeholders with choices about how to share data with appropriate protections against misuse, and within privacy and consumer protection laws (Chandra & Collis, 2021).

3. Examples of Digital Platforms in the 21 APEC Economies

Despite the challenges, there has been a remarkable development in digital technologies linked to family farmers which promote a better commercialization of their production in the APEC's economies and here there is a list of some examples per economy.

It is important to note that the information in this section is based on secondary information as a catalogue of platforms. In some cases, this systematization faced some inconveniences due to language barriers or access to repositories. Additionally, some platforms do not have family farmer's products as their unique target for commercialization. Instead, they have a much more open categories for their online webs. Nonetheless there are at least 40 platforms listed.

3.1 Australia (AUS)

Table 1 *Demographic and Socioeconomic Profile of Australia*

Category	**Information**
Total population	26,638,544 [a] (2023)
Population by gender M/F	M: 49.66%[b] / F: 50.34%[c] (2023)
Population rural/ urban	Urban: 86.62%[d] / Rural: 13.38%[e] (2023)
Access to connectivity (Individuals using the Internet (% of population)	96.24%[h] of population with internet access (2021)

Source: World Bank(2023a) [a], World Bank(2023t)[b], World Bank(2023u),[c] World Bank(2023v)[d], World Bank(2023w)[e], and World Bank (n.db)[h].

Small-scale agriculture is key in the rural economy and food security, but it is challenged by a variety of factors, such as climate variability, droughts, wildfires, competition from international markets, and more (Brown et al., 2020). These impact on fair pricing and sustainability. But there are more challenges such as the adoption of new technologies and financing for modernization because of a lack of resources and knowledge. Despite these challenges, numerous initiatives are supporting small scale farmers.

Austrade, Open Food Network, AgriDigital, and GrowAgriFutures promote the adoption of digital and sustainable agricultural practices, thereby facilitating digital trade and bolstering support for small-scale farmers.

Austrade https://www.austrade.gov.au/

It provides online resources and services to help Australian farmers export their products internationally. It also offers financial assistance, information about export opportunities and promotion of products abroad (Austrade, n.d.).

Open Food Network https://about.openfoodnetwork.org.au/

It is an open-source platform that helps create new supply chains, which are accessible and efficient for food producers to sell online. Wholesale managers can manage buying groups and stock through networks of food distribution centers and stores. Also, communities can bring together producers to create a virtual farmers market and build a resilient local food economy. Food Connect uses this platform to manage its wholesale operations, serving hundreds of clients weekly, including restaurants and cafeterias, and also offering mixed boxes for retail customers with optional add-ons each week (Open Food Network Australia, n.d.).The key actors involved include local food producers who can sell their products online, wholesale managers who organize and manage buying groups, and communities that can set up virtual farmers' markets. Food Connect, a significant participant, uses the platform to manage its distribution to both retail and wholesale clients.

The Open Food Network is an open-source platform that helps create new and ethical supply chains by making it easy and efficient for food producers to sell online.

AgriDigital https://about.openfoodnetwork.org.au/

AgriDigital is a leading independent software in Australia for digital grain management that offers a platform that integrates inventory, logistics, and financial management in one place. This system facilitates operations for grain companies of all sizes, allowing them to compete effectively and connect with key industry players. AgriDigital aims to simplify grain management by making the digital transition straightforward, using data and insights to create value and enhance the financial performance of grain operations (AgriDigital, n.d.).

GrowAgriFutures Grow https://www.growag.com/

This platform, supported by the Government of Australia, connects users worldwide with Australia's agricultural community. It enables users to find research, relevant knowledge, and business opportunities. This will lead to commercialization opportunities, research projects, and more in one accessible location. The platform is designed to attract business flow and investment and to position Australia as the center for agri-food innovation (Government of Australia, 2023).

3.2 Brunei Darussalam (BD)

Table 2 *Demographic and Socioeconomic Profile of Brunei Darussalam*

Category	**Information**
Total population	452,524 (2023)[a]
Population by gender M/F	M: 51.69%[b] / F: 48.31%[c] (2023)
Population rural/ urban	Urban:79.15%[d] / Rural:20.85%[e] (2023)
Access to connectivity (Individuals using the Internet (% of population)	98.08%[h] of population with internet access (2021)

Source: World Bank(2023b)[a], World Bank(2023t)[b], World Bank(2023u)[c], World Bank(2023v)[d], World Bank(2023w)[e], and World Bank (n.db)[h].

Brunei Darussalam's economy mainly depends on oil and natural gas; however, agriculture is still important for food security and economic diversification. BD cultivates high-value crops and adopts technologies to enhance productivity (Department of Agriculture and Agri-Food, 2018). Despite technological advancements, this sector confronts several challenges, such as reliance on food imports, lack of modern infrastructure for this sector, etc. In response, governmental and private initiatives in BD support small scale farmers, like AgroBiz.

Agrobiz https://bn.livewire.shell/events-and-programme/agrobiz.html

The AgroBiz project, launched by Brunei's Shell LiveWIRE in collaboration with AgroTech school, aims to develop young entrepreneurs in the rice supply chain. It trains youth producers in modern agriculture rice cultivation with advanced technologies, as part of the Institute of Brunei Technical Education curriculum (Wong, 2022).

3.3 Canada (CDA)

Table 3 *Demographic and Socioeconomic Profile of Canada*

Category	**Information**
Total population	40,097,761 (2023)[a]
Population by gender M/F	M: 49.70%[b] / F: 50.30%[c] (2023)
Population rural/ urban	Urban: 81.86%[d] / Rural:18.14%[e] (2023)
Access to connectivity (Individuals using the Internet (% of population)	92.83%[h] of population with internet access (2021)

Source: World Bank(2023c)[a], World Bank(2023t)[b] ,World Bank(2023u)[c], World Bank(2023v)[d], World Bank(2023w)[e], and World Bank (n.db)[h].

Agriculture in CDA is important and mainly relies on small-scale and family-operated farms. They face challenges such as floods, droughts, and wildfires, which impact food security and exacerbate rural poverty (Government of Canada, 2021). Farmers face economic difficulties, including high land costs and a declining workforce. Digital platforms such as ShopHERE and Young Agrarians support small farmers by improving market access and promoting sustainable local agriculture.

ShopHERE powered by Google https://programs.digitalmainstreet.ca/shophere-signup

This program helps small businesses in Ontario launch into e-commerce. It provides assistance in setting up, managing, and marketing online stores. Beneficiaries include small businesses with fewer than 10 employees and restaurants with up to 25, all registered in Ontario. It also offers 90 days of Shopify for free and advertising credits for Facebook and Google (Digital Main Street, 2024).

Young Agrarians (YA) https://youngagrarians.org/about/

Operated under the Agrarians Foundation in CDA, this program focuses on supporting new and young farmers interested in ecological, organic, and regenerative farming practices. YA provide a network of educational resources and networking opportunities, organizing events and workshops across CDA. It includes farmers, fishermen, ranchers, horticulturists and more. Also, this program emphasizes inclusion and equity within the agricultural community and offers accessible programs (Young Agrarians, n.d.).

3.4 Chile (CHL)

Table 4 *Demographic and Socioeconomic Profile of Chile*

Category	**Information**
Total population	19,629,590 habitants (2023)[a]
Population by gender M/F	M: 49.63%[b] / F: 50.37%[c] (2023)
Population rural/ urban	Urban: 88.01%[d] / Rural: 11.99%[e] (2023)
Access to connectivity (Individuals using the Internet (% of population)	90.19%[h] of population with internet access (2021)

Source: World Bank(2023d)[a], World Bank(2023t)[b], World Bank(2023u)[c], World Bank(2023v)[d], World Bank(2023w)[e], and World Bank(n.db)[h].

The economy in CHL relies heavily on exporting raw materials, with mining, food processing, and agriculture as the most significant sectors. Chile's, agricultural products in 2019 constituted 17.4% of total exports, with the agricultural sub sector contributing 90.3% of these exports (BCCH cited in FAO, n.d.). Family farming, representing 93% of producers (National Institute of Statistics, 2007), is concentrated mainly between the regions of Libertador O'Higgins and Los Lagos (INDAP, 2019) and contributes 22% of the Gross Production Value in Chilean agriculture (INDAP, 2017). It plays a crucial role in healthy eating and food security. However, this sector is highly vulnerable, with 63% of its members among the poorest 40% of the population (INDAP cited in FAO, n.d.).

Initiatives have been developed to enhance the visibility and market access of small farmers, promoting sustainable local agriculture such as The Rural World Store Network, The Peasant Markets Network, *A Cuánto*? Chile Agricola, Agro Predial CIREN, and the most Capable Entrepreneurial Woman Program.

The Rural World Store Network https://www.indap.gob.cl/red-tiendas-mundo-rural

The Rural World Store Network is an initiative of the Institute of Agricultural Development (INDAP), and part of the CHL's Marketing Program. This program seeks to expand the markets for peasant and Indigenous family farming, in addition to bringing their products closer to large urban centers. The products reach the consumer with their attributes, stories and values. Endemic ingredients of CHL such as *copihues, calafate, topinambur* and processed foods made with ancestral foods are highlighted (INDAP, n.d.-a). Its stores are managed by peasant organizations, which are currently present in the main cities.

The Peasant Markets Network https://www.indap.gob.cl/mercados-campesinos

The Peasant Markets Network is another initiative of the INDAP Marketing Program, which seeks to consolidate and give visibility to existing and future Peasant Market initiatives under common principles and graphic identity. Its main objective is to offer peasant products to the inhabitants of cities and towns, allowing producers to sell directly to consumers, ensuring quality, freshness, and identity at a convenient price for both parties (INDAP, n.d.-b).

A cuánto?
https://play.google.com/store/apps/details?id=cl.odepa.mayorista.frutahortaliza&pcampaignid=web_share

It is an application (APP) developed by the Office of Agricultural Studies and Policies (ODEPA) under the Ministry of Agriculture. Users can check daily prices of fruits and vegetables in major markets across CHL. It seeks to help consumers and farmers make informed purchasing decisions. This APP is available on Android platforms (ODEPA, 2019).

Chile Agricola https://www.chileagricola.cl/

Chile Agricola is an educational platform developed by the Ministry of Agriculture to support small-scale farmers. It offers resources on agricultural topics such as efficient water use, best practices, pest and disease control, financing, and many more. It provides resources in the format of videos, fact sheets, manuals, which can be downloaded and shared freely. The objective is to help farmers produce more efficiently and sustainably, enhancing their adaptability (Chile Agrícola, n.d.).

Agropredial CIREN https://www.ciren.cl/

Agropredial is an application developed by the *Centro de Información de Recursos Naturales* (CIREN) under the Ministry of Agriculture. It provides information on the suitability of horticultural and fruit species for specific locations to help farmers plant based on climatic conditions. The APP supports informed investment decisions for both small and large producers by offering insights into the feasibility of establishing species in particular areas (Ministry of Agriculture of Chile, 2022).

Most Capable Entrepreneurial Woman Program

The "Most Capable Entrepreneurial Woman Program" by INDAP aims to support women in accessing and staying in the labor market, focusing on those developing or intending to develop economic ventures or working independently. The initiative enhances women's income-generating capabilities through improved management skills facilitated by the *Gestión de Emprendimientos* training plan (INDAP, n.d-c).

3.5 People's Republic of China (PRC)

Table 5 *Demographic and Socioeconomic Profile of The People's Republic of China*

Category	Information
Total population	1.41 billion (2023)[a]
Population by gender M/F	M:51.01%[b] / F:48.99%[c] (2023)
Population rural/ urban	Urban: 64.57%[d] / Rural: 35.43%[e] (2023)
Access to connectivity (Individuals using the Internet (% of population)	75.61%[h] of population with internet access (2021)

Source: World Bank (2023e)[a], World Bank (2023t)[b], World Bank (2023u)[c], World Bank (2023v)[d], World Bank (2023w)[e], and World Bank (n.db)[h].

The agricultural sector in the PRC showed growth since the late 1970s at an annual rate of 5%. This growth has shifted towards higher-value crops (NBSC, 2011; Huang et al., 2010). Currently, PRC agriculture has embraced digitalization, using technologies like precision farming and drones to enhance productivity. Despite these advances, significant challenges remain. Income inequality has increased, with disparities between regions, rural and urban areas, and families (Cai et al., 2002; World Bank, 2002; NBSC, 2011). Fast industrialization has led to deterioration of the environment and food insecurity. In response to these challenges, digital platforms like Pinduoduo and Alibaba have been improving market access for small farmers.

Pinduoduo https://en.pinduoduo.com/

Pinduoduo, founded in 2015, is the leading agricultural platform for direct-to-consumer sales in the PRC. It's currently used by more than 16 million farmers to sell their products. With this platform, small farmers can increase their incomes and invest in their operations to make them more productive. Consumers benefit when they access a wide range of agricultural products directly from the growers (Pinduoduo, 2021). Pinduoduo collaborates with producer cooperatives and offers online training through initiatives like Duo Duo University in partnership with the China Agricultural University. It received the 2022 FAO Innovation Award for developing a platform that connects small farmers with the market, improving the lives and livelihoods of millions of farmers (FAO, 2022).

Alibaba https://cn.aliyun.com/page-sourcemarkets/et/brain/aos?from_alibabacloud=

Alibaba, is a large digital commerce platform and integrates financial services through Ant Group, its own university, and a rural tourism agency. It facilitates direct marketing for producers through a co-distribution logistics network comprising associative warehouses and an extensive delivery personnel network, supported by a set of allied institutions. The platform strategically aligns with government programs such as the "Plan to Promote the Digitalization of Agricultural Development and Rural Governance 2019-2025," promoted by the Ministry of Agriculture and Rural Affairs and the Office of the Central Cybersecurity Commission. Alibaba is also linked to a microcredit program supported by the Ministry of Agriculture, benefiting approximately 700 million small producers, many of whom are young farmers applying for these credits for the first time (CEPAL et al., 2021).

3.6 Hong Kong, China (HKC)

Table 6 *Demographic and Socioeconomic Profile of Hong Kong, China*

Category	Information

Total population	7,536,100 (2023)[a]
Population by gender M/F	M:46.01%[b] / F:53.99%[c] (2023)
Population rural/ urban	Urban:100.00%[d] / Rural: 0%[e] (2023)
Access to connectivity (Individuals using the Internet (% of population)	95.61%[h] of population with internet access (2022)

Source: World Bank(2023f)[a], World Bank(2023t)[b], World Bank(2023u)[c], World Bank(2023v)[d], World Bank(2023w)[e], and World Bank (n.db)[h].

HKC agriculture focuses on small-scale farming, especially fresh produce and aquaculture. Due to urban density, traditional farms are rare, leading to intensive cultivation methods that maximize limited land. Innovations like urban farming and high-tech aquaculture are becoming more common, integrating food production into urban settings and offering social and economic benefits (IntechOpen, n.d.). But this agriculture faces challenges like limited space and disasters (Agriculture, Fisheries and Conservation Department, 2024). Digitalization presents opportunities for efficiency and sustainability but requires significant investment and urban integration (Tsang, 2018; Agriculture, Fisheries and Conservation Department, 2024).

Innovative digital tools and platforms connect small farmers with consumers, improving market access and promoting sustainable practices. Supported by public and private sectors, e-commerce platforms like VMO, HKTVmall, and GreenPrice allow farmers to sell directly to consumers, increasing profits and providing fresh, locally sourced produce.

Vegetable Marketing Organization https://www.vmo.org/

The Vegetable Marketing Organization (VMO) is a non-profit making organization which provides farmers and traders with vegetable wholesale marketing services including trading facilities, accounting and transport services. It supports its operation from the commission charged on transactions. The “Local Fresh” mobile app and shopping website developed by the VMO and the Fish Marketing Organization provided an online shopping platform for farmers and fishermen to promote their agricultural and fisheries produce (VMO, n.d).

HKTVmall https://www.hktvmall.com/

HKTVmall is an online shopping platform that offers a variety of products like home appliances, beauty products, and groceries. It supports transactions and functions as a dynamic marketplace and its services are payment processing, logistics, and customer service. It includes a significant selection of agricultural products such as fresh fruits and vegetables. It also supports small farmers by providing them with a platform to sell their products directly to consumers (HKTVmall,n.d).

GreenPrice https://www.greenprice.com/

GreenPrice is a retail platform specializing in reducing waste by offering short-dated food and other products at reduced prices. This initiative is led by community-conscious individuals, including economic and environmental leaders and academic experts who emphasize sustainable living. GreenPrice's sells items that are close to their expiration date but still safe for consumption. This effort not only addresses environmental concerns but also educates the public about the viability of consuming products past their best-before dates while still maintaining safety and quality (GreenPrice,n.d.).

3.7 Indonesia (INA)

Table 7 *Demographic and Socioeconomic Profile of Indonesia*

Category	**Information**
Total population	277,534,122 (2023)[a]
Population by gender M/F	M: 50.34%[b] / F: 49.66%[c] (2023)
Population rural/ urban	Urban:58.57%[d] / Rural: 41.43%[e] (2023)
Access to connectivity (Individuals using the Internet (% of population)	66.48%[h] of population with internet access (2022)

Source: World Bank(2023g)[a], World Bank(2023t)[b], World Bank(2023u)[c], World Bank(2023v)[d], World Bank(2023w)[e], and World Bank (n.db)[h].

Agriculture in INA occupies 32% of the total land area and contributes 14% of the Gross Domestic Product (GDP), but still faces significant challenges. Smallholder farmers, who make up over 90% of agricultural workers, often receive the least benefits from the food system (ANTARA News, 2023; FAO, 2023c). Despite these challenges, digitalization offers numerous opportunities to transform Indonesia's food systems. In Indonesia, there are platforms such as TaniHub Food Solutions, the Digital Villages Initiative (DVI), and the Data Collection Platform (DCP) that support the adoption of digital and sustainable agricultural practices.

TaniHub Food Solutions https://www.foodsolutions.tanihub.com/

TaniHub Food Solutions enhances the connection between small farmers and the food and beverage sector, offering the latter direct access to fresh, quality agricultural products. This connection doesn't include intermediaries, so it improves the farmers' income. Small farmers are the direct beneficiaries of obtaining better prices and a larger market for their products. Food and beverage companies, for their part, benefit from the freshness and quality of the products they acquire directly from the source (TaniHub Food Solutions, n.da.;TaniHub Food Solutions,n.db).

The Digital Villages Initiative

DVI was launched by FAO to promote digital innovations in rural areas, aiming to enhance economic livelihoods, individual well-being, and social cohesion. It focuses on creating a digital ecosystem adapted to the local context, promoting inclusive and gender-sensitive rural development, and transforming agri-food systems to meet Sustainable Development Goals (SDG) (FAO,2023c; European Commission,2022).

Data Collection Platform

DCP supports the Digital Villages Initiative by providing a structured method to gather, analyze, and utilize data effectively. It facilitates better decision making by offering real-time data and analytics. Farmers can monitor crop health, manage resources efficiently, and access financial services and market information (AEIDL, 2023). By integrating digital tools into agricultural practices, the DCP helps in creating a more productive agricultural sector. This integration is important for addressing challenges such as climate change, resource scarcity, and market volatility, ultimately contributing to the sustainable development of rural areas in Indonesia (FAO,2023d).

3.8 Japan (JPN)

Table 8 *Demographic and Socioeconomic Profile of Japan*

Category	**Information**
Total population	124,516,650 (2023)[a]
Population by gender M/F	M:48.59%[b] / F: 51.41%[c] (2023)
Population rural/ urban	Urban: 92.04%[d] / Rural: 7.96%[e] (2023)
Access to connectivity (Individuals using the Internet (% of population)	82.91%[h] of population with internet access (2021)

Source: World Bank(2023h)[a], World Bank(2023t)[b], World Bank(2023u)[c], World Bank(2023v)[d], World Bank(2023w)[e], and World Bank(n.db)[h].

Agriculture in JPN uses efficient methods to optimize the utilization of its constrained arable land. However, JPN also faces challenges due to an aging agricultural population and the declining interest among younger generations in the sector. Also, disasters threaten crops and infrastructure (Fuhrmann-Aoyagi et al., 2024). JPN has been adopting technology and digitalization in order to address the challenges as well as to enhance the sustainability of its agriculture. Different alliances support small farmers through digital platforms and promote digital trade such as Pocket Marche.

Pocket Marche (ポケットマルシェ) https://poke-m.com/

Pocket Marche is an online platform created by the private company Ame Kaze Taiyo Inc. that directly connects farmers and fishermen with consumers, allowing for the purchase of fresh and seasonal produce. Users can browse and search for food, ask questions to producers, and place orders through the platform. Once they receive the products, they can communicate directly with the producers to thank them and share their experience. There are no additional fees for users, only the cost of the product and shipping. The platform focuses the freshness of food (Ame Kaze Taiyo, n.d.).

3.9 Republic of Korea (ROK)

Table 9 *Demographic and Socioeconomic Profile of The Republic of Korea*

Category	**Information**
Total population	51,712,619 (2023)[a]
Population by gender M/F	M:49.90%[b] / F:50.10%[c] (2023)
Population rural/ urban	Urban: 81.46%[d] / Rural: 18.54%[e] (2023)
Access to connectivity (Individuals using the Internet (% of population)	97.17%[h] of population with internet access (2022)

Source: World Bank(2023i)[a], World Bank(2023t)[b], World Bank(2023u)[c], World Bank(2023v)[d], World Bank(2023w)[e], and World Bank (n.db)[h].

Prior to this time, agriculture in ROK was based on traditional resources like land and labor. Beginning in the 1960s, ROK agriculture was transformed toward a science- and technology-oriented model. Productivity has improved and the main reasons are biotechnology and mechanization. Institutional policies play a crucial role in the continued development of this sector (Park,2023).

Agriculture in ROK faces significant challenges, highlighted primarily by the growing disconnect between urban and rural areas that affects the appreciation of agriculture among urban citizens. Other problems include a heavy dependence on imports that undermines local production, an aging rural population that limits labor, extreme fluctuations in food prices, and environmental challenges such as climate change, which threaten the long-term sustainability of the agricultural sector (Jang,2023). Faced with these challenges, there are also government and private initiatives that support smallholder farmers through digital platforms such as Nongsaro and Smart Farm.

Nongsaro https://www.nongsaro.go.kr/

The "Nongsaro" platform is a public initiative, managed by the Rural Development Administration (RDA). This platform provides information on agricultural techniques and educational resources for farmers. It supports small-holder farmers by offering access to resources, technology and improving the productivity (Rural Development Administration, n.d).

Smart Farm https://www.smartfarmkorea.net/

The Smart Farm, initiative driven primarily by the public sector in collaboration with private entities, integrates technology with agriculture. It automatically manages the growing conditions of crops and livestock and uses data to optimize the growing environment. It reduces the need for input and improves the productivity and quality of the products. In addition, this initiative focuses on increasing the competitiveness of this sector and attracting new generations to agriculture (Institute of Agricultural, Forestry, Fisheries, Food, Educational and Cultural Information,2021).

3.10 Malaysia (MAS)

Table 10 *Demographic and Socioeconomic Profile of Malaysia*

Category	**Information**
Total population	34,308,525 (2023)[a]
Population by gender M/F	M:51.07%[b] / F:48.93%[c] (2023)
Population rural/ urban (annual %)	Urban:78.72 %[d] / Rural:21.28%[e] (2023)
Access to connectivity (Individuals using the Internet (% of population)	97.40%[h] of population with internet access (2022)

Source: World Bank(2023j)[a], World Bank(2023t)[b], World Bank(2023u)[c], World Bank(2023v)[d], World Bank(2023w)[e], and World Bank (n.db)[h].

In MAS, agriculture contributes 7.1% to GDP and the main exported products are palm oil, rubber, cocoa, and food crops (e.g. tropical fruits) (Department of Statistics Malaysia, 2023; Ministry of Agriculture and Food Security Malaysia, 2023). Smallholder farmers face social wellbeing, economic, and environmental challenges, including low income for food producers, food loss and waste (Ministry of Agriculture and Food Industry, 2021). In MAS, various public and private initiatives have been launched to support farmers, particularly through the adoption of digital tools that enable trade, enhance sustainability practices, and improve overall productivity. These initiatives aim to modernize agriculture, making it more efficient, profitable, and environmentally sustainable, such as follows:

AgroBazaar Online https://www.agrobazaar.com.my/

Digitalization is a key aspect of modernization, and the Ministry of Agriculture and Food Security, through its agency, the Federal Agricultural Marketing Authority (FAMA), is working to transition from offline to online sales using digital platforms. Currently, AgroBazaar Online

(ABO) offers farmers an opportunity to engage in e-commerce. Additionally, rural entrepreneurs in the agro-food sector are supported through training programs, such as the Digital Zone Apprentice (DZA) training module.

Saya Digital https://mdec.my/sayadigital
Saya Digital, an initiative by the Malaysia Digital Economy Corporation (MDEC), enhances digital skills and promotes digital inclusion across MAS. It also focuses on the adaptability to digital economy, saving on expenses, protect against online fraud (Malaysia Digital Economy Corporation, 2022).

3.11 Mexico

Table 11 *Demographic and Socioeconomic Profile of Mexico*

Category	**Information**
Total population	128,455,567 (2023)[a]
Population by gender M/F	M: 48.77%[b] / F: 51.23%[c] (2023)
Population rural/ urban (annual %)	Urban: 81.58%[d] / Rural: 18.42%[e] (2023)
Access to connectivity (Individuals using the Internet (% of population)	75.63%[h] of population with internet access (2021)

Source: World Bank(2023k)[a], World Bank(2023t)[b], World Bank(2023u)[c], World Bank(2023v)[d], World Bank(2023w)[e], and World Bank (n.db)[h].

MEX, with its rich biodiversity and favorable climate, is one of the agricultural leaders in Latin America. Small scale producers generate 54% of food production and 80% of agricultural employment, like growing corn and beans. As a result, they support biodiversity and food self-sufficiency (Secretariat of Agriculture and Rural Development, 2024). However, the main challenges they face are low prices, disasters and climate change effects.

To address challenges, initiatives like Agro Oferta APP and the Computerized System for Traceability of Agricultural, Aquaculture, and Fisheries Merchandise (SITMA) support small farmers through digital platforms promoting digital commerce.

Agro Oferta APP-AgroMercados B2B https://agrooferta.gob.mx/e-commerce/

AgroOferta (before AgroMercados B2B) is an interactive digital platform created by the Secretariat of Agriculture and Rural Development of Mexico. It provides detailed information on agricultural, livestock and fishery products to producers and buyers. Thus, the platform would facilitate direct trade without intermediaries. It also promotes regional and international trade, offers comparisons of products and accessible tools (Secretariat of Agriculture and Rural Development, n.da; Secretariat of Agriculture and Rural Development, n.db).

Sistema Informático de Trazabilidad de las Mercancías Agropecuarias, Acuícolas y Pesqueras https://sistemasssl.senasica.gob.mx/sitma/pages/publico/busqueda.xhtml

The Information System for Traceability of Agricultural, Aquaculture and Fisheries Merchandise (SITMA) has as a main objective to trace the process of MEX's food. This system helps to preserve and open new markets, to ensure exports and the economy supply. Its benefits include global recognition, standardization of traceability information, food safety, response capacity in health emergencies and support for local and international mobilization of agricultural goods (MEX Service of Health, Safety and Agrifood Quality,2022).

3.12 New Zealand (NZ)

Table 12 *Demographic and Socioeconomic Profile of New Zealand*

Category	**Information**
Total population	5,223,100 (2023)[a]
Population by gender M/F	M:49.58%[b] / F:50.42%[c] (2023)
Population rural/ urban (annual %)	Urban:86.99%[d] / Rural: 13.02%[e] (2023)
Access to connectivity (Individuals using the Internet (% of population)	95.9%[h] of population with internet access (2021)

Source: World Bank (2023l)[a], World Bank (2023t)[b], World Bank (2023u)[c], World Bank (2023v)[d], World Bank(2023w)[e], and World Bank (n.db)[h].

Agriculture in NZ is highly productive and technical, benefiting from advances in aggrotech (Stats NZ, 2024). Smallholder's agriculture is crucial in the horticultural sector, because they also focus on specialized products like wine, fruit, and organics. The Ministry for Primary Industries (MPI) supports smallholder farmers with financing and training schemes to improve sustainability and efficiency (Ministry for Primary Industries,2017).

However, farmers face social challenges, including the need to integrate cultural values and sustainable resource management with indigenous communities (Our Land and Water, 2023). Climate change presents environmental challenges, which affect growing conditions and required water quality management and greenhouse gas emission reduction. Initiatives like Farmers' Markets support small farmers through digital platforms, promoting digital trade and sustainability.

Farmers' Markets https://www.farmersmarkets.org.nz/

The Farmers' Markets New Zealand (FMNZ) platform supports the local food economy, providing access to regional foods and strengthening local communities. FMNZ is a voluntary association that supports farmers' markets in NZ, offering benefits such as peer support, networking, promotions, publicity and advocacy at an economic level. Market members must follow authentic guidelines, ensuring that food is produced locally and sold directly by producers. The platform is incentivized and managed by a voluntary association. Volunteers are farmers and members of local communities in NZ, and they support farmers' markets across NZ (Farmers' Markets New Zealand, n.d).

3.13 Papua New Guinea (PNG)

Table 13 *Demographic and Socioeconomic Profile of Papua New Guinea*

Category	**Information**
Total population	10,329,931 (2023)[a]
Population by gender M/F	M:51.53%[b] / F:48.47%[c] (2023)
Population rural/ urban (annual %)	Urban: 13.72%[d] / Rural: 86.28%[e] (2023)
Access to connectivity (Individuals using the Internet (% of population)	32.05%[h] of population with internet access (2021)

Source: World Bank(2023m)[a], World Bank(2023t)[b], World Bank(2023u)[c], World Bank(2023v)[d], World Bank(2023w)[e], and World Bank (n.db)[h].

Agriculture in PNG is important for the economy and livelihoods. The National Agricultural Research Institute (NARI) promotes research for sustainable development, climate change adaptation and others. NARI's initiatives enhance productivity with climate-smart technologies for crops like sweet potato and taro, improving rural livelihoods through efficient value chains and markets (NARI, 2024).

PNG farmers face social challenges with unstructured relationships in the supply chain, leading to lower market prices (Oxford Business Group, 2020). Environmental challenges include climate change impacts like high temperatures, rainfall, and pests affecting crops (Oxford Business Group, 2020). Faced with these challenges there are initiatives like the Fresh Produce Development Agency (FPDA) supporting small farmers through digital platforms and trade promotion.

Fresh Produce Development Agency http://www.fpda.com.pg/

The FPDA is a government agency responsible for facilitating the development of the horticulture and fresh produce industry in PNG. From production to marketing, FPDA's primary function is to be a source of information relating to commercial horticultural activities across PNG (Devex, n.d). The agency works to improve the production and marketing of fresh agricultural products in PNG. In addition, the agency provides training and development programs for farmers, helping them access local and regional markets.

3.14 Peru (PE)

Table 14 *Demographic and Socioeconomic Profile of Peru*

Category	**Information**
Total population	34,352,719 (2023)[a]
Population by gender M/F	M:49.50%[b] / F:50.50%[c] (2023)
Population rural/ urban (annual %)	Urban: 78.92%[d] / Rural: 21.08%[e] (2023)
Access to connectivity (Individuals using the Internet (% of population)	74.67%[h] of population with internet access (2022)

Source: World Bank(2023n)[a], World Bank(2023t)[b], World Bank(2023u)[c], World Bank(2023v)[d], World Bank(2023w)[e], and World Bank (n.db)[h].

In PE, food production faces challenges due to the low productivity among small farmers and climate vulnerability, which results in substantial agricultural losses. Peru heavily relies on imports for oils (58%), cereals (43%), wheat (87%), hard yellow corn (60%), sugar (34%), and milk (13%) (FAO, 2024b).

Challenges for family farmers have worsened due to the COVID-19 pandemic, fertilizer crisis, and climate change. Also, small farmers struggle with market access due to limited infrastructure and reliance on intermediaries, which cuts into profits (Congreso de la República, 2022). Despite challenges, there are initiatives like Virtual Catalogue of Agricultural Products, AgroChatea and Mi Caserita.

Virtual Catalogue of Agricultural Products https://catalogo.midagri.gob.pe/

It allows direct contact between agricultural producers and buyers (short channel) without payments or sales commissions. At least 490 farmers and 1400 products are registered. Its main objective is to improve the marketing conditions of goods of agricultural, livestock and

forestry origin. Likewise, its main mission is to empower agricultural producers in the use of new technologies, placing value on their products from agrobiodiversity. Its vision is to be the digital platform for agricultural products (MIDAGRI,2020).

AgroChatea https://siea.midagri.gob.pe/portal/agrochatea/

AgroChatea is an initiative of the Ministry of Agrarian Development and Irrigation (MIDAGRI) in collaboration with the academia and the World Food Programme (WFP), which allows real-time consultation of prices of agricultural products in wholesale markets in main cities, accessible 24 hours a day from computers or mobile phones. It is connected to the Supply and Price System (SISAP) and complements the Agricultural Data System, which offers information on prices and weather without the need for internet (MIDAGRI, 2021).

Mi Caserita https://play.google.com/store/apps/details?id=minagri.micasera&hl=es

Mi Caserita is an APP launched by MIDAGRI to provide real-time retail prices for 75 agri-food products in 31 markets in Lima and Callao, and since 2020, includes prices from retailers in other cities (MIDAGRI, 2021). Users can organize a basket of products, calculate total costs, check recent prices, view five-day trends, and find market routes via Google Maps or Waze (MIDAGRI, 2021).

3.15 The Republic of the Philippines (PH)

Table 15 *Demographic and Socioeconomic Profile of The Republic of the Philippines*

Category	**Information**
Total population	117,337,368 (2023)[a]
Population by gender M/F	M:50.79%[b] / F:49.21%[c] (2023)
Population rural/ urban	Urban:48.29%[d] / Rural:51.71%[e] (2023)
Access to connectivity (Individuals using the Internet (% of population)	52.68%[h] of population with internet access (2021)

Source: World Bank(2023ñ)[a], World Bank(2023t)[b], World Bank(2023u)[c], World Bank(2023v)[d], World Bank(2023w)[e], and World Bank (n.db)[h].

In PH, agriculture is important for the economy and rural livelihoods (PhilSEED, 2023). Cereal production, for instance, has significantly increased, reaching 28 million metric tons in 2022 (Philippine Statistics Authority, 2022; n.d). However, the small farmers struggle with poor rural infrastructure, market access issues, and climate change challenges. The public sector is addressing these problems by improving connectivity and market access through infrastructure projects (PhilSEED, 2023). Also, initiatives like the Registry System for Basic Sectors in Agriculture (RSBSA) and the Farmers and Fisherfolk Enterprise Development Information System (FFEDIS) support small farmers by promoting digital trade and providing essential services.

Registry System for Basic Sectors in Agriculture https://www.da.gov.ph/rsbsa-registration-and-updating/

RSBSA is a registry of farmers, fishermen, and agricultural workers that serves as an identification mechanism for beneficiaries of various government programs and services related to agriculture (Municipality of Capas, n.d.). In the georeferencing of parcels, the areas of agricultural production are measured, including other physical parameters that serve as guides for government interventions to be more appropriate to increase productivity and income of farmers and to make their operations resilient and sustainable (Municipality of Capas, n.d.).

Farmers and Fisherfolk Enterprise Development Information System
https://ffedis.da.gov.ph/

FFEDIS is an online platform by the Department of Agriculture to help formulate business plans and programs. It connects producer groups, the private sector, LGUs, and donors with market needs and resources. FFEDIS includes a registry of enterprises, programs, and interested private companies (Department of Agriculture, 2023). Registered companies can access market linkage initiatives, loan and grant programs, training, technology transfer, and subsidies for seedlings, inputs, and machinery. Also, eligible entities include those registered with the Department of Trade and Industry, Cooperative Development Authority, Securities and Exchange Commission, or Department of Labor and Employment, as well as micro, small, and medium enterprises in agriculture and fisheries. The registration can be done at FFEDIS desks in Regional Offices or online through the FFEDIS portal (Department of Agriculture, 2023).

3.16 The Russian Federation (RUS)

Table 16 *Demographic and Socioeconomic Profile of The Russian Federation*

Category	**Information**
Total population	143,826,130 (2023)[a]
Population by gender M/F	M:46.45%[b] / F:53.55%[c] (2023)
Population rural/ urban	Urban: 75.33%[d] / Rural: 24.67%[e] (2023)
Access to connectivity (Individuals using the Internet (% of population)	90.42%[h] of population with internet access (2022)

Source: World Bank(2023o)[a], World Bank(2023t)[b], World Bank(2023u)[c], World Bank(2023v)[d], World Bank(2023w)[e], and World Bank (n.db)[h].

RUS is a leading wheat exporter and a major producer of sunflower seeds, potatoes, milk, eggs, and chicken meat. Agriculture in RUS has grown significantly, and it has become one main economic sector. However, small-scale farmers face challenges with accessing markets, modern technology, and financing, so their competitiveness is limited against larger farms. Therefore, agricultural support policies have been implemented (Foreign Agricultural Service, 2018) specially supporting small agricultural businesses in developing digital platforms to sell their products not only in the region, but also beyond its borders. Online platforms are available for selling farmer products and providing marketing information to small entrepreneurs, since it is important to raise public awareness of the availability of goods from local producers. The number of registered users is constantly growing.

At the same time, regional Centers of Competence in the sphere of agricultural cooperation and farmer support are consulting with cooperatives on product branding, certification and marketing support. Similarly, close cooperation with major Internet integrators is underway to include farm products in the assortment of the largest marketplaces operating in RUS. For instance, the platform ОЗОН Фреш support small farmers through digital platforms, promoting digital trade and helping them overcome these challenges.

ОЗОН Фреш https://www.ozon.ru/

This initiative responds to the growing demand for convenient and fast delivery services, adapting to new online consumption habits that were accelerated by events such as the COVID-19 pandemic. It offers a wide variety of food and daily consumption products. Users can purchase everything from fresh food to pantry items and cleaning products, all delivered conveniently and quickly (Ozon,n.d).

3.17 Singapore (SGP)

Table 17 *Demographic and Socioeconomic Profile of Singapore*

Category	Information
Total population	5,917,648 (2023)[a]
Population by gender M/F	M:52.26%[b] / F:47.74%[c] (2023)
Population rural/ urban	Urban:100.00%[d] / Rural: 0%[e] (2023)
Access to connectivity (Individuals using the Internet (% of population)	95.95%[h] of population with internet access (2022)

Source: World Bank(2023p)[a], World Bank(2023t)[b], World Bank(2023u)[c], World Bank(2023v)[d], World Bank(2023w)[e], and World Bank (n.db)[h].

SGP has a highly urbanized economy with limited local agricultural production, but it relies on imports for its food needs. The Singapore Food Agency (SFA) focuses on ensuring a safe supply of imported food. In 2019, the public sector launched the "30 by 30" vision to produce 30% of the SGP nutritional needs locally by 2030 (Singapore Food Agency, 2021; International Trade Administration, 2024). Singapore now is exploring urban agriculture due to the limited space for traditional farming. Initiatives like Pasar You and E-SG Farmers' Market support small farmers through digital platforms, promoting digital commerce and helping farmers overcome space and resource limitations.

Pasar You https://www.sfa.gov.sg/

It is a digital platform developed by the Agri-Food and Veterinary Authority of Singapore (AVA) and its aim is to connect local farmers with consumers, so they can list and manage their sales efficiently. It enhances direct transactions and improves transparency in the supply chain. In addition, it increases the availability of fresh and local products and supports smallholder farmers (Singapore Food Agency, n.d).

E-SG Farmers' Market https://safef.org.sg/

It is promoted by the Singapore Agri-Food Federation (SAFEF). It enables local farmers to sell directly to consumers. Therefore, this platform promotes the purchase of fresh and locally sourced products and facilitates access to them. By reducing the dependence on imported products and encouraging the consumption of local products, E-SG Farmers' Market supports the local economy and promotes sustainable agricultural practices (Singapore Food Agency, n.d).

3.18 Chinese Taipei (CT)

Table 18 *Demographic and Socioeconomic Profile of Chinese Taipei*

Category	Information
Total population	23,400,000 (2024)[a]
Population by gender M/F	M:49.3% / F:50.7% (2024)[b]
Population rural/ urban	Urban: 80.2% / Rural:19.80 % (2024)[c]
Access to connectivity (Individuals using the Internet (% of population)	90.7% of population with internet access (2024)

Source: Asian Development Bank (2024)[a], Worldometer (2024)[a], Department of Household Registration(2024)[b], and Worldometer (2024)[c].

In CT, agriculture is an important sector for the economy and rural livelihoods. It has improved agricultural efficiency, but it still faces challenges (FAO, 2023b). Socially, the aging agricultural population and urban migration reduce the labor force. Environmentally, climate change effects and water scarcity complicate resource management (FAO, 2023b). Economically, high production costs and international competition affect crop profitability.

To address these challenges, initiatives such as Chacha Brekkie, Super Buy, and The Wonderful Food support small farmers through digital platforms and promote digital commerce.

Chacha Brekkie https://chachabrekkie.com/

ChaCha Brekkie is a digital platform that promotes healthy eating and informs people about the benefits of eating nutritious meals by providing a variety of articles and resources about health and recipes of healthy meals. Additionally, it offers tips for daily routine exercises and emphasizes the importance of diet and physical activities (ChaCha Brekkie, n.d).

Super Buy https://www.superbuy.com.tw/about.php

It is an online marketplace that provides healthy and organic food products, such as fresh meat, seafood, snacks, and health supplements (SuperBuy, n.d). This platform connects consumers with local farmers and promotes the local agricultural community.

The Wonderful Food https://www.wonderfulfood.com.tw/

It offers a wide variety of fresh and organic food, CAS certified meat, gourmet gifts, and more. Wonderful food promotes the consumption of fresh, high-quality agricultural products through a membership program with special prices and benefits (Wonderfulfood, n.d).

3.19 Thailand (THA)

Table 19 *Demographic and Socioeconomic Profile of Thailand*

Category	**Information**
Total population	71,801,279 (2023)[a]
Population by gender M/F	M:48.50%[b] / F:51.50%[c] (2023)
Population rural/ urban	Urban: 53.61%[d] / Rural: 46.39%[e] (2023)
Access to connectivity (Individuals using the Internet (% of population)	87.98%[h] of population with internet access (2022)

Source: World Bank(2023q)[a], World Bank(2023t)[b], World Bank(2023u)[c], World Bank(2023v)[d], World Bank(2023w)[e], and World Bank (n.db)[h].

THA's agriculture plays a key role in the economy, with its production and export of rice and other cereals, THA, along with India and Viet Nam, is expected to continue to lead rice exports (OECD, 2023). Despite its success, the agricultural sector still struggles with the consequences of climate change and convenient management of natural resources. In the face of these challenges, some initiatives such as Shopee and Agrimark support farmers and promote digital commerce through digital platforms.

Shopee www.shopee.co.th

Shopee Thailand is part of Shopee, one of the most visited e-commerce platforms in Southeast Asia, which offers a wide variety of products, such as electronics, home goods, beauty products,

food and more (Shopee, n.d.). It aims to be the leading platform in that region by adapting its services to local markets.

Agrimark https://agrimark.dit.go.th

Agrimark is promoted by the Department of Domestic Trade of the Ministry of Commerce of Thailand, and it offers an online marketplace where farmers can sell their products directly to consumers, so the farmers would get fairer price for their products. So far, the platform has improved the promotion of local agriculture and the efficiency in the agricultural supply chain (Department of Internal Trade, Ministry of Commerce of Thailand, n.d).

3.20 The United States (US)

Table 20 *Demographic and Socioeconomic Profile of The United States*

Category	**Information**
Total population	334,914,895 (2023)[a]
Population by gender M/F	M:49.50 %[b] / F:50.50%[c] (2023)
Population rural/ urban	Urban: 83.30%[d] / Rural:16.70%[e] (2023)
Access to connectivity (Individuals using the Internet (% of population)	91.75%[h] of population with internet access (2021)

Source: World Bank(2023r)[a], World Bank(2023t)[b], World Bank(2023u)[c], World Bank(2023v)[d], World Bank(2023w)[e], and World Bank (n.db)[h].

The US is a major agricultural producer, and its main crop is corn, among other diverse products like sugar, vegetables, and cotton (Statista, n.d). However, it is estimated that in less than 10 years, the number of employees in this sector (more than 800,000 in 2022) will decrease by 16,000 approximately (Statista, n.d). Some of the principal struggles that small farmers face are the high supply costs and labor shortages as well as food insecurity, one of the consequences of climate change (US EPA, n.d.; American Farm Bureau Federation, 2022).

Climate change and water regulations pose environmental challenges, impacting productivity and resource management. While local markets, like farmers' markets, enhance public health by developing an ecological and social atmosphere where people can learn about healthy food and the farmers can provide it (Warsaw et al., 2021), there are also market access issues, which include trade barriers and infrastructure inadequacies, causing price volatility and income instability. Given this situation, initiatives like Farmers.gov support small farmers through digital platforms, promoting digital commerce.

A notable example is the USDA's pilot online purchasing program for the Supplemental Nutrition Assistance Program (SNAP), launched in 2019. This program aims to allow SNAP beneficiaries to purchase food online, including fresh produce from local farmers. Through partnerships with online retailers such as Amazon and Walmart, the program seeks to improve low-income consumers' access to healthy and fresh foods while supporting family farmers by expanding their sales channels (GAO, 2021).

Farmers.gov Farmers.gov

Farmers.gov is an initiative that provides a variety of resources, tools, and assistance to the US farmers and ranchers. This platform allows them to access technical advice, protection and recovery programs, financial support, and other resources to improve farming operations (The USA Department of Agriculture, n.d). The platform offers various loans, including microcredits, guaranteed conservation loans, and financial aid for climate-smart practices. These helps finance land, equipment, and essential resources, with tools for financial management and business planning (The US Department of Agriculture, n.d).

3.21 Viet Nam (VN)

Table 21 *Demographic and Socioeconomic Profile of Viet Nam*

Category	Information
Total population	98,858,950 (2023)[a]
Population by gender M/F	M:49.41%[b] / F:50.59%[c] (2023)
Population rural/ urban	Urban: 39.48%[d] / Rural: 60.52%[e] (2023)
Access to connectivity (Individuals using the Internet (% of population)	78.59%[h] of population with internet access (2022)

Source: World Bank(2023s)[a], World Bank(2023t)[b], World Bank(2023u)[c], World Bank(2023v)[d], World Bank(2023w)[e], and World Bank (n.db)[h].

In VN, agriculture plays a significant role in employment and exports. Walnuts, coffee, and rice were three of the main agricultural products that VN exported in 2021 (Nguyen, 2023). While there has been significant growth in its exports, local workers, mainly small farmers, that remain in this sector often lack modern or technological techniques that could lead to efficiency and improvement of their farming methods (Nguyen, 2023). To address the challenges they face, there are initiatives that support them through digital platforms like Postmart, Shopee Việt Nam, Tiki Việt Nam, Lazada Việt Nam, Voso.vn, and Eden Hub, by promoting digital commerce and assistance.

Postmart - Buudien.vn https://postmart.com.vn/

The Postmart digital platform (the platform has been renamed Buudien.vn) supports small farmers in VN by enabling them to sell their products directly to consumers through an online marketplace. It enhances the connection between rural producers and urban buyers. Also, it offers a technological infrastructure for farmers, so they are able to access a wider market and manage their sales. The platform allows buyers and sellers to negotiate directly, reducing middlemen, avoiding dependence on traders and generating higher profits. In addition, this platform is also a place for businesses to access and find reliable and transparent sources of products. It saves time and effort (Ministry of Information and Communications, 2024).

Shopee Việt Nam https://shopee.vn/

Shopee Viet Nam is an e-commerce platform that provides a digital channel where small farmers sell their products directly to consumers. It enhances the sale of products from various sectors and includes tools for promotions and shipping and it also simplifies the process for farmers. This platform has a Shopee Switchboard/Shopee Hotline, which is a function integrated into the Shopee application, which provides an official communication channel between Shopee and buyers and sellers, in order to help Users resolve problems or concerns related to the purchase. Also, in case of inconvenience, there is a staff that provides support 24 hours a day, 7 days a week (Shopee, 2021).

Tiki Việt Nam https://tiki.vn/

Tiki.vn is an e-commerce platform that connects farmers with a larger customer base, so they can sell fresh agricultural products directly to consumers. It also provides logistics and fast shipping options. This platform encourages people to place orders and thus participate in promotions, and you can also track the status of your order. If any issues arise, you can call a hotline, talk to a personal assistant, submit a request, send an email or write through their websites (Tiki.vn, 2024)

Lazada Việt Nam https://www.lazada.vn/

Lazada Viet Nam is a leading e-commerce platform that provides a digital marketplace for small farmers to sell their agricultural products, to reach more consumers while they benefit from secure payment options, delivery services and promotional tools. In the event of an error in the order, the platform allows you to request a refund. This refund is given within 24 hours after confirmation of the order cancellation (Lazada.vn.,2024).

Voso.vn (App on Smartphone)

This platform was developed by Viettel Telecommunications Group, which promotes the improvement of the online shopping experience by using Viettel Post technology. It provides greater security and convenience in payment methods and product delivery. The vision of this platform is to create a connection between producers and small farmers, as well as with restaurants, convenience store chains and consumers by applying the Online to offline to online model with a good foundation of digital technology (The Voice of Viet Nam,2022).

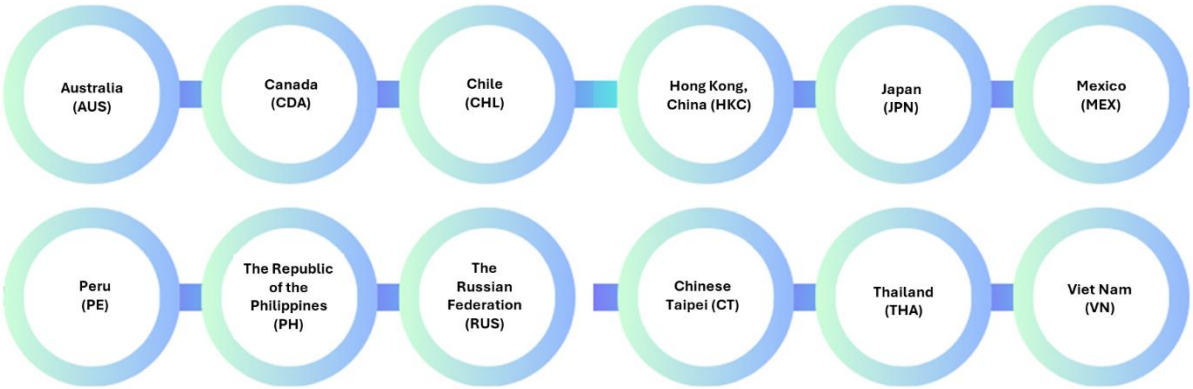
Eden Hub https://edenhub.vn/

Eden Hub is a free digital platform that supports agriculture by offering farm management solutions. It aims to improve the productivity and quality of small-scale agriculture through technology and providing the necessary tools. Eden Hub connects farmers to local and international markets to reduce middlemen. It also provides agricultural information, allows crop data to be updated and production to be recorded (EdenHub,n.d).

4. Results of the Survey on Interconnecting Family Farmers with Consumers through Innovative and Inclusive Digital Platforms in the APEC Economies

The Survey on Interconnecting Family Farmers with Consumers through Innovative and Inclusive Digital Platforms took place from 10 -26 June 2024. It was conducted using virtual and official channels and shared with 21 APEC's focal points. The aim was to gather information about the tools and platforms that promote digital commercialization for small-scale farmers—promoted by both the public and private sectors—and the barriers and opportunities in these processes. In total 12 responses were collected from the focal points of APEC economies.

Figure 01 APEC Economies that Responded to the Survey



APEC economies that did not respond: Brunei Darussalam (BD), People's Republic of China (PRC), Indonesia (INA), Republic of Korea (ROK), Malaysia (MAS), New Zealand (NZ), Papua New Guinea (PNG), Singapore (SGP), and The United States (US).

Source: Survey on Interconnecting Family Farmers with Consumers through Innovative and Inclusive Digital Platforms in the APEC Economies, 2024

4.1 Data Collection

For the data collection phase, a questionnaire with 36 questions was developed with open and closed items. The questionnaire was divided into 4 sections as follows: i) Information on Respondents, ii) Digital Platforms in APEC Economies, iii) Main Opportunities and Challenges in Digital Transformation, and iv) The Snowball Sampling Recruitment (see Appendix 1 - Survey Template). The participation of informants was voluntary, consented, and confidential and the sample for interviews applied the snowball sampling technique.

The digital form was sent by an official email to each APEC focal point of the economies. Even if the survey did not collect sensitive data from respondents, it was framed within APEC's Data Protection Policy to safeguard the shared information and ensure that the data is used solely for this process.

4.2 Data Analysis

For the data analysis phase, the responses were stored on digital platforms. Analysis avoids the use of personal information from respondents and their answers were related to the economy that they represented. In the survey there are multiple choices and other open questions. In the case of open questions, the content has been coded and analyzed according to thematic categories. Below, the analysis is divided according to the sections in the original survey.

4.2.1 Section 1: Information on Respondents

The survey collected 12 results out of 21 total APEC participants (See Figure 01). It represents more than 57% of the member economies. In general, most of the respondents represent the Department or Ministry of Agriculture or similar institutions in their economies. The majority are men over 46 years old with relevant experience in the sector (see Appendix 2 - Survey Figures 02 and Figures 03).

4.2.2 Section 2: Digital Platforms in APEC Economies

Continuing with the second section of the survey “Digital Platforms in APEC Economies”, respondents recognize the importance of digital tools for promoting family farmers products. And more than 90% report that their economies use digital platforms. However, an important point here is that the platforms are “partially known” and “moderately used” by family farmers. In this regard, we might ask why if digital platforms are so important, small farmers are not aware of their existence. Indeed, they are not using the platform so far (see Figures 04 to 07).

Figure 02 From your perspective, how important is the promotion of digitalization for small-scale farmers in the commercialization of their products?

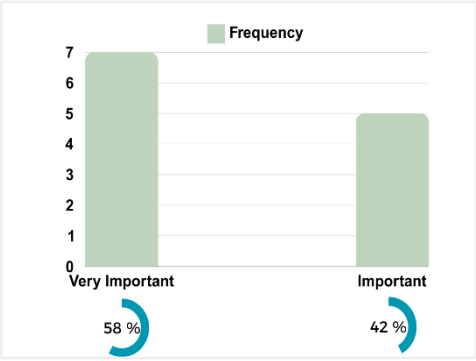


Figure 03 Does your economy use digital platforms to promote the commercialization (both e-commerce and information dissemination) of small-scale farmers' products?

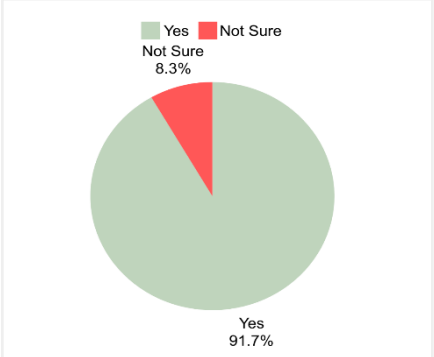


Figure 04 If the previous answer (2.2) was "Yes," to what extent are small-scale farmers aware of these platforms?

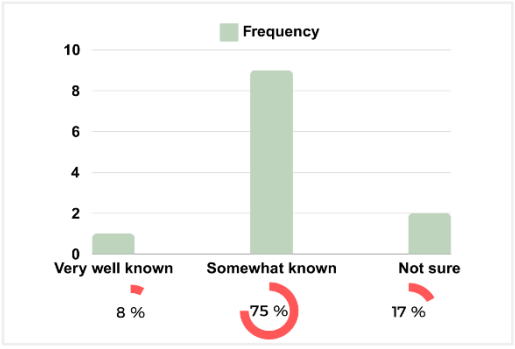
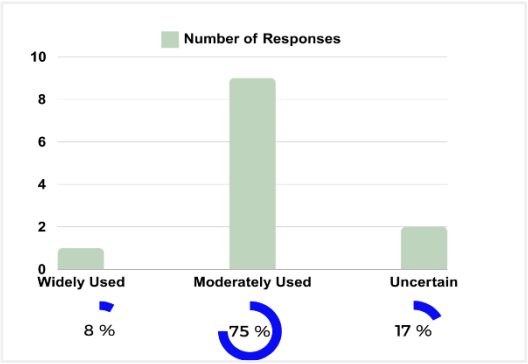


Figure 05 If the answer to question (2.2) was "Yes," to what extent do small-scale farmers use these platforms?



Then, as it detailed in Table 22, at least 30 different platforms were listed in the 12 APEC economies' answers. In relation to these platforms, respondents underline the following information (see Appendix 2 - Survey Figures 08 to 13):

- There are different types of actors involved in the development and implementation of the platforms, but the private sector, public sector, civil society organizations and academia predominate. Hence, alliances between those actors are crucial.
- The role of governments is indispensable to regulate and give sustainability to the processes, thus regulatory frameworks that are known and clear are required.
- The role of the private sector is also crucial, but the success of its interventions should be better promoted and/or disseminated.

Table 22 Digital Platforms that have Demonstrated Good Results in Promoting Family Farming Products

APEC Economy Represented	Platforms Used	Platform Links	Sectors Involved
Australia (AUS)	Austrade	https://www.austrade.gov.au/	All sectors: public sector, private sector, researchers
	GrowAg	https://www.growag.com/	
	DAFF	https://www.agriculture.gov.au/online-services	
Chile (CHL)	Peasants Markets	https://www.indap.gob.cl/mercados-campesinos	Public sector, private sector (peasant organizations)
Hong Kong, China (HKC)	Local Fresh	https://www.localfreshhk.com	Small farmers or fishermen
Japan (JPN)	E-commerce sites operated	Not specified	Private sector

Mexico (MEX)	SIAP	https://www.gob.mx/siap	Academia and secretaries of agriculture of the federal entities
	Agro Oferta APP-AgroMercados B2B	https://agrooferta.gob.mx/e-commerce/	
Peru (PE)	Agrochatea	https://siea.midagri.gob.pe/portal/agrochatea/	Public and private sectors, civil society
	Products Catalog	https://catalogo.midagri.gob.pe/	
The Republic of the Philippines (PH)	RSBSA	https://www.da.gov.ph/rsbsa-registration-and-updating/	Public sector, private sector, academia, civil society organizations, farmer cooperatives and associations, etc.
	FFEDIS	https://ffedis.da.gov.ph/	
The Russian Federation (RUS)	OЗOH Фреш	https://www.ozon.ru/	Private sector
Chinese Taipei (CT)	Chacha Brekkie	https://chachabrekkie.com/	Public and private sectors, academia, civil society organizations
	Yuansiang ecological farm	https://www.instagram.com/yuansiang_2009/	
	Super Buy	https://www.superbuy.com.tw/about.php	
	Farmers Buy	https://farmersbuy.cas.org.tw/#/	
	The Wonderful Food	https://www.wonderfulfood.com.tw/	
Thailand (THA)	Shopee	www.shopee.co.th	Private sector, public sector
	Lazada	www.lazada.co.th	
	Online market for farmers' products	https://www.ตลาดเกษตรกรออนไลน์.com	
	Social commerce (Facebook, TikTok, YouTube, Line, Google)	Not specified	
Viet Nam (VN)	Postmart	https://postmart.com.vn/	Public sector
	Shopee Việt Nam	https://shopee.vn/	Private sector

	Tiki Việt Nam	https://tiki.vn/	Private sector
	Lazada Việt Nam	https://www.lazada.vn/	Private sector
	Voso.vn	APP Smartphone	Public sector

Source: Survey on Interconnecting Family Farmers with Consumers through Innovative and Inclusive Digital Platforms in the APEC Economies, 2024

Afterwards, when we asked about the replication of their good practices or initiatives in other economies, the answers were 50%- 50%. But something that is very interesting to note is the following quote:

"*(…) it is important to note that while replication or adaptation is possible, it may require careful consideration of local contexts, regulatory environments, infrastructure, and cultural factors. Successful implementation often requires tailoring the initiatives to the specific needs and circumstances of each APEC economy".*

It means that there are good practices, but their replication or adaptation depends greatly on the characteristics and dynamics of each territory (see Appendix 2 - Survey Figure 15).

4.2.3 Section 3: Main opportunities and challenges in digital transformation

The third section of the survey, entitled "The main opportunities and challenges in technological transformation," is composed of some open questions. Thus, the content was processed, coded and analyzed into four categories for the opportunities and six categories for the challenges.

4.2.3.1 Opportunities

The main opportunities for implementing digital platforms in family farming were analyzed in four categories: i) Market and supply chain, ii) Sustainability and better practices, iii) Modernization and technology; and iv) Income and production (see Appendix 2 - Survey Figure 15).

Table 23: Four Categories- Opportunities

Category	Content
1 Market and Supply Chain	The economies reported that implementing digital platforms in small-scale agriculture could enhance market access and make it more competitive. Particularly, it connects growers to supply chains and consumers, enhancing productivity, traceability and marketing. It helps streamline the supply chain by connecting small-scale farmers directly with buyers, wholesalers, and retailers. It reduces intermediaries, increases transparency, and ensures better prices for farmers.
2 Sustainability and Better Practices	It strengthens sustainable agricultural practices, promoting climate resilience. Importantly, it creates opportunities to build a sustainable business through improvements in innovation, adaptation, adoption, extension and farm management practices.
3 Modernization and Technology	Ideally, it collaborates with digital transformation in rural areas with modernization, digitalization and access to technologies. It facilitates the creation of online communities where small-scale farmers can access knowledge, share experiences, best practices, and support each other.

4 Income and Production	It could increase income for farmers' households and with more profit other conditions also improved. They also increase their level of life.

Source: Survey on Interconnecting Family Farmers with Consumers through Innovative and Inclusive Digital Platforms in the APEC Economies, 2024

Respondents consider the adoption of digital tools and platforms as a positive thing because family farmers could diversify their market options, improving their welfare and modernizing their production in a sustainable perspective.

4.2.3.2 Challenges

On the other hand, the main challenges for implementing digital platforms in small-scale farming were analyzed in six categories: i) Technology access and connectivity, ii) Digital literacy and capabilities, iii) Political instability and regulatory frameworks, iv) Cultural and environmental barriers, v) Information and data; and vi) Resources, funds and maintenance (see Appendix 2 - Survey Figure 16).

Table 24: Six Categories- Challenges

Category	Content
1 Technology access and connectivity	Respondents reported that limited access to technology is a big barrier to the adoption of innovative solutions and this is due, in part, to the connectivity problems that persist in rural areas.
2 Digital literacy and capabilities	Most respondents stated that the lack of skills in the use of digital devices and technical knowledge is a big barrier to achieving innovation in family farmers. The digital literacy of farmers is a crucial topic to consider, and technical support is essential in this process.
3 Political instability and regulatory frameworks	Political instability is a permanent threat for the installation of innovation and the continuity of projects in the field due to big elements such as corruption. Therefore, regulatory frameworks are essential to provide support and continuity to interventions. Likewise, important topics appear such as data privacy and security normative.
4 Cultural and environmental barriers	The territories and small farmers are diverse and have different needs. In this sense, the digitalization of small agriculture faces cultural and language barriers. Therefore, they must be flexible and understand local dynamics. At the same time, the environment changes rapidly and climate change exacerbates this situation.
5 Information and data	There is a lack of updated information for small farmers. This represents an important barrier when developing digital solutions because data is required.
6 Resources, funds and maintenance	Another important concern is the lack of investment and capital that provide continuity to the maintenance of the digital tools. Maintenance is an important problem in this path.

Source: Survey on Interconnecting Family Farmers with Consumers through Innovative and Inclusive Digital Platforms in the APEC Economies, 2024

Respondents report that there are relevant barriers to consider in order to promote the adoption of digital technologies for family farmers. These barriers are mainly related to access and connectivity in the rural areas, skill, formats, cultural elements, languages and tech-knowledge, the lack of regulatory frameworks to protect their information and sufficient funds to ensure sustainability over time.

4.2.3.3 Women

The survey addresses the different perceptions of whether women in small-scale agriculture face as challenges in accessing digital platforms. Respondents were first asked if they consider that women have different challenges in accessing digital platforms and the three response options showed the same percentages as results: 33% (No), 33% (Not sure) and 34% (Yes).

Then, respondents mention that, mostly, differences in the challenges between women and men are due to different cultural practices and beliefs. The challenges lie mainly in a social preference for men as farmers, which limits women's access to resources and different opportunities. Women are also often perceived as “vulnerable or less capable” of achieving the same results as men, leading to stigmatization. In addition, women face significant barriers in technology adoption due to lack of knowledge and different restrictive local customs. Similarly, their limited economic independence further deepens these challenges, since they have less access to productive resources such as water, land and capital for their investments. This combination of cultural, educational, and economic barriers significantly hinders women's access to engage with digital platforms effectively.

However, as opportunities for women's involvement in digitalization processes, respondents mentioned the following perceptions: there is a positive impact on production, community development and economic growth for them and their families. The diversification of business models, the empowerment of female producers, financial independence and equity in participation (see Appendix 2 - Survey Figure 17 and 18).

4.2.3.4 *Young People*

The survey reveals information about young farmers on whether they feel they face different challenges in accessing digital platforms due to their involvement in small-scale farming. The answers vary according to the options. 25% (no), 33% (not sure), and 42% (yes).

Respondents state that most young people in family farming face different challenges in accessing digital platforms. First, one of the main challenges is the lack of access to different digital technologies in the places where they are located. This limits their access to the opportunities that these platforms can offer. Second, access to capital and the lack of financial resources to invest in technology prevents them from modernizing their agricultural practices. Third, not being able to make their own decisions, since older adults intervene, makes it difficult for them to access digital platforms. That is why young people, despite having greater digital literacy, have difficulties in incorporating new technologies.

However, as opportunities for young people's involvement in digitization processes, respondents mentioned the following perceptions: young farmers are more open and flexible to adopting new techniques or platforms. In addition, they can help teach other generations (older or younger). Production is also increased by promoting more efficient models, so income can be more attractive. And it is these alternatives that can reduce migration and the ageing issue.

5. Results of the Workshop

This section of the report is focused on the workshop which was held in Trujillo- Peru, on 14 August 2024, with the aim to present the survey results (component I), and share success stories, and platforms that promote the use of ICT among small farmers in APEC economies. The following lines systematize the results of the event highlighting the key discussions topics.

5.1 Workshop Agenda

The workshop was attended by 66 participants, including delegates from APEC economies, representatives of governments, the private sector, civil society organizations, academic and research institutions related to family farming and digital technology. The opening ceremony was held by Jorge Castro, General Director of the Directorate of Agrarian Policies (MIDAGRI) and Dr. Su San Chang, Principal Coordinator of the Agricultural Technical Cooperation Working Group (ATCWG- APEC); and it was moderated by Mariana Escobar, FAO representative in Peru.

Then, it was divided by two thematic sessions: i) Setting the Context on the adoption of digital tools and platforms (ITCs) for the commercialization of products from small farmers in APEC; and II) Best practices - Tools and platforms (ICT) for the commercialization of products and adoption of digital technology among smallholder farmers in APEC (see Appendix 3 – Agenda).

- Session I included three presentations to cover the general context of digitalization in the food systems, especially in family farming production. It begins with the APEC survey's insights, then some reflections of the new revolution of agriculture were shared, followed by the private case of value chains to ECOSYSTEMS and the session finished with an official photograph (see Appendix 4 – Group photo).

- Session II included four presentations oriented to share the best practices in one group of APEC economies: Chile; Mexico; Peru; and Viet Nam. This session concluded with some questions from the participants, closing remarks and with the conduction of a survey (see Appendix 5 – Workshop survey template) to collect the impressions and suggestions of all participants.

Below, a brief summary of each presentation is provided.

5.1.1 Session I

Presentation 1: Setting the Context on the Adoption of Digital Tools and Platforms for the Commercialization of Products from Small Farmers in APEC economies- Lorena Cardenas (Project Researcher/ APEC Expert)

The survey collected 12 results out of 21 total APEC participants. It represents more than 57% of the member economies. In general, most of the respondents expressed that there are different types of actors involved in digital tools and platforms innovation initiatives, but the private sector, public sector, civil society organizations and academia predominate. The alliances between these actors are crucial in this path. The role of governments is indispensable to regulate and give sustainability to the processes, thus regulatory frameworks that are known and clear are required. Similarly, the role of the private sector is also crucial, because it opens many opportunities, but the success of its interventions depends on their flexibility and the context of each space.

As opportunities, digital tools and platforms allow direct access to markets, limiting the need for intermediaries and improving prices. Production, traceability, marketing and transparency are improved. As well as reducing the effects of CC and environmental degradation, ideally, with more sustainable practices in the field. Facilitating modernization, digitalization and access to new technologies. As challenges, digital tools and platforms still face limited infrastructure, connectivity, cultural traditions or social norms. Digital education, capacity building, financial

inclusion, affordability, limited timely and up-to-date data/information and regulatory frameworks especially in data trust and security.

To finish, the importance of involving women and young people in digitalization is highlighted because it can empower them by opening opportunities and improving their quality of life and increasing their participation, leadership and equity in rural areas. It opens new perspectives and digital capabilities for them and other generations.

Presentation 2: Manager of Digitalization of Agrifood Systems Hemispheric Program Inter-American Institute for Cooperation on Agriculture - Federico Bert (Manager of Digitalization of Agrifood Systems Hemispheric Program IICA)

This presentation examines the transformation of agricultural value chains through digitization, with a particular focus on the Latin American region. Its emphasis, the speed of change in the technology and innovation field where value chains were completely reinvented. Agri-food systems are being transformed by digital technologies. Users demand better products, more efficiency and more transparency processes. A double effort must be made so small farmers are not the "losers" in these new market dynamics. In this regard, we need to avoid exclusion, conflicts, displacements and violations of properties and privacy rights within family farmers producers. Because transformation will have many positive and some negative impacts.

Presentation 3: Family Farming: From Value Chains to ECOSYSTEMS- Hugo Piñarreta (Founder of AGROS)

Identi (AGROS) was founded in Piura (Peru) in 2024 to have an impact on the lives of millions of farmers around the world. It gained more than USD2 million invested in research, development, and scaling of technological solutions that contribute to boosting the rural economy around the world with more than 50 clients. The problem that the initiative identified is the fragmented information in rural farmers thus, they created the multimodal wallet which permits the storage of user's information with no asymmetry, digital slavery and intermediation.

The multimodal wallet, mainly, triggers: i) Digital infrastructure that allows farmers and value chain stakeholders to collect and share data securely, without relying on third parties, ii) Farmers at the center understand their needs, context, and develop practical solutions, iii) Multimodality because the developed infrastructure must be accessible to both digital and non-digital users. Therefore, it should be usable through multiple channels, regardless of their level of technological connectivity: and iv) Sovereignty of "my data" where producers should own their own data and have the power to decide with whom to share it.

5.1.2 Session II

Presentation 4: Develop Policies, Programs and activities to Promote the Adoption of ICT for Small Farmers Product Commercialization - Daniela Villanueva (Chile)

In Chile, there are around 162, 211 family farmers (2023), 46.19% are women, 39% belong to an indigenous people, the average age is 57 years old, 7.43% are young people under 35 years of age, 83% receive technical assistance, 75% received investment subsidies and 32% accessed credit.

The National Institute for Agricultural Development (INDAP)- Ministry of Agriculture of Chile promote the digital commerce for family farming through the Digital Integration Strategies 2024 that aim to have the following items: i) Family farming catalog products (https://catalogo.indap.cl/), ii) Development of commercial platforms projects, iii) Commercial consolidation projects for Tiendas Mundo Rural (https://mundorurallamoneda.cl/); and iv) Digital payment methods. The main goal of the strategy is to provide high-quality, competitive products at fair prices and create a commercially viable product offering.

Presentation 5: Use of Information and Communication Technologies in the AgriFood Sector of Mexico - Ana Gutierrez (Mexico)

In Mexico, 75% of the producers are categorized as small-scale production (2022) and a big concern with this target population is the connectivity. In this context, to ensure the commercialization of their products and the trade between producers and buyers the government in alliance with other actors created "*Aldeas Digitales*" to provide access to the internet in rural areas. Additionally, the government promotes 2 platforms: Agro Offer as a free digital platform to connect local and international producers and buyers and MIPYMESMX as a services platform designed to promote micro, small and medium-sized businesses.

Presentation 6: Family Farming in Viet Nam and Digital Platforms for the commercialization- Nguyen Anh Phong (Viet Nam)

In Viet Nam, labor in the agriculture, forestry, and fisheries sector in 2023 was 138 million people. It represented 27.5% of the total labor force. In this sense, the government is focused on the promotion of different mechanisms to improve production. For example: The Agricultural Cooperative Data Management System is a web page that connects producers as well as the Smart Village models. Digital transformation helps farmers access information, improve capacity and connect to markets for example: i) VOSO e-commerce platform launched by Viettel Post, which is part of the large Viettel Group Army Telecoms. VOSO initially started as an online marketplace but quickly specialized to differentiate by focusing on supporting local industries, including agriculture. ii) SENDO e-commerce platform is part of FPT Corporation (Viet Nam's largest IT services company), it operates on both C2C (Consumer-to-Consumer) and B2C (Business-to-Consumer) models, acting like a fast delivery service supported by the partnerships with local logistics companies to ensure that perishable goods are delivered promptly, maintaining quality and reducing spoilage.

Presentation 7: Family Farming in Peru, characteristics and advances from Peru in the digitalization through tools and digital platforms for the commercialization- Cesar Santisteban (Peru)

In Peru, the government in hand with other actors, promotes many digital tools and platforms to enhance family farmers production. The Virtual Catalogue of Agricultural Products allows direct contact between agricultural producers and buyers (490 farmers are registered at local level). The Platform of Supply System and Prices (SISAP) provides different tools to improve decision-making among production agents, facilitate internal and external marketing operations and update key information. As a kit of apps, there are *Mi Caserita* and *AgroChatea* as good practices of innovation. Another initiative is the Digital Identity of the Farmer (*Padrón*). These digital initiatives empower farmers with the ability to record and geo-reference their information, access real-time weather information, and employ advanced analytical tools to optimize their farming practices. These advances not only improve the competitiveness of family farmers but also promote more sustainable and efficient agricultural management in Peru.

5.2 Workshop Keynotes

The main points discussed at the workshop can be summarized as follows:

- There is great interest in promoting the digitalization of family farming from different actors in APEC economies. However, it must still be recognized that there are several aspects to improve and gaps to address in order to achieve a transition to digitalization in an inclusive and sustainable way.
- The use of ICT is very important to improve efficiency in the production and marketing of different agricultural products at different stages of connection between different actors. In addition, recognizing how these technologies can be implemented and adapted to the specific needs of each farmer is important to ensure their success in the market.
- Greater sustainable commitment over time is needed from the main actors, from the public and private sectors, civil society and academia. This commitment is relevant for the adoption of different digital tools and platforms in the marketing of family farming production.

- It is important to have updated data on small farmers. This would allow us to know each of them, as well as consumer demand and trends. It is also important to have strong regulatory frameworks, privacy mechanisms, storage and automatic collection of their data in real time.
- Establishing open dialogues between stakeholders such as farmers, government and technology companies is very important to foster cooperation in agricultural digitalization.
- Different strategic alliances allow sharing knowledge and resources. This facilitates the implementation and expansion of digital technologies in family farming.
- There are important challenges, such as connectivity gaps, and limited digital education in different rural areas. Addressing these challenges would ensure that digitalization is inclusive and accessible to all small farmers.
- Women and young farmers are an important group to consider in the digitization process. Their participation is important, since their labor in rural areas would allow them to develop inclusive digital capabilities for themselves and other generations.

5.3 Workshop Evaluation Survey

The survey was completed by 29 participants, and the results show a positive reception to the agenda, especially about the relevance, impact and applicability of the topics. Most of the participants agreed that the content was very important for their needs and for the development of their economies. In terms of skills and knowledge acquired, feedback indicated that most participants appreciated the opportunity to learn about different digital platforms and the applications of technology in agriculture. This suggests that the workshop provided useful and up-to-date information.

The transfer and adaptation of this knowledge was also a strong point of the workshop, as many participants expressed concrete plans to implement what they learned in their work environment, such as improving public policies, developing new tools, and organizing training. This point is very important for the middle and long-term impact of the workshop, as it evidences a direct link between the content of the event and practical improvements within APEC members. However, for the improvement of similar spaces, some participants suggested that more time should be necessary for peer discussion and recommended less emphasis on one-speaker presentations to encourage a more active and productive exchange of ideas.

6. Conclusions and recommendations

6.1 Conclusions

APEC is aware of the importance of adopting digital tools and platforms for the commercialization of small farmers' products. The topic of Innovation and Digitalization appears as a main economic driver in the Putrajaya Vision 2040 (APV2040) and as a cross-cutting element in the Food Security Roadmap Towards 2030.

This piece of work provides evidence to have a better understanding of the APEC economies' context in the adoption of digital tools and platforms for family farmers. However, they are a very diverse group, and innovative solutions must take that into account. One-size-fits-all approach can't work for every place. Innovation requires investing in research and development to respond to real local dynamics (it must be flexible).

Innovation and digitization are complex, involve many actors (at different levels), and cannot and should not operate in isolation. The key components are partnerships, alliances and networks linking different actors. Public-private collaborations can accelerate digital innovation providing resources and expertise, but it is also necessary to have clear regulatory frameworks.

Digital platforms allow direct access to markets, limiting the need for intermediaries and improving prices. Production, traceability, marketing and transparency are improved. As well as reducing the effects of CC and environmental degradation, ideally, with more sustainable practices in the field.

The involvement of women and young people in this route is key because it can empower them by opening opportunities and improving their quality of life, promoting equity and greater participation and leadership in rural areas. New perspectives and digital capabilities are opened for them and other generations.

Despite the benefits, there are latent challenges such as limited infrastructure, connectivity, cultural traditions or social norms. Digital education, capacity building, financial inclusion, affordability, limited timely and up-to-date data/information and data trust and security.

Even if this field is continuously evolving and changing, family farming should contemplate digital tools and platforms to guarantee its sustainability over time. The COVID-19 pandemic provides many lessons learned and good practices around the use of digital tools for sharing information, delivering information to farmers, and to some extent receiving feedback from them.

This comprehensive analysis – which include literature review, conduction of a survey and development of a workshop - shows a clear trend toward the importance of digitalization in family farming. While significant challenges exist, the opportunities to improve productivity, market access, social inclusion and sustainability are vast. The combination of government support, public-private partnerships, research and the empowerment of women and youth can transform family agriculture, making the sector more competitive and sustainable in the future.

6.2 Recommendations

Promoting more of this type of space that encourages dialogue and reflection between different actors on the adoption of digital platforms in family farming opens the possibility of sharing information, good experiences and lessons learned between peer economies and other contexts that can inspire similar initiatives.

The different actors involved in these types of initiatives - government, private sector, academia, civil society, rural communities and others - must know the territory and its dynamics before developing a digital idea. They must also consider possible pre-existing limitations related to the following points: technology access, connectivity, affordability, digital literacy and capabilities, political and regulatory frameworks for data trust and security, lacking updated data, resources and maintenance of devices and structures, and cultural, language and environmental barriers. In this way, technological solutions fit more closely to the territories in which they would be implemented. Thus, the active participation of local actors is essential from the beginning with a special attention on women and young participation.

Encourage alliances between actors at different levels. Each one plays a role, and coordination is necessary for the development of useful and sustainable platforms over time. Experiences showed that many initiatives do not prosper due to a lack of clarity in roles or weak coordination with users. These elements must be considered beforehand.

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8. Appendices

8.1. Appendix 1 - Survey Template

https://drive.google.com/file/d/1fnVIR-Nd4wzxS_6SpiRBVY9iTY8JlSIx/view?usp=sharing

8.2 Appendix 2- Survey Figures

https://drive.google.com/file/d/1YvvJcTCXLhxauRmQ0CI-CijKjqKPixcK/view?usp=sharing

8.3 Appendix 3- Agenda Workshop

https://drive.google.com/file/d/1wK4OkKf_QWd9Ux6PGUe9DgnCnajVjIp1/view?usp=drive_link

8.4 Appendix 4- Group Photo

Source: https://www.flickr.com/photos/apecperu/with/53923091201

8.5 Appendix 5 – Workshop Survey Template

https://drive.google.com/file/d/1l2l2SMkqHlzcRdLcs4eRw5WJAww6Difp/view?usp=drive_link

9. Glossary

Digital Platform	According to OECD (2023) digital platform is defined as any digital interface that generates economic and/or social value and that intermediates between three distinctive agents (the owner of the platform, the provider of labor services, and the final user of the goods and services produced). It provides services and/or tools.
Small-scale producers	According to FAO (2024) smallholders' farmers are small-scale farmers, pastoralists, forest keepers, and fishers who manage areas varying from less than one hectare to 10 hectares. Smallholders are characterized by family-focused motives such as favoring the stability of the farm household system, using mainly family labor for production, and using part of the produce for family consumption. Family farming refers to all types of family-based production models in agriculture, fishery forestry, pastoral and aquaculture, and include peasants, indigenous peoples, traditional communities, fisher folks, mountain farmers, forest users and pastoralists (FAO & IFAD, 2019).