Food and Agriculture Organization
of the United Nations

STRENGTHENING THE E-AGRICULTURE ENVIRONMENT AND DEVELOPING ICT-MEDIATED AGRICULTURAL SOLUTIONS FOR PAPUA NEW GUINEA

April 2020

SDGs:

Countries:	Papua New Guinea
Project Codes:	TCP/PNG/3605
FAO Contribution	USD 300 000
Duration:	27 December 2016 – 26 December 2019

Contact Info: FAO Office with Programme Officer in Papua New Guinea
FAO-PG@fao.org

Implementing Partners

The Department of Agriculture and Livestock, the National Information and Communication Technology Authority and line ministries of the International Telecommunication Union.

Beneficiaries

Smallholder farmers, producers and agricultural value chain actors; agri-innovators; extension services and officers from the Department of Agriculture and Livestock; and consumers in Papua New Guinea.

Country Programming Framework (CPF) Outputs

Strengthened capacity in data collection, management and analysis; strengthened policy, legal, regulatory and strategic frameworks for sustainable agriculture, forestry and fisheries development; strengthened capacity for agricultural products to meet market standards and be competitive on target markets; sustainable management of forests and trees; and sustainable and efficient fisheries management and practices.

Background

Agriculture is the mainstay of Papua New Guinea's (PNG) rural economy, with 85 percent of its population (of over 8 million) depending on the agriculture sector for their livelihoods. The sector has a great potential to improve national food security, nutrition and income-earning opportunities; create employment; reduce poverty; and enhance socio-economic development. However, attention needs to be directed towards developing appropriate policy, strategies, resources and activities that improve livelihoods and foster rural development. Given both the observed decline in the conventional extension system and emerging global challenges, agricultural development in PNG is becoming more dependent on strengthening linkages between stakeholders and improving access to information and knowledge. Importantly, emerging information and communication technology (ICT) tools and applications offer promising opportunities to promote communication, information sharing and general national development. Many actors in the sector have taken advantage of these opportunities but cannot progress further without favourable guidelines and policy, appropriate infrastructure, funding support and the underlying technical skills.

The Government of PNG has expressed a need to improve the research–extension–farmer continuum so that it can both better serve farmers and rural communities involved in agriculture and make relevant information more readily available through an appropriate delivery medium. The availability, accessibility and adaptability (commonly referred to as AAA) of crucial livelihood-related information are essential to sustainable farming. Yet, the existing information gap between agricultural extension efforts, outreach services and farmers has been widely acknowledged as a barrier to sustainable food production. New ICTs provide a way to bridge this information gap and more effectively address issues relating to climate change mitigation and adaptation, economic growth and general agricultural productivity.

Public and private sector actors have been continually searching for effective solutions to address both the long- and short-term challenges faced by the agriculture sector, which include addressing the abundant information and knowledge requirements of farming communities, strengthening value chains, promoting innovation and participating in emerging markets. Contemporary digital technologies for information processing and communication, as a suite of technologies, are one of the solutions that have shown considerable promise when applied to agriculture in developing countries. The ICT industry has moved beyond the costly, bulky, energy-consuming equipment, which was once available only to a small number of individuals, for the storage, analysis and publication of agricultural and scientific data.

With the mobile, wireless, and internet industries booming, ICT has found a foothold in the activities of poor smallholder farming communities. The potential of ICTs to support agricultural innovation and progress appears even more compelling in light of the increased investment in agricultural research, the private sector's keen interest in the development and spread of ICTs and the increased number of organizations committed to the agricultural development agenda.

E-agriculture is an evolving field that focuses on the enhancement of agricultural and rural development through improved access to information and communication processes. Its scope is constantly changing with new ICT applications continually being harnessed in the agriculture sector. In this context, ICT can be viewed as an umbrella term that encompasses all devices, networks, services and applications, ranging from innovative internet-era technologies and sensors to pre-existing aids such as telephones, mobiles, televisions, radios and satellites. More specifically, it involves the conceptualization, design, development, evaluation and application of innovative ways to use these tools in the rural domain, with a primary focus on agriculture, forests and livestock. The future of e-agriculture will incorporate the provision of standards, norms, methodologies and tools, the development of individual and institutional capacities and the delivery of policy support.

The FAO–International Telecommunication Union's (ITU) E-agriculture Strategy Guide provides a framework on how countries can identify key ICT for agricultural solutions that address existing challenges and help achieve the sector's goals. As e-agriculture services are cross-cutting and involve many actors, particularly ministries of agriculture, feasibility studies are necessary to ensure ecosystem suitability and the sustainability of e-agriculture services.

In PNG, the national approach to e-agriculture must be built on national policies and goals such that its outcomes directly contribute to addressing concerns over household food and nutrition security and poverty alleviation. The Government of PNG has received technical assistance from FAO in the past on various thematic areas related to agriculture and ICTs. However, since a long-term national strategy was lacking, many initiatives have become unsustainable. Hence, under the FAO Regional Project on E-Agriculture, FAO initiated the development of the PNG E-agriculture Strategy together with the Department of Agriculture and Livestock (DAL) and other key stakeholders. Importantly, the strategy has helped guide stakeholders towards forming a holistic approach that both captures and better utilizes the vast opportunities to apply ICT in agricultural and national development.

In parallel with the strategy development process, the Government of PNG has requested that FAO provide technical support for ongoing capacity development on the integration of ICT solutions into agricultural development and on the implementation of pilot/demonstration activities that further support strategy development and finalization processes. Hence, this TCP project aimed to support the Government of PNG to identify, develop and pilot services that ensure the sustainability and facilitate the mainstreaming of initiatives related to agricultural ICT.

Impact

The project aimed to improve agricultural productivity and rural livelihoods by enhancing national capacity to support the development of ICT solutions that address national agricultural goals.

Achievement of results

E-agriculture Strategy Development

The establishment of a strategic framework for e-agriculture in PNG was considered paramount to the success of the project. Following the initial stakeholder consultation and sensitization workshop in June 2016, the "PNG National E-Agriculture Strategy 2017–2023" was drafted. The draft was then validated through a national validation workshop in Port Moresby in July 2017.

The strategy was aimed at achieving national agriculture goals by better harnessing the potential of ICT and accelerating the growth of the agriculture sector in a sustainable and equitable manner by further strengthening the role of ICT. Strategy development was guided by sectoral policies, including the PNG Vision 2050 (2010–2050), the PNG Development Strategic Plan (2010–2030), the National Agriculture Development Plan (2007–2016) and the National Broadband Policy (2013), among others.

An e-agriculture taskforce was established by the DAL, comprising representatives from various agencies, including the DAL itself, Coffee Industry Corporation, the Fresh Produce Development Agency (FDPA), the National Agriculture and Quarantine Inspection Authority, the Department of Communication and Information, the National Information and Communication Authority, the National Disaster Centre and the National Statistics Office. The collective input of taskforce members was central to the development and finalization of the strategy document.

Other important stakeholders were consulted throughout the development of the e-agriculture strategy, including the National Forest Authority, the National Fisheries Authority, the Office of Climate Change Authority, the Department of National Planning and Monitoring, the National Weather Service, National Development Bank, Bank South Pacific, Telikom, Digicel PNG, Bemobile, Vodafone, Datec and the media (EM TV, the National Broadcasting Corporation, the National, the Sunday Chronicle and PNG FM). Technical assistance and expertise for strategy development were provided by the FAO Country Office, together with the FAO and ITU Regional Offices for Asia and the Pacific.

The PNG E-agriculture Strategy was developed in accordance with the framework proposed by the FAO–ITU E-Agriculture Strategy Guide (found at www.fao.org/3/a-i5564e.pdf). It outlines the development of PNG's e-agriculture vision and comprises 69 recommended e-solutions (nine of which were prioritised), an action plan for key ICT solutions and a monitoring and evaluation framework. To best align with the five-year planning cycle of the Government, the 2017–2023 time frame was chosen. The strategy also identifies critical ecosystem requirements (e.g. telecom infrastructure, banking infrastructure, institutional arrangements and capacity levels), takes into consideration the existing systems/solutions and details plans for developing and implementing the nine prioritized solutions.

The strategy was submitted to the National Executive Council (Government Cabinet) for official government endorsement as a national development framework for PNG. The process was at an advanced stage at the time of this report and it is anticipated that it will attract much interest and support once endorsed by the cabinet.

Development of the DAL Website

The DAL is PNG's lead agriculture agency and is charged with policy and regulatory responsibilities. However, the organization did not have an official website until the e-agriculture initiative was introduced. The need to develop an interactive website for the DAL was deemed important and was therefore a prioritized e-solution. Being a priority, the website (www.agriculture.org.pg) was developed under the project. In general, it has enhanced the online presence and visibility of the DAL and PNG's agriculture sector, has promoted corporate standing, has increase networking and communication and has facilitated knowledge management and information sharing in real time. Value chain actors, farmers and a range of other knowledge seekers are expected to benefit significantly from the increased access to information, links and resources on the website.

A local internet service provider (ISP), Datec PNG, was contracted to develop the main framework and the hosting of the website, which was then jointly maintained and administered by the DAL and FAO PNG. The website publishes briefs on the DAL, the agriculture sector and major commodities, and in addition, links to major agencies in the sector, partners and other useful resources.

The Agrometeorology Tool (AMAMAS) for Weather Forecasts and Alerts

A training workshop on agro-meteorological advisory services for PNG was conducted at the National Weather Service (NWS) in Port Moresby on 22–24 May 2018. The Specialized Expert System for Agro-Meteorological Early Warning (SESAME) training aimed to develop national capacity in generating and utilizing user-relevant agro-meteorological information for the early warning of natural hazard risks and for guiding resource management plans and decisions.

The SESAME serves an agricultural advisory system for early warning and day-to-day crop management. It was developed by the Regional Integrated Multi-Hazard Early Warning System for Africa and Asia (RIMES). FAO and the RIMES, in partnership with the DAL and the NWS, organized and delivered the three-day learning event as part of PNG's e-agriculture initiative, under which it was considered a prioritized e-solution. Agro-meteorological services and advisories are considered an innovative shift that enhances weather information-based crop/livestock management strategies and operations. This effort was ultimately dedicated to enhancing crop production by providing location-specific, real-time crop and agrometeorological services with a crucial level of outreach to rural communities.

The training program involved (i) SESAME introduction (system design, features, functionalities and customization for PNG) and (ii) SESAME demonstration (data entry, crop calendar generation, forecast bulletin preparation, agro-advisory generation and the dissemination of forecasts and advisory bulletins). A customised version of SESAME was developed specifically for PNG. It is commonly referred to as AMAMAS (Agricultural Meteorological Advisory Monitoring and Services) and found at amamas.rimes.int/login/login_form.

In total, 25 participants from 14 organizations benefited from the training. These organizations included the DAL, Coffee Industry Corporation, the FDPA, the Cocoa Board of PNG, Kokonas Indastri Koporesen, Oil Palm Industry Corporation, the Oil Palm Research Association, the National Agricultural Research Institute (NARI), the National Agriculture and Quarantine Inspection Authority, the National Forest Authority, the National Fisheries Authority, the National Weather Service and provincial DAL organizations from Jiwaka and East Sepik.

AgriTech Training

An AgriTech and digital literacy training was conducted for women and youths in the Jiwaka Province on 7–9 August 2018. Twenty participants, who were both active farmers and members of the Jiwaka Women and Youth in Agriculture, attended the event and displayed high levels of interest and enthusiasm. The training was focused on developing the capacity of women and youths in the application of basic ICT for the promotion and marketing of their agricultural produce. The event was facilitated by FAO, the National Information and Communications Technology Authority (NICTA), the DAL, the International Telecommunication Union, the FDPA and the Jiwaka Provincial Administration.

More specifically, the training addressed: (i) advocacy for opportunities to use ICT in the transformation of agriculture, the empowerment of women, entrepreneurship and Government-supported national ICT programmes; (ii) data collection using mobile apps, branding and online marketing, and smartphone photography skills; (iii) how to setup, send and receive e-mails; (iv) how to set up and use social media (Facebook) to improve the productivity and marketing of products; (v) the use of smart phones, laptops and the internet to improve marketing and outreach; (vi) further data collection, as well as data analysis, using mobile apps; (vii) QR code generation and reading; and (viii) brand building using traceability, radio-frequency identification (RFID), packaging and collective branding.

Broadband Technology

One of the priorities of the e-agriculture initiative was to introduce broadband technology to farming communities and to support their use of the internet for digital engagement in networking, communication, marketing and sourcing information. Under the provincial e-agriculture pilot in Jiwaka, broadband was installed at three sites – the Kingku Training Institute, Fatima TVET, and the Jiwaka Provincial Administration. The aim was to create community access points for broadband internet services at community centres, particularly for nearby farmers. Where necessary, wireless internet access was established for community members located within 10–15 km of selected community centres.

The project was funded by the NICTA, under its Universal Access and Service scheme, in consultation with FAO, the DAL and the Jiwaka Provincial Administration. The service included: (i) an upload and download rate capacity of at least 2 Mbps (unlimited), with a contention ratio of 4:1 or lower; (ii) 50 percent of the bandwidth of the primary connection being available to community centres during the hours 6.00–8.00 and 15.30–00.00 (i.e. outside of the normal school/working hours); (iii) wireless internet coverage within a 10–15 km perimeter of community centres; (iv) the availability and quality of service as specified in "Schedule A: Mandatory Services, Availability, Quality, and Institutional Arrangements; (v) the availability of a CFP supervisor to assist farmers at selected community resource centres/institutions; and (vi) an internet connection to the local internet exchange point.

A Livestock Traceability System using the Blockchain Technology

One of the priority e-agriculture solutions that was identified during consultation with key stakeholders was the traceability of livestock, watermelon, capsicum and coffee. The introduction of traceability measures was expected to improve the sales value of produce, improve product quality and help establish stronger brands. Since pigs are an asset with a great commercial and social impact in the highlands of the Jiwaka region, an agreement was made to carry out a pilot project using distributed ledger technology (blockchain) to create a database, track the quality of pigs and engage with key stakeholders along the value chain.

A livestock traceability system using blockchain technology was developed and piloted in the North Whagi and South Whagi districts to establish "proof of concept." Pig farmers registered for the project and provided up to five pigs for being ear-tagged. The RFID-enabled tags were linked to the database of the traceability system. A mobile application, PNG Pigs, was developed for the traceability system and used for the registration of pigs and the continued uploading of performance data.

Since the launch of the pilot on 11 March 2019, 15 farmers and 50 pigs were registered. Farmers participated by inputting data into the system throughout the life of the project until animals were ready for sale. The system tracked and recorded the history of the pigs. When pigs were ready for sale, potential buyers were expected to visit pig selling points and utilize the app to scan the ear-tags and view the animal's history before making their purchase.

During registration, basic information about the pigs was entered, including data on breed type, feed type, geography, incidences of pig disease and control remedies. The ongoing provision of data included information on animal weight and feed type. Accounts were closed for pigs that died, pigs that were sold and pigs that were used for social obligations. Existing farmers were also able to add new pigs to the pilot under these circumstances. While most participating farmers were from nearby the Minj and Banz areas, interest was also shown by farmers from the Whagi Valley.

To ensure the effective delivery of the pilot effort, project partners provided hands-on training and demonstrations for farmers, which covered the use of relevant technology. FAO also provided 11 smart phones, regular data top-ups and pig fencing materials to farmers who required such support. The Field Assistant was hired for the period of April–November 2019 to perform field monitoring. Switch Maven was contracted to develop the traceability system, including the mobile app. The company has continued to provide remote monitoring and support services. However, the system will be transferred to national project partners in the future.

The FARMIS Platform

The FPDA was a key partner in the e-agriculture initiative. As an extension agency for horticulture, the FPDA embraces ICT to increase its reach and engagement. Its active participation under the e-agriculture framework involved the development of an online knowledge portal, called Fresh produce, Resources, Marketing, Information System (FARMIS), which was launched in June 2019 and serves as a digital information service for fresh produce and agriculture in PNG. The platform provides options or menus for (i) farm inputs, (ii) market information, (iii) weather advisory, (iv) crop advisory and (e) subscription and is available through USSD, Android/Apple Apps and the website.

The FPDA proposed a pilot test of FARMIS in Jiwaka as part of the e-agriculture interventions taking place at the provincial level. It also proposed that the platform be made the national e-agriculture product/service that covers the entire country, be hosted through the Integrated Government Information System and be managed at the DAL level.

Blockchain Training for Local ICT Experts

Blockchain training was conducted for national ICT experts coming from different agriculture agencies and ICT organizations in PNG. The training involved broad capacity development on emerging technology for ICT managers and enthusiasts. Using the Jiwaka pig traceability system as a model, local capacity was developed to enhance the sustainability of the existing system and to support the development and maintenance of similar blockchain-derived products and services in the future. Ultimately, national capacity was being developed on the use of distributed ledger technology (blockchain) for the creation of suitable e-solutions that support the agriculture goals of PNG. The topics covered included the blockchain ecosystem; cryptocurrencies and exchanges; mining; security; cryptography; tools of the trade, such as node, geth, mist, truffle and meteor; voting systems, tokens, registries; smart contract variables, controls and events; Ethereum and Solidity; storage and testing; upgrades; and the Geora platform and integrations.

Twenty participants attended, including representatives from the DAL, the Jiwaka Provincial Administration, the NICTA, the NARI, the FPDA, Coffee Industry Corporation, FAO and the Department of Communication and Information. The week-long training was held on 13–17 May 2019 and was delivered by Switch Maven, with support from the NICTA, the ITU and FAO.

Implementation of work plan

Project activities were implemented within the originally determined budget. A 12-month no-cost project extension was approved to allow for greater involvement of external parties, such as international partners and contractors and to facilitate the piloting of the livestock traceability system. Throughout project implementation, the project team continually reviewed and managed potential risks. The risk of key stakeholders not immediately buying into the project, as well as the risk of a lack of political support, was mitigated through increased sensitization and networking. As a result, both the DAL and the NICTA took an active interest in e-agriculture. The risk of project activities becoming discontinued by partners was mitigated through increased emphasis on products/services that contributed to the goals of both the agriculture sector and the participating organizations. Additionally, there was a risk that the death of tagged pigs could discourage farmers from continuing with the pilot. A livestock expert was hired to investigate the causes of death in these cases, who confirmed that the deaths were not related to ear-tagging, therefore instilling confidence to continue with the pilot.

Follow-up for government attention

There are several project areas that require immediate follow-up attention. At project closure, the e-agriculture strategy was left with the Central Agencies Coordination Committee (CACC), which is responsible for ensuring that all such submissions are in order before being sent to the Cabinet. It is imperative that the DAL and FAO follow up with the CACC to ensure that the submission goes through. In addition, the uploading of pig traceability data continued into early 2020. As such, project partners are required to ensure that farmers continue to populate the database until the “proof of concept” phase is completed. The datasets generated from this initiative will prove important for project beneficiaries and the Government. It is expected that the app will be upgraded and that a digital payment system will be added beyond the project. This, however, will require ongoing support (both technical and financial) from the NICTA, as well as input from other project partners. Eventually, the traceability database will be transferred from Switch Maven to the NICTA, as initially agreed. Finally, for administration purposes, FAO has been maintaining the DAL website since its establishment. The DAL will be required to take over the role of administrator in the near future.

More generally, the Government of PNG has acknowledged the potential of ICT and the vast opportunities it brings to the table. Hence, it has promoted innovations in ICT and digital inclusion as critical aspects of the country’s advancement. It has therefore collaborated in the integration of ICT for supporting growth and development. Moreover, the national Medium-Term Development Plan III has flagged ICTs as necessary catalysts for development and therefore focuses on solutions that reduce the costs and increase the speed of accessibility in rural areas. This is expected to both support the general population and promote entrepreneurship and rural development. Sustained efforts by the Government through the Integrated Government Information System will be required to continually provide an enabling environment for digital interventions.

SUSTAINABILITY

1. Capacity development

The PNG National E-Agriculture Strategy 2018–2023 was developed to harness and integrate ICT as a catalyst for the achievement of agricultural goals related to food security, income and both socio-economic and national development. Importantly, it was formulated collectively by the main stakeholders in agriculture and ICT, as well as the private sector. Suitable e-solutions were documented to support and assist the agriculture sector in meeting its key challenges, particularly in terms of the costs, timeliness and efficiency. The DAL also developed a new sector plan for the current political cycle, the Agriculture Medium-Term Development Plan 2020–2023, which aligns with the Government's Medium-Term Development Plan III 2018–2022. E-agriculture is highly embedded in this plan, with activities proposed at the district level across the country. Additionally, the DAL has submitted a proposal for the Public Investment Program, valued at PGK 20 million, to support e-agriculture and statistics.

A Memorandum of Understanding (MoU) was signed between the Jiwaka Provincial Administration, the DAL and the NICTA to continue with piloting activities and to enhance e-agriculture in Jiwaka. The MoU contains clearly defined roles and responsibilities. This demonstrates the high level of adoption of e-agriculture by authorities in PNG, which will be responsible for the ownership, sustainability and expansion of future initiatives. All project partners have clearly demonstrated an interest in and commitment to the collaborative efforts required for the advancement of agriculture. This is evidenced by the allocation of office space at the provincial administration for e-agriculture and permission being given to use existing ICT resources and expertise to support e-agriculture implementation in the Jiwaka province. In general, the DAL is responsible for agricultural content, while the NICTA provides technical ICT support. The continued partnership between these key stakeholders will prove critical to the project's sustainability. Notably, a national e-agriculture taskforce, comprising the DAL, the NICTA, the Department of Commerce and Industry (DCI) and others, which receives technical support from FAO and the ITU, was formed under the project and is expected to push the e-agriculture agenda in the future.

The development of technical capacities was also central to the project. More specifically, the blockchain training conducted for national ICT experts will enhance the sustainability of the livestock traceability system in Jiwaka and support the development and maintenance of similar blockchain-derived products and services beyond the project.

2. Gender equality

Gender empowerment is one of the primary focus areas of the National E-Agriculture Strategy. In PNG, agriculture is dominated by subsistence farming and women are critical players. For example, women are mainly responsible for pig rearing in the highlands of the Jiwaka province. As such, the involvement of women's groups encouraged more women to participate in project activities. Almost 50 percent of participants in the Jiwaka pilot initiative were women. Emphasis was placed on gender equality in decision-making and leadership. Additionally, the beneficiaries of the AgriTech training were members of the Jiwaka Women and Youth in Agriculture.

3. Environmental sustainability

Environmental sustainability was not directly addressed under the project.

4. Human Rights-based Approach (HRBA) – in particular Right to Food and Decent Work

The project focused on the enhancement of agricultural productivity and marketing efforts to promote higher food security, income and well-being. The use of ICT can reduce the costs of, and time required for, agricultural activities. This supports better working conditions and higher incomes for all users of new ICT across the country.

5. Technological sustainability

The technologies introduced under the project are both appropriate and tailored for the beneficiaries. For instance, the customization of SESAME into AMAMAS for PNG facilitates the use of its features by field officers, who are required to register in the system, input their data and process forecast bulletins and advisories. The project substantially contributed to the development of technical capacity and expertise in data generation, information sharing and communication. For example, the DAL website serves as a knowledge hub, both aggregating and increasing access to relevant information and resources. Importantly, Government officials from the Jiwaka Provincial Administration were involved in all the trainings and demonstrations. A group of both agriculture and ICT officials was formed, who possess the capacity to replicate and sustain project activities. Overall, sufficient capacity was built within the DAL at both the national and provincial levels, and their lead staff will be expected roll out e-agriculture efforts.

6. Economic sustainability

Under the e-agriculture partnership, the provision/sourcing of resources/costs was designated as a shared responsibility, an understanding which was well received by all partners. Under this agreement, for example, the NICTA wholly funded the broadband installation component of the project at a cost of PGK 600 000.

Given that e-agriculture is primarily technology based, the costs involved can become expensive for beneficiaries. Therefore, concerns over affordability and value were key considerations during the development of products/services so that the best options could be provided to beneficiaries at the lowest feasible cost.

Documents and outreach products

- PNG Mission Report 1. A Seniorl and T Philip. 13 August 2018.
- PNG Mission Report 2. A. Seniorl and K. Rubina. 3 April 2019.
- PNG Mission Report 3. A. Seniorl. 4 June 2019.
- PNG Mission Report 4. A. Seniorl. 21 July 2019.
- PNG Mission Report 5. A. Seniorl. 20 October 2019
- PNG E-Agriculture Strategy 2017-2023. National Department of Agriculture and Livestock. 2018-2019. 68 pp.
- Final Technical Report. FAO. 2018–2019. 14 pp.

Achievement of results - Logical framework

Expected Impact	Improved agricultural productivity and rural livelihoods facilitated by enhancing national capacity to support the development of ICT solutions to help address national agricultural goals	
Outcome	Enhanced capacity for development of sustainable ICT solutions that accelerate achieving national agricultural goals and vision	
	Indicator	Number of E-agricultural services/solutions developed
	Baseline	0
	End Target	3
	Comments and follow-up action to be taken	Several key results were achieved under the project: 1. Formulation of the PNG E-Agriculture Strategy The "PNG National E-Agriculture Strategy 2017–2023" was developed following stakeholder consultation and sensitization workshops according to the framework proposed by the FAO–ITU E-agriculture Strategy Guide. The strategy was aimed at harnessing the ICT potential of the country for achieving its agriculture goals and at further strengthening the role of ICTs in accelerating the growth of the agriculture sector in a sustainable and equitable manner. 2. Operationalization of the NDAL website. The DAL website (www.agriculture.org.pg) was developed. The website enhanced the online presence of the DAL and PNG's agriculture sector, leading to greater visibility, the promotion of corporate standing, increased networking and communication, and the facilitation of real-time knowledge management and information sharing. With advances in technology, value chain actors, farmers and a range of other knowledge seekers will benefit significantly from instant access to crucial information, links and resources on the website. 3. Establishment of the Agromet tool (AMAMAS) for weather forecasts and alerts. FAO and the RIMES, in partnership with the DAL and the NWS, organized and supported training on the Specialized Expert System for Agro-Meteorological Early Warning (SESAME). A customized version of SESAME was developed specifically for PNG, which is known as AMAMAS (Agricultural Meteorological Advisory Monitoring and Services) and is found at amamas.rimes.int/login/login_form. 4. Agri-tech training. The Agri-tech and digital literacy training developed the capacity of farmers, including women and youths, on the use of relevant and basic ICT applications in the promotion and marketing of agricultural produce. 5. Broadband technology installation. Under the provincial e-agriculture pilot in Jiwaka, broadband was installed at three sites – the Kingku Training Institute, the Fatima TVET and the Jiwaka Provincial Administration. This enabled farming communities to use the internet to digitally engage in networking, communication, marketing and information sourcing. Broadband installation was funded by the NICTA, in consultation with FAO, the DAL and the Jiwaka Provincial Administration. 6. Use of livestock traceability systems and blockchain technology. One of the priority e-agriculture solutions identified in Jiwaka was the traceability of livestock, watermelon, capsicum and coffee. A pilot project was developed for use on pigs, which utilized distributed ledger technologies (blockchain) to create a traceability database. Pig farmers were registered, and their pigs were ear-tagged using RFID-enabled tags, which were linked to the traceability database. Farmers participated by inputting data (breed type, feed type, geography, incidence of pig disease and remedy used) into the system until pigs were ready for sale. Potential buyers were expected to visit pig selling points and use the app to scan their ear-tags in order to access and view their history before making decisions. 7. Use of the FARMIS platform. The FDPA was a key partner in the PNG e-agriculture initiative. The FPDA's active participation under the e-agriculture framework involved the development of an online knowledge portal, the Fresh produce, Resources, Marketing and Information System (FARMIS), which was launched in June 2019. The platform has options/menus that cover (i) farm inputs, (ii) market information, (iii) weather advisory, (iv) crop advisory and (v) subscription; and can be accessed through USSD, Android/Apple Apps and the website.

Expected Impact	**Improved agricultural productivity and rural livelihoods facilitated by enhancing national capacity to support the development of ICT solutions to help address national agricultural goals**	
Outcome	Enhanced capacity for development of sustainable ICT solutions that accelerate achieving national agricultural goals and vision	
	Indicator	Number of E-agricultural services/solutions developed
	Baseline	0
	End Target	3
	Comments and follow-up action to be taken	8. Blockchain technology training for local ICT experts. Blockchain training was conducted for national ICT experts from various agriculture agencies and ICT organizations in PNG. The training involved a broad capacity development initiative on emerging technology, exemplifying the Jiwaka traceability system for pigs, for ICT managers and enthusiasts. The objective was to develop local capacity and enhance the sustainability of the livestock traceability system in Jiwaka, as well as to support the development and maintenance of similar blockchain-derived products and services in the future. Several areas for follow-up action were identified: 1. The pig traceability project in the Jiwaka Province continued into early 2020. Project partners were expected to ensure that farmers continued to populate the database until the “proof of concept” period ends. The datasets produced will be interpreted and utilized by project partners. 2. The traceability project also involves both a second phase, in which the app will be upgraded, and a third phase, in which a digital payment system will be added. Both phases will be technically and financially supported by the NICTA but will also require inputs from other partners in terms of content and other required support. This will also include the transfer of the traceability database from Switch Maven to the NICTA, as initially agreed. 3. While FAO has been maintaining the DAL website since its establishment for administration purposes, the role of administrator will be relinquished to the DAL in the near future.

Output 1	High priority ICT in agriculture services and solutions designed, developed and implemented		
	Indicators	Target	Achieved
		PNG E-Agriculture Strategy policy adopted and implemented	Yes
Baseline	None		
Comments	The PNG E-Agriculture Strategy 2017-2023 was formulated, identifying 69 independent ICT solutions (e-solutions), which address one or more e-agriculture outcomes. A number of e-solutions were piloted in Jiwaka through continued collaboration with the NICTA, the DCI, the DAL and the ITU. The second and third phases of the pig traceability project will include transfer of the database to the NICTA, upgrading of the mobile app and integration of a digital payment system.		
Activity 1.1	Prioritization of the e-agricultural outcomes		
	Achieved	Yes	
	Comments	Of the 69 ICT solutions identified and described, a number of key e-solutions were prioritized and implemented under the project in collaboration with its respective partners. The prioritization of e-agriculture outcomes resulted in the development of the PNG E-Agriculture Strategy, operationalization of the NDAL website, establishment of the Agromet tool (AMAMAS) for weather forecasts and alerts, provision of AgriTech training, installation of broadband technology, development of a livestock traceability system that uses blockchain technology, delivery of blockchain technology training for local ICT experts and promotion of the FARMIS platform to facilitate market access.	
Activity 1.2	E-agriculture services and solutions designed and implemented		
	Achieved	Yes	
	Comments	The development of the National E-agriculture Strategy built on national agricultural policies/goals. Hence, the strategy was designed to contribute directly to addressing issues related to household food and nutrition security and poverty alleviation. Overall, the project addressed key national development outcomes that are underlined in national plans and policies. Independent ICT solutions were successfully piloted at the national, provincial and district levels. Moreover, capacity was built at the institutional and farmer levels, and a growing interest developed in the application of ICT tools and solutions to address systematic gaps in the agriculture sector.	
Output 2	Capacity building at the national and provincial levels to develop priority e-agriculture solutions and to identify, prioritize, develop and implement and sustain ICT in agriculture services and solutions		
	Indicators	Target	Achieved
			Yes
Baseline			
Comments	National and provincial workshops were conducted to validate and sensitize stakeholders on the national strategy, as well as the establishment of the nine key priorities. Most of these priorities were developed and implemented successfully.		
Activity 2.1	National workshop		
	Achieved	Yes	
	Comments	A national workshop was held for e-agriculture stakeholders, covering the validation of the national strategy and the nine key priorities.	
Activity 2.2	Provincial workshops		
	Achieved	Yes	
	Comments	Provincial workshops were conducted and provided further training on several ICT solutions to improve the delivery of agricultural services to local farmers at the provincial and district levels.	

Outreach, Marketing and Reporting Unit (PSRR)
Business Development and Resource Mobilization Division (PSR)

For more information please contact: Reporting@fao.org

CA9077EN/1/05.20