Kenya, Nigeria, Uganda, Rwanda Survey on Open Innovation through Utilizing Disruptive Digital Technologies in Africa

Final Report

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Japan International Cooperation Agency

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Survey Target Areas

List of Abbreviations

AI	Artificial Intelligence
AU	African Union
AIMS	African Institute for Mathematical Sciences
ASTGS	Agricultural Sector Transformation and Growth Strategy
B2B	Business to Business
CARD	Coalition for African Rice Development
CBN	Central Bank of Nigeria
CEO	Chief Executive Officer
CMU	Carnegie Mellon University
CP	Counterpart
CUP	Project for Strengthening Coffee Value Chain in Rwanda
EAVCA	East Africa Venture Capital Association
FAO	Food and Agriculture Organization of the United Nations
FCTWB	Federal Capital Territory Water Board
GIZ	German Corporation for International Cooperation GmbH （GesellschaftfürInternationale Zusammenarbeit GmbH）
ICT	Information Communication Technology
ICT4D	ICT for Development
IFC	International Finance Corporation
IFNA	Initiative for Food and Nutrition Security in Africa
IoT	Internet of Things
IT	Information Technology
JETRO	Japan External Trade Organization
JICA	Japan International Cooperation Agenchy
JKUAT	Jomo Kenyatta University of Agriculture
MDGs	Millennium Development Goals
MINAGRI	Ministry of Agriculture and Animal Resources
MINAGRI	Ministry of Agriculture and Animal Resources
NARO	National Agricultural Research Organization
NGO	Non Governmental Organization
NIRDA	National Industrial Research and Development Agency
NITDA	National Information Technology Development Agency
ODA	Official Development Assistance
OI	Open Innovation
OLPC	One Laptop Per Child
PAN	Pan African University
PoC	Proof of Concept
RDB	Rwanda Agriculture Board
RISA	Rwanda Information Society Authority
RURA	Rwanda Utility Regulatory Authority
SDGs	Sustainable Development Goals
SHEP	Smallholder Horticulture Empowerment & Promotion
SME	Small Medium Enterprise
SMS	Short Message Service
STI	Science, Technology and Innovation
SU	Startup
TICAD	Tokyo International Conference on African Development

UHC	Universal Health Coverage
UNCDF	United Nations Capital Development Fund
USAID	United States Agency for International Development
VC	Venture Capital

Survey on Open Innovation through utilizing Disruptive Digital Technologies in Africa Final Report

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Chapter 1

Overview of the Survey

Chapter 1 Overview of the Survey

1.1 Background and Purpose of the Survey

1.1.1 Background of the Survey

In the recent years, various phenomena that dramatically change the development context of developing countries can bee seen. First, there are new megatrends such as rapid evolution and global expansion of digital technology, rapid population growth mainly in Africa, change in demographic dynamics particularly represented by an increase in young population, penetration of sharing economies, etc. Secondly, the "Sustainable Development Goals (SDGs)" was adopted at the "United Nations Sustainable Development Summit" in September, 2015. In fact, 432 trillion yen/ per year is required to achieve the high goals set by SDGs, however, the amount of the current public investment invested is 155 trillion yen/ per year with the investment gap of about 277 trillion yen/ per year. To minimize this gap, private investment in SDGs related fields should be increasd,even though the current private investment is only about 100 trillion yen per year. Thus, further increase in private investment is essential. As SDGs concept addresses “to leave no one behind", it is crucial to increase investment as well as to realize inclusive development through innovative approaches.

Development cooperation agencies including the Japan International Cooperation Agency (JICA) are paying close and significant attentions to the possibilities of science, technology and innovation (STI). They are trying to involve stakeholders who were not used to be recognized as development cooperation actors, such as startups, to achieve greater results with the same or less amount of investment. Especially, there are strong expectations toward “disruptive technology” such as artificial intelligence, big data, block chain, IOT, fintech, drone etc., which has the possibility of realizing reapfrog developpment, allowing access to things which could not have been accessed before. International development organizations including the World Bank and International Monetary Funds are working on formation and implementation of new projects applying such technologies.

Based on these backgrounds, JICA has set up a STI Task Force with the Department of Africa as secretariat, to contribute to the implementation process of the 7th Tokyo International Conference on African Development (TICAD 7). The Task Force sets the following three outcomes:

Output 1 “Raising Awareness”: Raising awareness of development stakeholders (governments, private companies, NGOs, universities, local governments, etc.) that STI is essential for development of Africa
Outcome 2 “Consensus Building and Acceleration”: Compiling a plan to promote STI in Africa and promote incorporation of STI in ongoing and new projects
Output 3 “Resource mobilization and Ecosystem”: Realize open innovation involving a wide range of stakeholders including private companies and NGOs to develop ideas related to STI as well as to mobilize fund (including private resources)

1.1.2 Objective of the Survey

Based on the background mentioned above, this survey, on the one hand, will investigate the applicability of STI, especially disruptive technology, in Africa. On the other hand, this survey will examine the possibilities of solving development issues in Africa by incorporating technologies and ideas of non-JICA actors such as private companies, governments, academic institutions, etc. through open innovation.

1.2 Process of the Survey

1.2.1 Work Flow

The survey was conducted based on the following workflow.

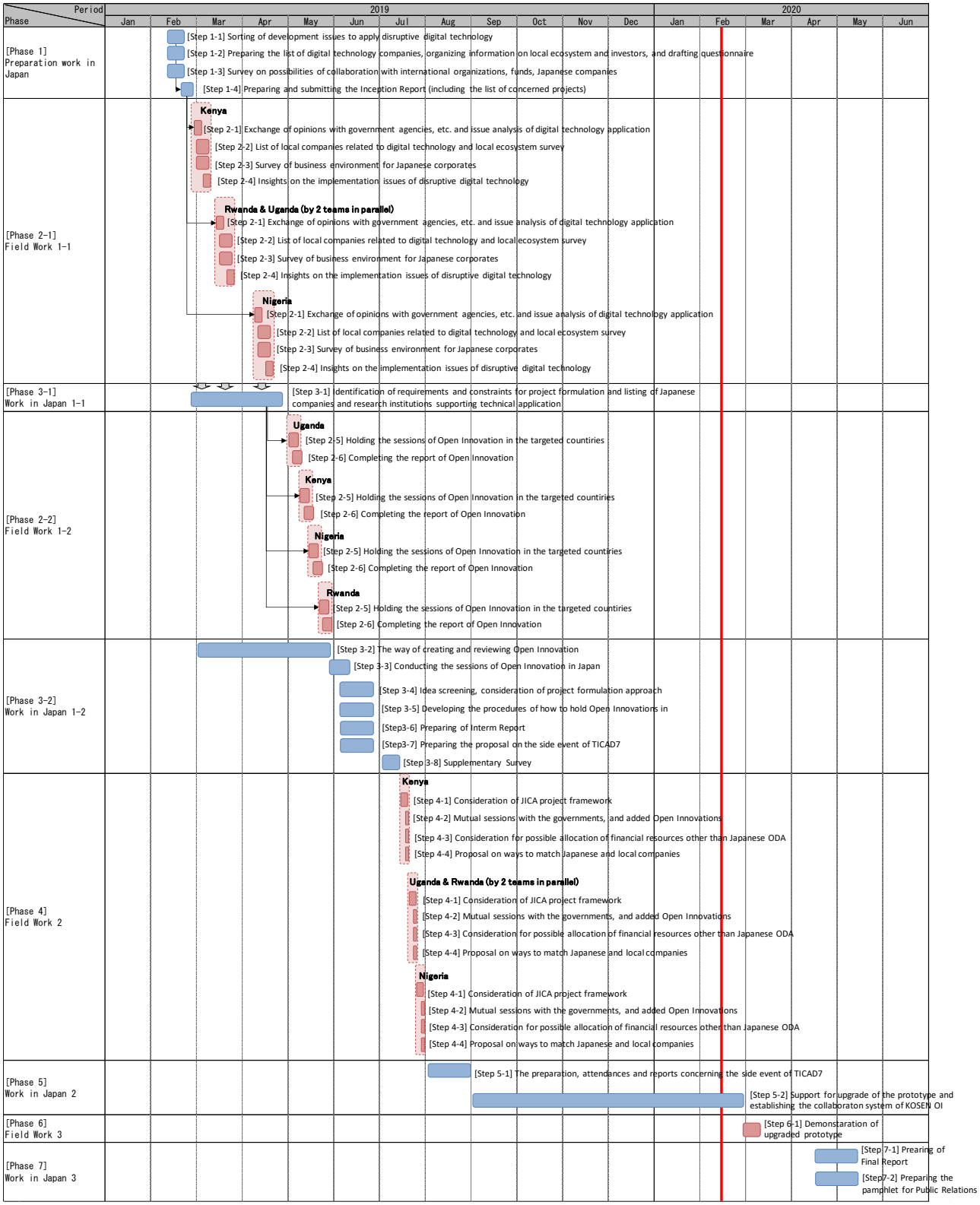


Figure 1-1 Work Flow

Source: JICA Survey Team

1.2.2 The Survey Team

The members of the survey team are as follows:

Table 1-1 The Survey Team

Name	Company	Position
Osamu Sakurai	Deloitte Touche Tohmatsu LLC	Team Leader / Science, Innovation & Technology (1)
Yusuke Tanaka	Japan Development Service, Co., Ltd.	Science, Innovation & Technology (2)
Minako Sagara	Deloitte Tohmatsu Venture Support Co., Ltd.	Science, Innovation & Technology (3)
Tomonari Takeuchi	ABeam Consulting Ltd.	Science, Innovation & Technology (4)
Masayuki Sakata	Deloitte Touche Tohmatsu LLC	Science, Innovation & Technology (5)

Source: JICA Survey Team

Chapter 2

Application of Disruptive Technologies to Development Agenda

Chapter 2 Application of Disruptive Technologies to Development Agenda

2.1 Categorization of Development Issues that Can be Solved by Disruptive Digital Technology

2.1.1 Target Technology, Success Factors, and Risk of Failure

As the first step, in order to analyze and organize the development issues that can be solved by disruptive digital technology, the success factors and failure risks of the application of innovative technologies, and knowledge, the scope of the technology in this survey's targets sets in the table below.

Table 2-1 Scope of the Target Technology

No	Technology	Overview considering application in African context
1	AI, Big Data	A wide range of applications can be conceived in financial credit, risk assessment, disease discovery, precision agriculture, automatic translation, etc.
2	Blockchain	It is characterized by dispersibility, transparency, completeness and availability, allowing direct transactions without intervention by neutral and fair third parties such as banks.
3	IoT (Internet of Things)	Solutions that use dedicated devices for specific purposes are costly to develop and operate, so keep in mind the utilization of sensors that are attached to commodity like GPS sensor of mobile phone
4	Fintech	Pay As You Go service via mobile money attracts attention in small-lot buying and selling of utilities such as electricity and water in developing countries
5	Drone	Though it is in the stage of the B to B business, there are few cases of B to C business in commercial use
6	3D Printing	3D printing technology enabling the creation of many types of small quantities of products has the potential to be utilized in manufacturing in niche markets in developing countries
7	Mobile Application	Since it is well-known technology, there is not so serious issue regarding the technical aspect. But, it is necessary to consider if there are sufficient skilled engineers locally.

Source: JICA Survey Team

As for second step, various cases using such technology for development (including pilot projects and trial cases) were listed according to the development issues and analyzed the success factors and failure risks of the technology application. It is appropriate to utilize the past researches conducted by many scholars in ICT4D (ICT for Development) field when it comes to analysis of the success factors and failure risks, regardless of what type ("disruptive" or not) of technology is used. After the Kyushu-Okinawa Summit, in which the term "Digital Divide" was introduced at the first time in international society, international organizations as well as bilateral donors recognized that ICT can be a strong tool for development, and started implementing ICT4D projects. However, most of the projects could not achieve the expected outcomes. For example, according to the evaluation report named "AN EVALUATION OF WORLD BANK GROUP ACTIVITIES IN INFORMATION AND COMMUNICATION TECHNOLOGIES Capturing Technology for Development", which was released by the World Bank Independent Evaluation Group in 2011, the project success rate in the ICT sector was 60%. This evaluation covers 4 categories of ICT related projects (ICT sector reform support, infrastructure support, ICT skills improvement, and ICT utilization) implemented by the World Bank between 2003 and 2010. However, the

success rate for ICT-related projects, especially those targeting areas and populations with limited access to ICT, has been depressed at about 30%. In addition, The World Bank's "World Development Report 2016: Digital Dividends" found that the success rate of public-sector ICT implementation projects is 13%. Similarly, famous researchers in the ICT4D field (Prof. Richard Heeks, University of Manchester, and Prof. Kentaro Toyama, University of Michigan), who aim to use ICT for international development, have also pointed out that it is not easy to use ICT in developing countries.

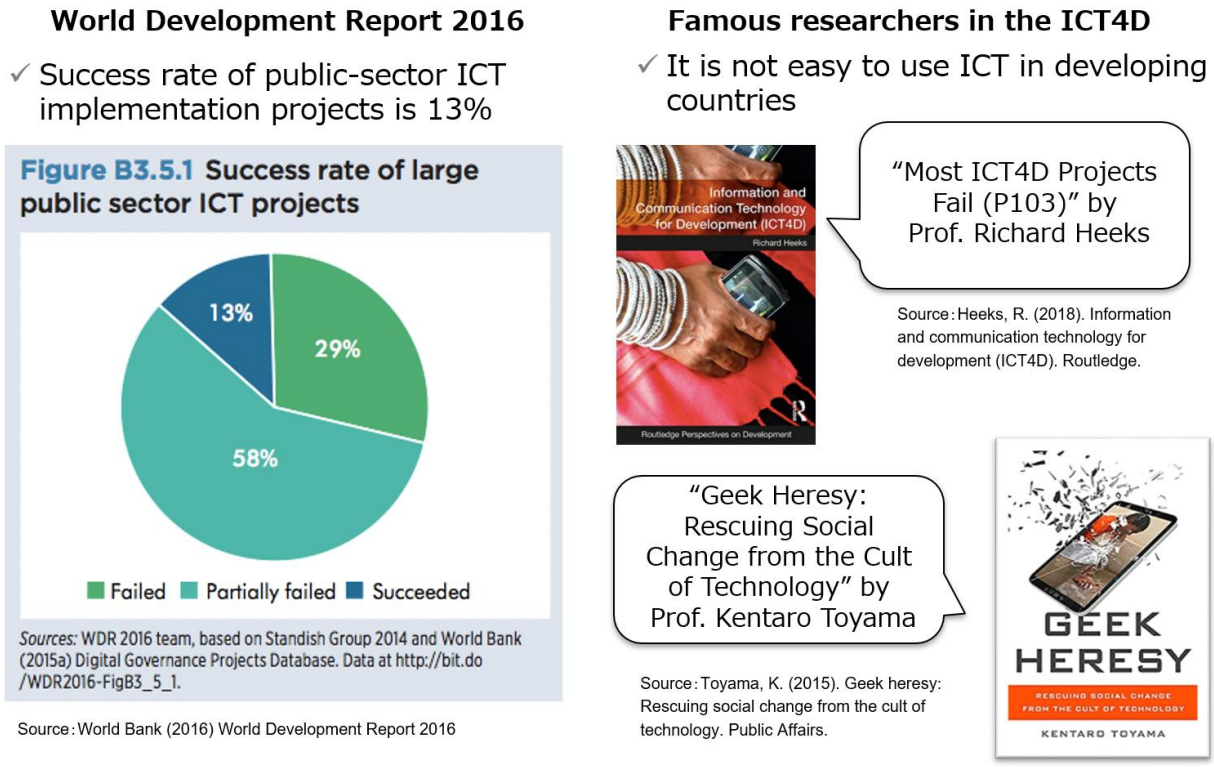


Figure 2-1 Example of Creating Good Practices through Innovation

Source: JICA Survey Team

The reasons for such failure projects in the past are analyzed by many scholars as follows.

- Start from problems, not technology

  As mentioned above, in order to minimize the "Digital Divide" by providing information through the internet, many ICT4D projects such as rural tele centers and the provision of PCs for schools were implemented after 2000, but, in some cases, the purposes of deploying ICT were unclear. In other words, the purpose of ICT4D projects was considered as the introduction of ICT itself, not to use ICT for something .In the case of ICT related projects, there are typical failure cases such as "a new information system is developed and works properly, but nobody makes use of it" and "an information

system is developed to solve the targeted problem, but the problem do not exist in fact". To avoid such a failure, it is crucial to start from discussion on "what is a problem?", not from "how to use ICT?".

- Consider broader factors

According to the past researches, the risks of failure ICT4D projects are more related to non-technical factors than technical ones. As the model below (onion-ring model[1]) created by Prof. Richard Heeks, one of the famous scholars in ICT4D field, indicates, there are various factors which affect ICT4D projects, such elements related to Information, Technology, Information Technology, Organization, and Environment. It is necessary to consider broader factors to make ICT4D projects successful. For instance, various factors are pointed out as the success factors of M-PESA in Kenya as follows; Support from the government (the government didn't adopt regulations preventing a mobile operator from providing financial services), Safaricom's market share (it had about 80% market share), Thorough training for agents (Safaricom provided thorough training for kiosk owners to be agents because customers distrust M-PESA service if argents make a wrong operation (shortage of cash, for example), Strategic advertisement (using the simple tagline "Send Money Home" for three years with green painting kiosk), Simple service charge rate, Easy operation, Strong leadership of CEO of Safaricom, etc. It is important to understand that there is no single success factor, and various factors leads to success in ICT4D projects.

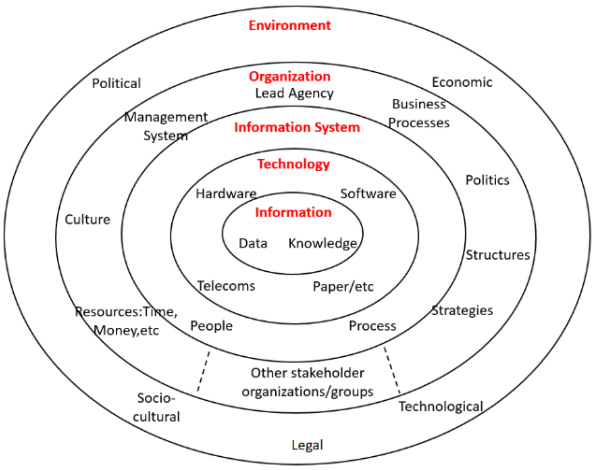


Figure 2-2 Onion-ring Model

Source: Heeks (2018)

- Understand gaps between countries

The past failed projects show that ICT solutions from developed countries tend to be impracticable in developing countries due to the differences in infrastructure (not only communication network but also social and economic infrastructure), income level, user skills, education level, culture, etc. between countries. On the other hand, solutions invented by developing countries (ex. Ushahidi in Kenya) and projects which soundly involved local people through partnership with local organization (ex. Digital Green in India) tend to be successful. In addition, it is also noted that although there are policies and regulations in developing countries, it does not necessarily mean that everyone follows these policies and regulations. In some cases, unlike Japan, the policies and regulations tend not to go align with the reality which often is affected by the cultural belief and local rules in the case of developing countries.

[1] Source: Richard Heeks (2018), Information Communication Technology for Development.

Therefore, in addition to check policies and regulations, addressing local circumstances is another key factor to design successful projects.

- Be careful to roll- out model case

  When ICT is applied for development fields, it is reasonable to start a pilot project at first and gradually expand its scale with necessary modification. However, there are many cases in which a successful pilot project fails to roll out Why? The reason is that a pilot project tends to be implemented under an ideal environment (in selected organizations and/or areas with motivated stakeholders and enough resources such as budget and time), but rolling out is different. For example, Digital Green in India implemented the successful project in one area, but they are very careful to expand the activity. Digital Green has a strong policy not to expand their activity even if another village requested until they confirm enough motivation of the villagers. Even if a pilot is very successful, careful attention should be paid for rolling out. There is no "one-fit-all" solution

2.1.2 Points to Consider in Each Sector

In consideration of the above-mentioned success factors and failure risks, more specific points of concern in case of ICT application for each sector are summarized as follows.

- Transport sector
  - There are many cases to streamline the operation of public transportation with ICT, such as transportation IC cards and ticket issuance with QR code. In addition to improving the efficiency, it also has the advantage of improving transparency of fund flow. However, if there are people who benefit from informal operation, they can be rebellious force against ICT introduction. When introducing ICT, it is also necessary to take into consideration the advantages of public organizations are not necessarily advantage of individuals.
  - Although the transportation is a public service, it is not necessarily to say that the service improvement by introduction of ICT (ex. IC cards) brings more income and more profit enough to be sustainable. In some countries, the operation cost of transportation services relies on governmental subsidies. Considering such a situation, a business model that can generate enough capital is crucial because ICT requires maintenance cost. Otherwise, there is a high risk of failure. Projects which are based on public funds or based only on revenues of public institutions will not be sustainable.

- Power sector
  - Block-chain, which are associated to be technology comparable to the internet, are used in various fields. In particular, there are many cases in which block-chain and crypt currency are applied to renewable energy more efficiently and effectively around the world. It will be possible to share electricity in a form that does not depend on electric power companies. Since such an attempt is still

in its early stages, it has not been proved to be successful. In the case of implementation, it is necessary to speculate the risk of failure by positioning it just as PoC (Proof of Concept).

- Different from streamlining existing social systems, discovering actual demands is required when creating new services. Electricity supply to the non-electrified area is a common business, but it does not necessarily mean that all people living in the areas without electricity really need electricity even if they pay for it. It is important to doubt preconceived notion and start from thinking about actual needs like “what do they want to do with electricity?” Taking such an approach is required rather than rushing to an easy solution.

■ Agriculture sector

- If ICT services target farmers as end-users, considering their level of education and IT skills as well as vulnerability of network infrastructure is important (for example, in addition to ICT services, providing an alternative way like face to face communication as a supplementation).
- In provision of services to farmers in conservative rural areas, ingenuity is required to have them accept new things (for example, Digital Green in India develops video teaching materials on which the local farmers appear as instructors for agricultural technology dissemination in rural area. By doing so, they succeed to receive acceptance and spread video teaching materials in the target areas).
- Even if valuable information (market price and agricultural technology) can be provided, these information beneficial to local people do not always bring developments or improvements in their daily lives since there might be no transportation means to go to the market and no cash to purchase seeds and fertilizer, etc. There may be other factors different from the lack of information to achieve final development impact. Therefore, it is necessary to consider all the processes up to the development impact. For example, in the project named "Achieving Impact at Scale through ICT-Enabled Extension Services (AIS)" conducted by the Grameen Foundation of Ghana, they intentionally involve major buyers, who want to buy large quantities of high-quality agricultural products, in the project. Such buyers naturally encourage middlemen to support farmers to gain better and more harvest by providing valuable information and regular monitoring, and middlemen are also motivated to do so because they can get more profits if farmers get better and make more harvests to meet the request from the major buyers. Like this case, business ideas to establish a whole system to make benefit to all stakeholders, are required.

■ Water sector

- In the case of water supply scheme projects in rural areas, such as improvement of fee collection and maintenance, similar points of concerns with the agriculture sector can be raised.
- One of the common problems in this sector is a conflict of interest among users regarding the use of water resources. Here comes a question “Is this problem solved by ICT?” (Answer is “No”). It is necessary to firmly determine whether it is a problem that can be solved by introducing ICT or not in

the first place. ICT introduces fair use and easy fee collection of water resources, however, ICT may bring another risk of concentrating the control power of water resources in a specific stakeholder.

■ Health sector

- Even if a solution leads to efficiency improvement at the entire region or at the national level, the burden on doctors and nurses on sites may be increased in some cases (for example, more time and more tasks for data entry, additional requirement to know new ICT system operation, etc.).Such ICT use is not accepted by them. In the medical services, beneficiaries are not users of ICT system in many cases, so it is necessary to consider how to involve each stakeholder with adequate merit setting to each.
- Depending on a project, the application of new technology itself is sensitive and any project failure cannot be accepted. Therefore, it is important to consider humanitarian perspectives and information security.

■ Education sector

- Teachers are much more respected by students in developing countries. In this context, the introduction of digital teaching materials may lower the position of teachers. It is necessary to consider the effective use of digital teaching materials as supplementation which assists teachers, not replace them.
- There are cases where digital teaching materials are not effectively used because teachers do not know how to handle digital teaching materials (for example, this failure has been pointed out in several countries that introduced OLPC. For this reason, it is necessary to provide sufficient training for them to acquire necessary skills to fully utilize digital teaching materials.
- Even though education is supposed to be conducted in English according to the policy by the Ministry of Education, there are cases in which education is actually conducted in the local language. It is necessary to provide services that fit the actual situation.
- It is important to consider not only the content of digital teaching materials, but also the mechanism to provide it. For example, in the educational business developed by Surara Net in Sri Lanka, women in the rural area and the micro finance institutions are involved in the educational business in which the women can start a small cram school business using digital materials with the starting fund by the micro finance institutions.
- In areas such as programming education and vocational training, it is important to consider even employment after graduation. For example, Framgia, which conducts Japanese language education + programming training in Vietnam, holds a job fair in which the trained IT human resources are matched with Japanese IT companies for the purpose of securing job after graduation.

2.2 Potential Project List

Considering the probability of application by referring to the rolling plan (cooperation program) in each target country and the cases of the ICT application mentioned in the preceding paragraph, the potential

projects are listed in each sector. In order to list the project candidates, the following points are also carefully taken into consideration.

- Common priority areas in the four countries: Transportation, electricity, agriculture, and water supply are priority areas in all four countries (see table below), and health and education are priority fields of the three countries of the four countries. Therefore, if these fields are targeted for theme setting for the open innovation events, there is also a high possibility of making ODA projects and further wider cooperation beyond countries.
- Wide area initiative: Projects related to the initiatives that JICA already set in Africa, such as CARD for rice cultivation, IFNA for nutrition and agriculture, UHC for health care, etc., can be expected for future development to not only four target countries but also all of Africa. Even for already completed initiatives, it seems possible to associate and to achieve synergies with past JICA projects as "NEXT xxx" and Post xxx" initiatives.
- In Kenya and Nigeria, through cooperation programs in the field of industrial promotion, what can be assumed as potential projects and business proposals in the industrial promotion field are likely to be utilized in any field such as settlement and remittance services using block-chain and virtual currencies, mobile applications for Job matching service etc. It is highly likely to be used as a tool in other fields (for example, payment of electricity fee or settlement of agricultural crop sales etc), therefore, the industry promotion field alone is not taken up as a specific field.

Table 2-2 Common Priority Areas in the Four Countries

Sector	Kenya	Nigeria	Uganda	Rwanda
Transportation	・Improvement of urban transportation in Nairobi ・Wide area logistics improvement	・Improvement of transportation	・Improvement of transportation	・Improvement of transportation and Trade facilitation
Power	・Improvement of power generation and transmission capacity	・Improvement of power supply	・Improvement of power supply	・Improvement of power supply
Agriculture	・Smallholder Horticulture Empowerment and Promotion（SHEP） ・CARD，IFNA	・Agriculture, fishing industry, promotion of food industry ・CARD，IFNA	・Promoting rice cultivation ・Livestock promotion ・CARD	・Promotion of Value-added Agriculture and Business ・CARD
Water Supply	・Water supply and resource management	・Water resource management	・Water supply in local area	・Improvement of Water and Sanitation
Health	・Infection control measures ・UHC	・Improvement of health care system ・UHC	・Strengthening health services ・UHC	・UHC
Education	・Primary and secondary education (math and science) ・African Union - african innovation - JKUAT AND PAUSTI Network Project	-	・Strengthening vocational training	・Strengthening Education and Training in Science and Technology

Source: JICA Survey Team

Table 2-3 Potential Project List

Seector	Application case	Technology						
		AI, Big Data	Blockchain	IoT	Fintech	Drone	3D Printing	Mobile Application
Transport	Intelligent Transport System	○		○				
	Urban development planning with big data analysis related to transport use	○		○				
	Monitoring for maintenance for facilities and areas where human cannot do easily (ex, bridges)	○						○
	Transportation network app and jurnney planning app	○			○			○
	Logistics improvement (tracking, matching), new logistics service (ex. by drone)	○		○		○		○
	Speedy construction with 3D printing technology						○	
	Easy and speedy payment for public transport by e-money (mobile payment, IC card, QR code, etc.)				○			○
	Public transport fee collection by face authentication gate	○						
Power	Optimization of power usage (ex. for factories, offices, etc.)	○		○				
	Power supply with Pay As You Go model in non-electrified areas (with renewable energy facilities)				○			○
	Optimization of operation and maintenance of power facilities	○		○				
	Distributed power supply		○					
Agriculture	Market information provision and matching service between farmers and buyers	○			○			○
	Technical information provision based on data analysis on climate and soil	○		○				○
	Streamlining product supply chain and securing traceability	○	○	○				○
	Weather index insurance	○			○			○
	Streamlining daily operation (ex. pesticide spraying, monitoring, etc.)	○		○		○		○
	Quality control of product	○		○				○
	Automation of irrigation scheme	○		○				○
	Rental service of agricultural machine (like Uber for tractors)							○
Water Supply	Optimization of water supply faicilities	○		○				○
	Improve efficiency of water quality management	○		○				○
	Water supply service with Pay As You Go model				○			○
Health	Telemedicine	○						○
	Electronic medical records, medical information sharing	○	○					○
	Distribution of medical information							○
	Manufacture of artificial legs and prostheses by 3D printing technology						○	
	Manufacture of medical equipment for indivisual (eg umbilical cord clip etc.)						○	
Education	Distribution of digital teaching materials (distance education, supplimental teaching materials of class)	○						○
	Distribution of digital teaching materials (for students, teachers, enterprises, for social workers)	○						○
	Distribution of digital teaching materials (elementary, secondary, higher, programming, business skills)	○						○
	Combination of digital teaching materials and hardware such as tablets	○						○
	Education on FabLab-like Manufacturing						○	
	School/Classroom management system	○						○
Industry Promotion	Settlement service and remittance service for cheaper commission		○		○			○
	Token Economy Creation, ICO (Initial Coin Offering)		○		○			○
	Job matching service	○						○
	Manufacturing for niche markets by 3D printing technology						○	

Source: JICA Survey Team

For more details, the list will be narrowed down according to the future consultation with JICA headquarters and JICA overseas offices and the consideration often further survey such as the list of local start-ups, interviews with Japanese private enterprises and universities, the results of information gathering, etc. The theme of open innovation in each country is summarized in Chapter 5.

Chapter 3

Overview of Ecosystem in Target 4 Countries

Chapter 3 Overview of Ecosystem in Target 4 Countries

3.1 Kenya

3.1.1 Startup ecosystem

- Higher Internet penetration rate underpins the growth of startups:
  Internet speed in Kenya is faster than other African countries, in addition, comparing other African countries, Kenya marks the highest internet penetration rate, showing around 80% in Africa.
- Abundant supports for startups by various incubation facilities:
  Many incubation facilities, such as iHub and Nairobi Garage, locate in Nairobi, and underpin the increase and growth of startups through the support including providing space, mentoring, enticing foreign investors and so on.
- Not many cases of fundraising through financial institutions and VCs:
  The fundraising methods for most startups are individual saving, support from family and donation, and there are not many cases of fundraising through financial institutions and VCs.
- M-Pesa (mobile remittance service) activates the Kenya startups:
  M-Pesa provided by Safaricom, the largest MNO in Kenya, is a mobile remittance service which enables to send money to mobile phone number. Around 60% of Kenyan population use this service, enabling the bottom of pyramid without bank account to send and receive money. M-Pesa also provides the opportunities to create new business, and Safaricom plays a leading role in startup ecosystem in Kenya.

3.1.2 Digital Technology related Corporates (Local and Foreign)

Major local and foreign startups providing services related to digital technologies in Kenya are as follows (except for the startups in later stage or already exit).

Table 3-1 Local and Foreign Startups Companies in Kenya, June, 2019

#	Technology	Sector	Name of company	Description	Headquarter	Founded yr	# of employees	Funding status (amount, investor)
1	fintech	Financial services	BitPesa (BTC Africa A.C.)	Remittance platform of blockchain. Contribute to cost reduction and speeding up of remittance between frontier market and other area.	Luxembourg, Nairobi	2013	51-100	JPY570mil (SOMPO Holdings)
2	SaaS	Agriculture	Twiga Foods	Provide the platform to connect farmers and venders. Guarantee the fair price for farmers and guarantee the quality a fair price and provide transportation service for venders.	Nairobi	2013	101-250	USD30.4 mil (Google Launchpad, etc)
3	mobile app	Logistics	Copia Global	Provide consumables catalog order & delivery system for customers in rural areas.	Nairobi	2012	11-50	Savannah Fund, etc

#	Technology	Sector	Name of company	Description	Headquarter	Founded yr	# of employees	Funding status (amount, investor)
4	fintech	Energy, Financial Services	M-KOPA	Sell Solar Home System for lower-income households in sub-Saharan area.	Nairobi	2011	251-500	Mitusi Corp, Sumitomo Corp., etc
5	fintech, machine Learning	Agriculture, Financial Services	Apollo Agriculture	Provide credit, agricultural insurance, and etc, for small farmers by utilizing mobile money, machine learning and remote sensing.	Nairobi	2016	11-50	USD500k (FMO, Rabobank)
6	mobile app	Organizational Management	Africa's Talking	Provide communication & payment API for telecom companies in Africa	Nairobi	2010	11-50	USD8.6mil (IFC VC, etc)
7	mobile app	Logistics	Sendy Ltd	Users can appoint pick-up location and destination via app, and available drivers (bike & track) pick up.	Nairobi	2014	11-50	USD2mil (CFAO)
8	Telecommunication	Telecommunications	Wananchi Group	Provide cable TV and Internet service for households and companies in Kenya & Tanzania.	Nairobi	2008	251-500	Liberty Global Ventures, etc
9	fintech	Financial services	Direct Pay Online Group	Provide online payment platform responding to various payment modes.	Nairobi	2006	11-50	Apis Partners
10	Device, IoT	Telecommunications	BRCK	Develop hardware & software for connecting frontier market to the Internet.	Nairobi	2014	11-50	Invested Development, etc
11	Bigdata	Logistics, Financial Services	Sokowatch	Provide credit and demand projection by purchase history of informal business.	Nairobi	2013	-	4DX Ventures, etc
12	fintech	Financial services	Lendable	Provide support for African alternative lenders.	Nairobi	2014	-	USD6.5mil (Fenway Summer Ventures, etc)
13	data analysis	Logistics	iProcure	Provide supply-chain platform for procurement and last-one-mile delivery in rural areas.	Nairobi	2013	-	Safaricom, etc
14	data analysis	Information	mSurvey	Provide mobile survey platform of consumers.	Nairobi	2012	11-50	USD3.5mil (TLcom Capital Partners, etc)
15	Device	Agriculture, Energy	SunCulture	Provide reasonable solar-power irrigation system for farmers.	Nairobi		11-50	EDF, etc
16	-	Health	pesabazaar.com	Manage online comparison site of insurance.	Nairobi	2014	-	-
17	Mobile app	Transportation	Mondo Ride	Provide taxi dispatch app in East Africa.	Nairobi	2016	51-100	-
18	Device	Energy	PayGo Energy	Provide pay-as-you-go service of LPG by smart meter.	Nairobi	2014	11-50	USD1.43mil (Novastar, etc)

#	Technology	Sector	Name of company	Description	Headquarter	Founded yr	# of employees	Funding status (amount, investor)
19	AI, Blockchain	Sharing economy	UTU technologies	Provide infrastructure for sharing economy.	Nairobi	2017	-	USD250k (æternity venture, etc)
20	Device	Energy	Pawame	Provide off-grid home solar system.	Nairobi, UAE	2016	101-250	Goldfish Fund, etc
21	Mobile app	Health	Flare	Provide ambulance dispatch app for platform to connect patients and hospitals.	Nairobi	2016	-	USD100k
22	Mobile app, Blockchain	Agriculture	Once Sync Limited.	Provide Shmaba Record, the mobile app with blockchain for trading between farmers and processors.	Nairobi	2016	-	n/a
23	Mobile app	Agriculture	Zalisha	Provide the mobile app providing information on market, weather forecast, etc for farmers.	Nairobi	2016	-	-
24	Mobile app	Logistics	Oracom Web Solutions LTD	Manage the EC website, Mybigorder.	Nairobi	-	-	-

(-: no information posted)

Source: JICA Survey Team

3.1.3 Ecosystem Players

(1) Accelerators, Incubators, Co-working Space

There are 24 co-working spaces in Kenya, and 22 locates in Nairobi according to the registration in Coworker.com, the search engine for co-working spaces around the world. Major co-working spaces are as described below. Some co-working spaces, such as iHub and Nairobi Garage, provide the services as accelerator or incubator. Most startup incubators, such as iLabAfrica, iBizAfrica and IFC SME Solution Centres, are established by university or existing players.

Table 3-2 Incubators, Co-working Space in Kenya, June, 2019

#	Name	Target sector	Founded yr	Description
1	iHub	ICT	2010	World famous innovation hub/ hackers space established by Erik Hersman in Nairobi.
2	Gearbox	Hardware	-	Open makers space for design ad prototyping in Nairobi. Provide work space, shared prototyping facility, training, mentorship, investment opportunities, incubation, and etc.
3	Nailab	ICT	2010	Business incubator providing business advice, mentoring, and investment opportunities for ICT entrepreneurs. Alibaba Group provides Africa Netpreneur Prize.
4	Nairobi Garage	All sectors	-	The largest co-working space in Nairobi providing full services in 2 spaces of 50k sq ft in total. Accommodates not only top startups but also large corporates and investors.

5	BitHub	Blockchain	2015	Blockchain accelerator focusing on acceleration of financial and energy access in Africa.
6	Growth Africa	All sectors	2002	Provide acceleration for local and foreign startups doing business in Africa.
7	mlab East Africa	Mobile technology	2011	Support entrepreneurs in East Africa focusing on mobile technologies.
8	IFC SME Solution Centres	Small business	-	Established by IFC, World Bank Group. Support business growth, market development and new product development for small businesses.
9	iLabAfrica	ICT	-	Center of Excellence (COE) on ICT innovation established in Strathmore University

Source: JICA Survey Team

(2) Others (Universities, etc)

Table 3-3 Other Support Institutions, June, 2019

Name	Description
Strathmore University (Program: iBizAfrica)	iBizAfrica functions as focal point connecting tech entrepreneurs and investors. iBizAfrica provides mentorship, necessary services for entrepreneurs (seed investment, legal & financial advice, training), and physical infrastructure (office space & goods, free Internet access, and etc.). Select the participants by startup idea pitch, and provide support.
Kenyatta University (Program: Chandaria Business Innovation and Incubation Centre)	ChandariaBIIC was established in 2011 to support Kenyan innovation ideas. It aims to support 120 startups annually, 70% of them from Kenyatta University and remaining 30% for Kenyan citizen. Provide mentorship and necessary services for startups.
University of Nairobi (Program: C4DLab)	C4DLab was established to create and share necessary knowledge and innovative technologies to solve social issues. Provide mentoring to researchers and opportunities with foreign partnership. Conduct capability building for university community and important research based on partnership, and startup acceleration.
Jomo Kenyatta University of Agriculture and Technology (JKUAT) (AFRICA-ai-JAPAN Project)	AFRICA-ai-JAPAN Project is a joint project among JKUAT, Pan African University Institute of Basic Sciences, Technology and Innovation (PAUSTI), and JICA. The project focus on biotechnology, mathematics and engineering (including civil engineering, mechanics, mechatronics, and electrical & electronic engineering) among STI. This project conducts capacity building of JKUAT and aims to contribute to education all over Africa.

Source: JICA Survey Team

(3) Points to Consider in Holding Open Innovation Events

As mentioned in the next chapter, this survey conducted the first and second open innovation events in iHub based on the research of each accelerator, incubator, co-working space and other support institution. The points for selecting places and partners when conducting open innovation in Kenya are as follows:

- Facility: A hub with enough space which is lively and frequently holds general startup related events (for non-member) can be a potential partner. iHub and Nairobi Garage meet the conditions.
- Network with startups: Conducting open innovation event requires a partner to have the network with startups (regardless of member or non-member). iHub and Nairobi Garage meet the conditions in the list above.
- Others: In Kenya, since iHub has accumulated experiences as an innovation hub and one of key players in startup community, our research decided to conduct open innovation event in iHub.

However, as there are multiple actors existing within startup ecosystem in Kenya, there may have limitations to make the event known widely by announcing from only one hub.

3.1.4 Investment Environment

(1) Recent Trends (number of funds, transition of investment, etc.)

The GDP growth of Kenya was 2.7% in 2018 on the back of sound market and domestic demand, and is projected to increase to 3.4% on average from 2019 to 2020. The private equity investment in Kenya recorded high in 2018, namely 24 investments, and increased by 33% from 18 in 2017.

In 2018, 37 Kenyan startups raised funds of over USD52 million in total. This is the highest record in Kenya, increasing by 58.6% from 2017 and 398% from 2016, and accounts for 15.6% of the whole startup fundraising in Africa.

As Kenyan market attracts rising attention of investors, ticket size of investment is increasing. The average investment per startup increased (USD1,407,162 in 2018, USD1,367,875 in 2017, and USD402,469 in 2016).

There are various kinds of accessible funding sources of fund and risk capital in Kenya, and new entry of such domestic and international funds are increasing.

(2) VC and Funds

Table 3-4 VC and Funds, June, 2019

Name	Classification	Description	Location	Founded yr	Investment area		Amount	# of exits	Exit cases	Portfolio (Kenyan corporate)
					Sector	Stage				
Savanna Fund	Fund	Invest to 27 sub-Saharan startups so far. Partnering with 500 Startups and conduct acceleration program.	Kenya	2012	Tech-based	Early	$25,000-$500,000	–	–	–
Safaricom Spark Venture Fund	CVC	USD1 million fund by Safaricom, the largest telecom company in Kenya. Invest to mobile-tech startups, and provide technical support and asset of Safaricom.	Kenya	2014	Mobile tech	Seed - Early	KES6 mil – KES22 mil	-	-	FarmDrive, iProcue, Eneza Education, etc
Novastar Ventures	VC	Invest to startups in East Africa.	Kenya	—	—	Early – later	$100,000-$6m	—	—	–
TLcom Capital	VC	VC based in Nairobi, Lagos and London. Manage total €200 million. Technology and Innovation for Developing Economies (TIDE) Africa Fund is the 1st VC fund focusing on all stages of tech startups in sub-Saharan Africa.	Kenya, Nigeria, UK	1999	ICT	Early - Growth	-			Twiga Foods, Kobo360, Terragon, mSurvey, Andela, Persado, etc
Viktoria Ventures	VC	Victoria Ventures provides advisory and training for enterprises. In their activity they found that the fund raising for early-stage companies is missing link, and established Victoria Business Angel Network (VBAN). VBAN is angel investors' network with 28 Kenyan companies and focus on early-stage companies.	Kenya	2016	Energy, real estate (necessary to be innovative)	Early	$50,000 - $300,000	-	-	- (Target: 4 companies per year)

Source: JICA Survey Team

3.1.5 Japanese Business Entry Environment

(1) Local Business Environment

Kenya's business environment (Doing Business) ranking is 56 out of 190 countries (2020)[2]. Furthermore, Kenya has better business environment comparing to other African countries, and is one of the most successful countries of largely improving Doing Business score from 2017. By items in Doing Business, business reforms in "Getting Credit" and "Protecting Minority Investors" especially contribute to the ranking of business environment in Kenya. While the Global Peace Index is ranked in 125 out of 163 countries (2020), and the Corruption Perceptions Index is 124 out of 180 countries (2020)[3], Kenya still has issues in security and corruption.

Figure 3-1 Local Business Environment (Kenya)

Source: Doing Business 2020 Kenya

[2] Doing Business 2020
[3] 2020 Global Peace Index, Corruption Perceptions Index 2020

(2) Japanese Corporates related to Digital Technology

Japanese corporates related to digital technologies in Kenya is as follows.

Table 3-5 Japanese Corporates related to Digital Technologies in Kenya, June, 2019

#	Technology	Sector	Name of company	Description	Headquarter	Founded yr	# of employees	Funding status (amount, investor)
1	mobile app, SaaS	Organizational management	African incubator	Provides sales and distribution management application "SENRI" for local companies in Africa. Real-time sales / delivery tracking is also possible on the dashboard on the Web. Subsidiary in Uganda and Nigeria. Participated in the MORINAGA Accelerator Program	Tokyo	2015	4	80 mil yen:Morinaga, Leapfrog Ventures, Zero Booster, ANRI, Monex Venture
2	Mobile app	Health	Cancer Scan	AfricaScan, affiliate company, run kiosk and develop diet coaching app.	Tokyo	2008	-	-

(-: no information posted)

Source: JICA Survey Team

3.2 Nigeria

3.2.1 Startup Ecosystem

The Nigerian start-up ecosystem is rapidly developing around Lagos. With the increase of startup support and funding opportunities and with the vast social challenges present, new digital startups are blooming. In particular, the rise of e-commerce services, in the absence of a formal retail sector, and new fintech services, with the population's bank account holding rate of 40%, are remarkable; Jumia, an EC site born in Nigeria, has become the first unicorn, a company with market capitalization of over 100 billion yen, in the African continent. In addition, there are many promising SUs that collect internal and external funds such as Konga (EC), Branch International, Paga, Flutterwave, Interswitch (fintech), Andela (IT human resource development), Krobo 360 (logistics), Babban Gona and Farm crowdy (agriculture). As for the sector of SU, as shown in the figure below, the ICT sector has the largest share of about 42%, followed by retail & wholesale, manufacturing & construction, and agribusiness. There is a tendency that talented Nigerian returnees who have received education and worked at a global company in the United States or European countries are driving innovation.

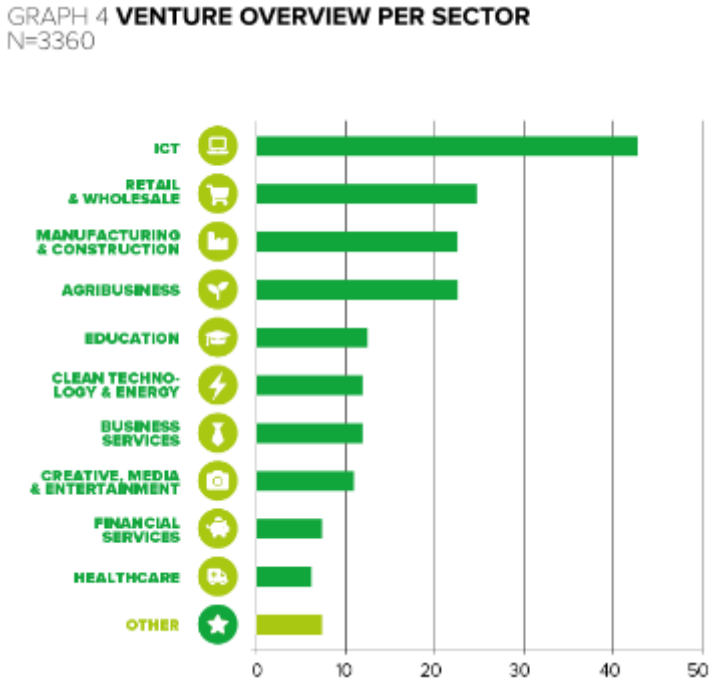


Figure 3-2 Number of Startups in Different Industries

Source: VC4A 2018 Startup Ecosystem Analysis Nigeria Report

The value of the Lagos ecosystem is said to be 2 billion USD[4]. In Lagos, there are 400 to 700 active

[4] 2017 Global Startup Ecosystem Report

startups, which number is the second largest in the African continent after Cape Town. The number of tech hubs is the largest amongst African cities, with 31 hubs including co-working space (As for Nigeria as a country, there are 55 tech hubs which is the second largest number amongst African countries). Abuja's ecosystem is also developing, with 13 tech hubs in Abuja, which number matches that of Senegal and Zimbabwe.

The amount of SU funding in Nigeria is on the rise; Nigerian SUs has raised $ 114.6 million in 2017 which is the third largest amount in the African continent after the South Africa and Kenya. In the first half of 2018, the number of funding cases was top in the African continent with 31 cases, followed by 23 in Kenya, 19 in South Africa, and 21 in Egypt[5]. Various factors which have effects on the number of SU can be raised, for instance, the size of the population, which is expected to be the third largest in the world after India and China by 2050, the presence of investors who are looking at Nigeria as a destination for investment, and the presence of SUs led by talented managers who were educated in Europe and the United States and worked for global companies before returning to their home countries.

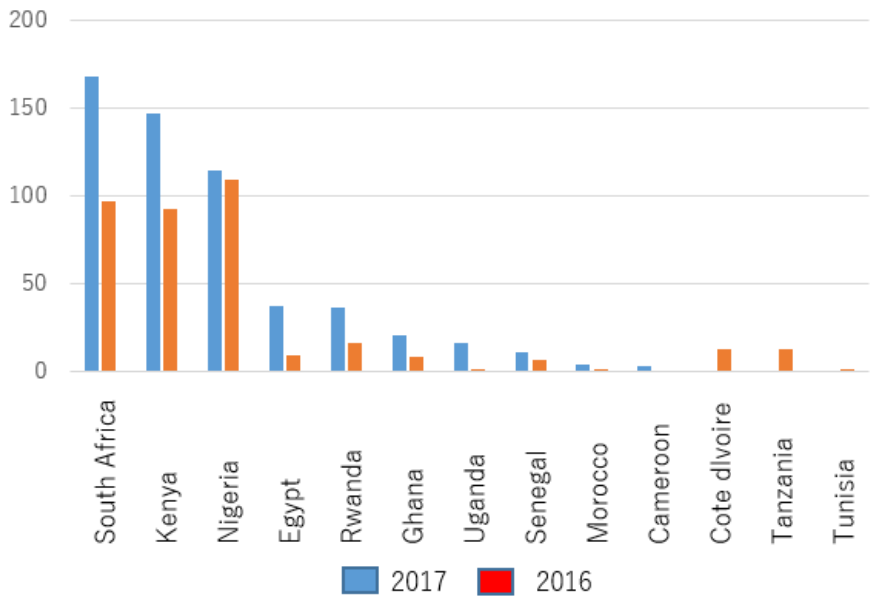


Figure 3-3 Funding for Startups in Africa 2016/2017 (million dollars)[6]

Source: Ministry of Economy, Trade and Industry Survey Report on Funds and Other Related to African Business

[5] WeeTracker African Startups & VC Ecosystem Report H1 2018
[6] Projection by Partech, EAVCA

Examples of government support for entrepreneurs include the following activities. In April 2018, a plan was announced to establish a technology and innovation advisory council to improve the environment for tech SUs[7].

Table 3-6 Support Program for Entrepreneur by Local Government, June, 2019

Program	Organizer	Description
2018 Startup Nigeria	The Office of the Vice President of the Federal Republic of Nigeria	Provides a free three-month incubation program to startups as part of the National Social Investment Program (NSIP)
YOUWiN! Connect	Federal Ministry of Finance	Providing business education to young people with innovative business ideas for the purpose of job creation
Lagos State Employment Trust Fund (LSTEF)	Lagos State	Provides funding and capacity building programs to create jobs in Lagos State. Operates with an initial capital of N 25 billion and plans to raise additional funds from donors and companies
Lagos Innovates	Lagos State	Support program specifically for startups within the LSETF. Provides workspaces, trainings, early stage funding, networks with investors, etc for promising tech startups.

Source: JICA Survey Team

3.2.2 Digital Technology related Corporates (Local and Foreign)

Examples of local and foreign startups and corporates providing services related to digital technologies in Nigeria are as follows.

Table 3-7 Local and Foreign Startups in Nigeria, June, 2019

#	Technology	Sector	Name of company	Description	Headquarter	Founded yr	# of employees	Funding status (amount, investor)
1	-	EC	Konga	Online marketplace covering wide range of goods such as books, home electronics, foods, and online contents.	Lagos	2012	1,000	USD41mil (Naspers)
2	-	EC	Jumia	EC & marketplace in partnership with over 50,000 African companies. The 1st African unicorn valued over USD1 billion in 2016.	Lagos	2012	3,000	EUR 360m (MTN, etc)
3	-	HR	Andela	IT human resource training and job matching service from Nigeria.	NY (at present)	2014	5,000	USD100 mil (Generation Investment Management)

[7] https://innovation-village.com/the-federal-government-of-nigeria-to-set-up-technology-and-innovation-advisory-council-to-support-tech-startups/

#	Technology	Sector	Name of company	Description	Headquarter	Founded yr	# of employees	Funding status (amount, investor)
4	Fintech	Financial services	Paga/ Pagatech	Mobile payment business.	Lagos	2009	250	USD10mil (Global Innovation Fund, etc)
5	Fintech	Financial services	Paystack	Provide POS service enabling MSMEs to pay by credit card, debit card, bank transfer and mobile money via website and mobile app.	Lagos	2015	50	USD10.3 mil (Stripe, Visa & Tencent)
6	Fintech, Blockchain	Financial services	SureRemit	Provide EC service and digital voucher remittance (free of charge) through the platform of crypt currency. Aim to enter USD601 billion of overseas remittance market, currently dominated by Money Transfer Operators such as Western Union and MoneyGram.	Lagos	2017	10	USD7mil by ICO
7	Fintech	Financial services	Branch International	Implement lending for MSME based on credit scoring via smartphone. Have more than 1 million subscribers in Sub-Saharan Africa.	HQ: San Francisco, Operational HQ: Lagos, Nairobi	2015	250	USD70mil (Trinity Ventures)
8	Fintech	Financial services	Lidya	Implement lending USD500 – 5k for MSMEs by AI credit decisions based on past transaction and cash flow data on the digital platform (no need for collateral, auditing, financial statement and business plan).	Lagos	2016	10	USD6,9mil (Omdiyar Network, etc)
9	Fintech	Financial services	Riby	Provide online platform for existing transaction such as microfinance among group, lending between friends and saving group.	Lagos	2016	15	USD15k (Microtraction)
10	Fintech	Financial services	Flutterwave	Develop and provide technology, infrastructure and service for trading companies, collection agencies and African banks to receive payment from various channels such as web, mobile, ATM and POS. Respond to over 150 foreign currencies.	San Francisco, Lagos	2016	50	USD10mil (MasterCard & Joseph Saunders, etc)
11	Fintech	Financial services	Piggybank	Service for saving interest and return by decreasing frequent cash withdrawal and saving & investing daily, weekly, or monthly. Provide service not only for individual but also for grow saving. Possible to receive interest and return daily basis.	Lagos	2016	10	USD1,1mil (Leadpath Nigeria)
12	Fintech	Financial services	Mines. IO/ MINES	Provide digital credit for banks, retailers, and collection agencies in emerging market. Possible to evaluate and decide lending through acquiring credit information not only from smartphone but also feature phone.	San Francisco, Lagos	2014	50	USD13mil (TPG's the Rise Fund, etc)
13	Fintech	Financial services	TeamApt	Provide digital banking service and digital business solutions.	Lagos	2015	11-50	USD5.5m (Quantum Capital Partners)

#	Technology	Sector	Name of company	Description	Headquarter	Founded yr	# of employees	Funding status (amount, investor)
14	Fintech	Financial services	Interswitch	Provide services including Quickteller which provides various payment options (USSD, mobile app, web platform, POS, ATM, agents) to individuals, Pay direct which is to B back-end software, and e-cash which is wallet service.	Lagos	2002	251-500	USD10.5m (TA Associates, etc)
15	Fintech	Financial Services	Remita	Provides various payment options such as through web, POS, banks, USSD, and agents. It is a payment platform designated by the government and has partnership with all domestic banks. Payment of salary for public servants are carried out on this platform and public utilities can also be paid.	Lagos, Abuja, Ghana	1992	200	-
16	Fintech, AI	Financial services	Kudi	Provide secure payment service through Facebook, Telegram, Slack, Skype, etc.	Lagos	2016	1-10	USD120k (Y Combinator, etc)
17	Mobile app, Fintech	Financial services	SpacePointe	Provide government revenue management platform "Point Pay Collections". Can manage payment in real time.	Lagos	2014	51-100	USD1.2m
18	Fintech	Financial services	Wallet.ng	Provide fintech solution that allows you to send, pay and receive if you have a phone number. Companies can also accept payments with a link.	Lagos	2016	11	Microtraction, YCombinator, etc
19	SaaS	Logistics	TradeDepot	Platform directly connecting manufacturers, distributers, middlemen, retailers (including informal individual stores and kiosks) and so on. Manage real-time status of order, distribution and inventory and facilitate payment.	Lagos	2015	-	USD3 mil (Partech Ventures)
20	Big data	Logistics	Kobo360	Improve logistical efficiency by optimizing delivery route by GPS & data analysis, optimizing truck loading capacity, monitoring drivers and maximizing incentive. Expand business to financial service to purchase trucks, setting workshop for maintenance on the main route of transportation, and so on. Won the major clients such as DHL and Unilever.	Lagos	2017	-	USD6 mil (IFC)
21	Big data	BI	Terragon Group	Provide B2B digital solutions such as Business transformation, consumer access, data and intelligence, mobile payment, digital content management & technology.	Lagos	2009	-	USD5 mil (TLcom Capital)
22	-	Research	Asoko Insight	Research firm providing information on African market mapping and supply chain analysis for investors, banks, companies and government.	HQ: London	2013	100	USD3,6mil (North Base Media, etc)

#	Technology	Sector	Name of company	Description	Headquarter	Founded yr	# of employees	Funding status (amount, investor)
23	-	Energy	Rensource	Sell solar system to industrial clusters and residential areas. Built in monthly bill collection system by mobile money, monitor daily usage of electricity and payment, and utilize it for credit formation.	Lagos	2015	50	USD3,5mil (Amaya Capital Partners, etc)
24	-	Energy, environment	RecyclePoints	Collects recycle products from consumer, gives points, and the consumers can purchase products in the iRecycle store offered by the company	Lagos	2015	-	USD200k (Chivas Venture)
25	Hardware	Health	MDaaS Global	Develop medical instruments based on local needs for people with fewer access to medical treatment (reducing 60% of procurement cost), and set & manage diagnosis system utilizing technologies.	Lagos	2016	-	USD100k / (Venture Platform)
26	Hardware	Energy, Utility	GRIT Systems Engineering Ltd	Develops an interface that converts mechanical meters into a smart meter as well as meters for commercial facilities. Developing a trading platform of electricity.	Lagos	2015	15	-
27	-	Telecommunication	Tizeti	Deploy WiFi and wireless internet service in densely populated cities in Africa.	Lagos	2017	-	USD3m (4DX Ventures)
28	Fintech	Agriculture	Farmcrowdy	Provide solutions for farmers by aggregating off takers by each crop, selecting optimal supply areas, and confirming the farmers by accessing to cooperatives in selected areas. Necessary funds are raised by crowdfunding matching investors and farmers. Share the profit among farmers, investors and Farmcrowdy (ROI of investors is about 15%). By insuring each project, avoid risks of disaster and plague, and guarantee the principal of investors.	Lagos	2016	-	USD325k (GSMA Ecosystem Accelerator Innovation Fund)
29	-	Agriculture	Babban Gona	Deploys a franchise model in the agriculture sector, organizing farmers and supporting their management by groups. Income increase of farmers is realized through providing funds, equipment, know-how and sales partners.	Lagos	2012	-	$24m (FMO)
30	Fintech	Agriculture	Thrive Agric	Increase productivity through connecting farmers and investors and providing technical support. Revenue is shared between farmers, investors and Thrive Agric.	Maitama	2017	-	$20k (Ventures Platform)
31	-	Agriculture	Foodstock Farmers market	Product direct farm product delivery service	Lagos	2016	11-50	NGN3b
32	AI	Agriculture	Crop2Cash	Allows small scale farmers to receive digital payments and accumulate credibility data	Ibadan	2017	1-10	NGN1.3m (Wennovation Hub)

#	Technology	Sector	Name of company	Description	Headquarter	Founded yr	# of employees	Funding status (amount, investor)
33	大企業	General, Energy	CWG-PLC	Various business in IT infrastructure, communications, hardware, software development, etc. Develops AMR meters and payment and CRM systems for electricity.	Lagos	1991	694	n/a

(-: no information posted)

Source: JICA Survey Team

3.2.3 Ecosystem players

(1) Accelerators, Incubators, Co-working Space

Since the establishment of CcHub in 2010, the first SU support organization in Nigeria, the number of incubation facilities and co-working spaces has been on the rise with 55 tech hubs in 2018, boasting second place after South Africa with 59 hubs. In Lagos and Abuja, there are 31 and 13 hubs respectively. However, there are quite many hubs that act only as co-working space without incubation service.

Table 3-8 Accelerators, Incubators, Co-working Space in Nigeria, June, 2019

#		Name	Target sector	Founded year	Description
1		Co-Creation Hub/ CC-Hub	Tech and all sectors related to social challenges	2010	The first incubation space in Nigeria. Co-creates solutions towards social challenges by involving technicians, social entrepreneurs, government, tech companies, impact investors and hackers. Holds 6 months incubation program for seed stage startups（including $5k funding）, and 12 months incubation program for startups with traction (including $25k funding). For growth stage SUs, provide funding of $150k through Growth Capital by CcHub. Has implemented programs with various partners including GIZ, Government of Netherlands, US embassy, BBC, MTN, Microsoft, etc. Located in Lagos and Aguja.
2		Leadpath	Software applications, mobile app, electronic payments, big data	2015	With an accelerator fund of about $1.5m, provides funds, co-working space and hands-on support. Located in Lagos.
3		Venia Hub	All sectors	2011	Co-working space in Lagos. Accommodates anyone such as startups, multi-national enterprises and freelancers.
4		Vibranium Valley	All sectors	2018	Tech hub/ office space (2,500 sq m) established by Venture Garden Group. Located in Lagos

#		Name	Target sector	Founded year	Description
5		Wennovation Hub	Education, Agriculture, Healthcare, Infrastructure	2010	Provides incubation programs and funding to early stage SUs. Has wide domestic coverage with locations in Lagos, Ibadan and Abuja.
6		Passion Incubator	Tech	2013	An accelerator that supports early-stage tech SUs. Provides a three-month acceleration program and a service called "Collaborate" to match corporates and government challenges with SU solutions. Operates co-working Space "Leadspace" and the "Leadpath Nigeria fund", which makes $10-25k investment. Has implemented programs with World Bank, TOTAL, etc. Strong ties with large companies. Location in Lagos.
7		Spark	All sectors	2015	Founded by Nigerian Jason Njoku, a prominent tech entrepreneur. Support the growth of companies with a scalable revenue model. Location in Lagos.
8		Startpreneurs	AR, data science, machine learning, AI, blockchain, geo spatial intelligence	2015	Provides a 3-month acceleration program. Has partnership with 500 startups in the United States. Head office in Abuja, offices in Lagos, Kaduna and Adamawa.
9		Itanna	All sectors	-	Provides 4 months acceleration program and $25k funding. Located in Lagos.
10		MEST Nigeria	SaaS, consumer internet, EC, digital media, agritech, fintech, heathcare IT	2016	Provides a 12-month start-up support program for outstanding students. Also provides seed funding and incubation for talented entrepreneurs. Location in Lagos
11		Lagos Innovates	Tech	-	The Lagos State Employment Trust Fund initiative to enhance the Lagos tech ecosystem. Offers a 12 week acceleration program etc.
12		Civic Innovation Lab	Tech	2017	Provides incubation program for social challenge oriented high impact businesses related to SDGs, provides co-working space and networks with VCs, etc. Has strong connection with the government, and demonstration days at the presidential palace and policy recommendations on innovation and science and technology are also implemented. Located in Abuja.
13		ScaleUp Lab	Agribusiness, Health, Creatives, Education	-	Provides a 4-6 month program including accelerator boot camp, workshops, consulting, mentoring, etc. for SU in the growth stage. Location in Lagos
14		Ventures Platform	All sectors	2016	Supports early stage SUs with MVP. The Ventures Park offers co-working space, the $ 20k- $ 500k Ventures Fund, and a non-profit Venture Platform

#		Name	Target sector	Founded year	Description
					Foundation offering policy recommendations and other incubator development programs, as well as a 16-week mentoring program. Located in Abuja and Lagos.
15		Aiivon Tech Hub	Tech	-	Provides services such as co-working space, training, incubation, business development support, mentoring, and access to funding. Located in Abuja.
16		Box Office Incubator	All sectors	2012	Provides co-working space
17		Enspire Incubators and Accelerators	ICT, bio-tech, mineral-tech, energy-tech	2013	Government-run incubator which was established as an initiative of the Abuja Technology Village Free Zone Company (ATV). Supports early stage SUs in ICT, biotech, mineral-tech and energy-tech. Provides 3 month-incubation program by area, co-working space, etc. Located in Abuja.
18		Harmony Innovation Hub	Agribusiness, construction, Education, ICT, Mobile solutions, Digital Banking, E-Commerce, E-health, Fintech, Insurtech	-	Provides a 3, 6, 12 month start-up support program and co-working space. Located in Abuja.

(-: no information posted)

Source: JICA Survey Team

(2) Others (Universities)

The following are examples of institutions and universities providing entrepreneurship education and producing tech talent in Nigeria.

Table 3-9 Other Support Institutions in Nigeria, June, 2019

Name	Description
FATE FOUNDATION	Non-profit organization established in 2000. Provides entrepreneurial support program through FATE School of Entrepreneurship. In the Institute for Venture Design (IVD), provides various innovation creation programs in collaboration with the design research center of Stanford University. Located in Lagos.
University of Lagos	Established in 1962. One of the top universities in Nigeria. 55,000 students are enrolled. Has three campuses in Yaba and Surulere. All students are required to take an entrepreneurship course. With the support of Airtel, the Entrepreneurship and Skills Development Center was established to provide entrepreneurship support to student entrepreneurs.
Yaba College of Technology (YABATECH)	Established in 1947 as Nigeria's first higher education institution and vocational training school. In addition to business education, the Center for Entrepreneurship Development supports prototyping. Applied Research and Technology Innovation unit has been established to promote research and development with the private sector.

Name	Description
Pan-Atlantic University	The Enterprise Development Center (EDC) provides business development support services such as mentoring and consulting for SMEs. Location in Lagos
Federal Institute of Industrial Research (FIIRO)	Established in 1956 under the Ministry of Science and Technology. Promote research to accelerate industrialization of Nigeria.
University of Abuja	Established in 1988. One of the top universities in Nigeria. Provides undergraduate and postgraduate courses. Conduct entrepreneurship education in the Institute of Entrepreneurship Development Studies.
Baze University	Private university established in 2011. Conducts entrepreneurship education in the Faculty of Business. Located in Abuja.
African University of Science and Technology	Pan-African organization established in 2007 in response to requests from leaders of African countries to strengthen science and technology in sub-Saharan Africa. Provides only postgraduate programs that do state-of-the-art research. Located in Abuja

Source: JICA Survey Team

(3) Points to Consider in Holding Open Innovation Events

As mentioned in the chapter, this survey conducted the first open innovation event in Civic Innovation Lab and the second event in Aiivon Tech Hub. Below are some points to consider when selecting places and partners to conduct open innovation events in Nigeria.

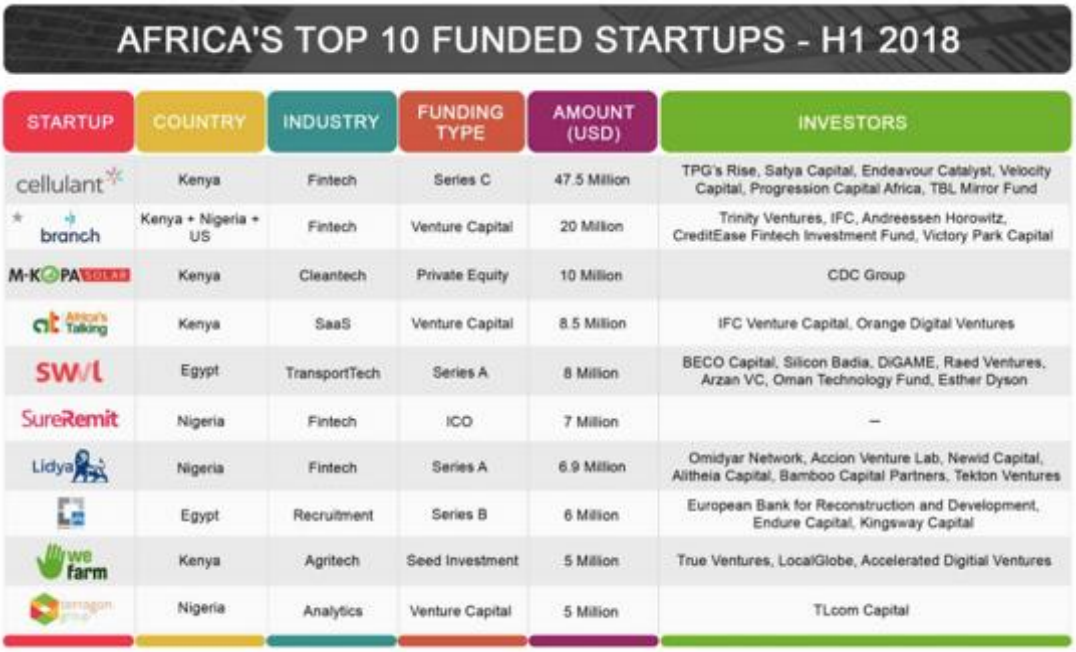
- Facility: A hub with enough space which is lively and frequently holds startup related events can be a potential partner. In Abuja, in addition to Civic Innovation Lab and Aiivon Tech Hub, Ventures Platform etc. also meet the conditions, and Enspire was developing a new incubation space at the time of the survey, so it may be an option in the future.
- Theme and its relevance: The Civic Innovation Lab aims to create innovation towards achieving the SDGs; the high affinity of Civic Innovation Lab's policy with this event was one of the points considered in the selection of the space, aside from the facility mentioned above. For example, when conducting events related to energy, Enspire could be an option as it focuses on SU support related to energy field.

3.2.4 Investment Environment

(1) Recent Trends (number of funds, transition of investment, etc.)

As mentioned above, Nigerian SUs financed USD 114.6 million in 2017, the third largest in Africa, and has already raised USD 180 million in the first half of 2018 alone[8]. In the first half of 2018, amongst the top 10 funded startups, 4 companies (branch, SureRemit, Lidya (fintech) and terragon group (analytics)) were from or related to Nigeria, and they raised a total of 40 million USD. As for the number of funded cases in the first half of 2018, Nigeria was the top with 31 cases, followed by 23 in Kenya, 19 in South Africa and 21 in Egypt.

[8] Current Situation and Trend of Startup and Venture Capital (VC) in Nigeria, JETRO



AFRICA'S TOP 10 FUNDED STARTUPS - H1 2018

STARTUP	COUNTRY	INDUSTRY	FUNDING TYPE	AMOUNT (USD)	INVESTORS
cellulant	Kenya	Fintech	Series C	47.5 Million	TPG's Rise, Satya Capital, Endeavour Catalyst, Velocity Capital, Progression Capital Africa, TBL Mirror Fund
branch	Kenya + Nigeria + US	Fintech	Venture Capital	20 Million	Trinity Ventures, IFC, Andreessen Horowitz, CreditEase Fintech Investment Fund, Victory Park Capital
M-KOPA SOLAR	Kenya	Cleantech	Private Equity	10 Million	CDC Group
Africa's Talking	Kenya	SaaS	Venture Capital	8.5 Million	IFC Venture Capital, Orange Digital Ventures
SWVL	Egypt	TransportTech	Series A	8 Million	BECO Capital, Silicon Badia, DiGAME, Raed Ventures, Arzan VC, Oman Technology Fund, Esther Dyson
SureRemit	Nigeria	Fintech	ICO	7 Million	–
Lidya	Nigeria	Fintech	Series A	6.9 Million	Omidyar Network, Accion Venture Lab, Newid Capital, Alitheia Capital, Bamboo Capital Partners, Tekton Ventures
	Egypt	Recruitment	Series B	6 Million	European Bank for Reconstruction and Development, Endure Capital, Kingsway Capital
we farm	Kenya	Agritech	Seed Investment	5 Million	True Ventures, LocalGlobe, Accelerated Digital Ventures
	Nigeria	Analytics	Venture Capital	5 Million	TLcom Capital

Figure 3-4 Africa's Top 10 Funded Startups

Source: Wee Tracker 2018

African tech SUs have raised over US $ 195 million in 2017, and about one third of the amount is concentrated in Nigeria with Nigerian tech startups raising US $ 63 million. In terms of area, 70% of the investment is concentrated in FinTech.

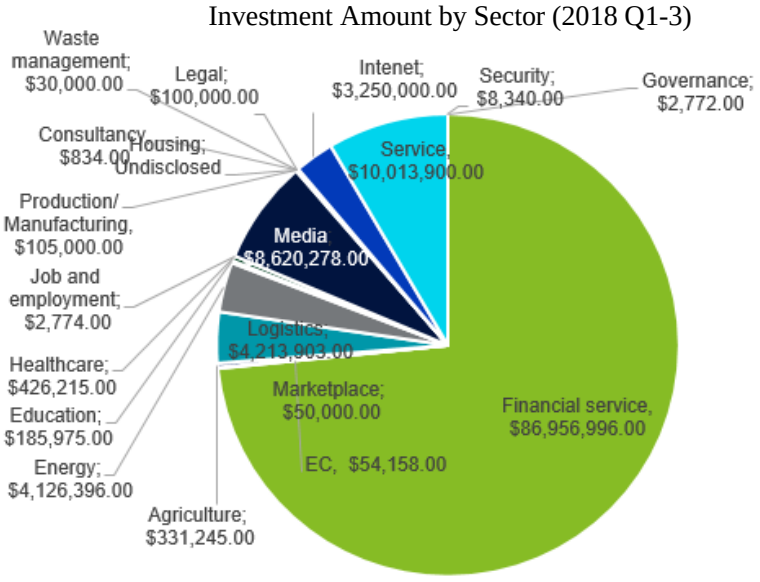


Figure 3-5 Investment Amount by Sector, 2018 Q1-3

Source: TechPointQ1 (2018), TechPoint Q2 (2018), TechPoint Q3 (2018))

According to the LP survey conducted by the African Private Equity and Venture Capital Association (AVCA), 85% of 60 LPs have selected West Africa as the most attractive area to invest in the next three years (East Africa: 72 %, Southern Africa: 44%, North Africa: 43%, Central Africa: 7%), with the highest expectations for Nigeria. With no major confusion after the election, investment is expected to grow further.

On the other hand, domestic funding gaps are still large; domestic investors tend to avoid the risk of investing in SUs. In addition, there is no incentive for the wealthy to invest in high-risk SUs, and the absolute number of angel investors and the amount of investment are limited. Foreign capital is the dominant source of investment.

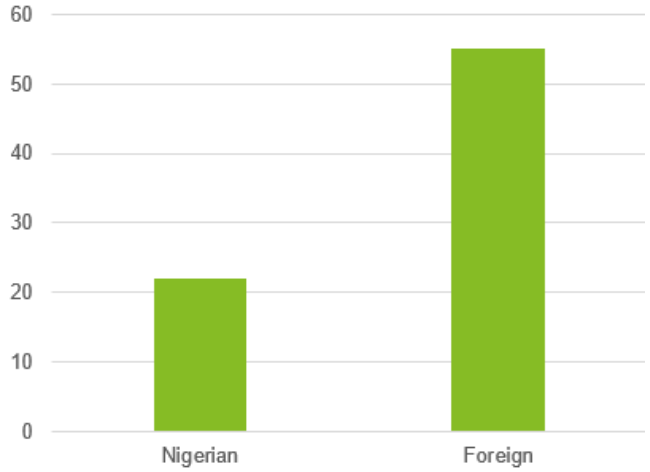


Figure 3-6 Number of Investment Cases in Nigeria by Source (2018 Q1-3)

Source: TechPoint_Q1_(2018), TechPoint_Q2_(2018)_, TechPoint_Q3_(2018)

(2) VC and Funds

There are 9 funds that are based in Nigeria and operated by local personnel. The three Nigerian funds that participated in the top eight investments in the first three quarters of 2018 were Singularity Investments, Adlevo Capital and Alitheia Capital. The average investment period of VC is said to be 3-7 years, while the investment period of VCs that invest in SU in Nigeria is said to be 7-10 years.

Table 3-10 VC and Funds in Nigeria, June, 2019

Name	Classification	Description	Location	Founded yr	Investment area		Amount	# of exits	Exit cases	Portfolio (Nigerian corporate)
					Sector	Stage				
EchoVC Partners LLC.	Fund	Join large-scale investment (over 100 million) by consortium with foreign institutional investors. Established 2 fund, namely, EchoVC Pan-Africa Fund (for Seed & early stage) and EchoVC+ (for Growth)	Lagos	2011	Consumer Internet and Services, SmartGraph and SmartData, Mobile, Digital Media, Content and Advertising, E/M-commerce, Software, Tech-enabled Services and Enterprise Infrastructure	Seed – Growth	USD25k-	4	Easyshop Easycook、Retailigence, etc	19 (20 in TC)(Kukua: Seed (ER2.2mn, 2018) (lead), EAT Club: Series C (USD30mn, 2017), etc)
Adlevo Capital	VC	Lead the fundraising of fintech startups I Nigeria by raising from CDC,	Lagos (registered in Mauritius)	2009	Financial, fintech	All stages	-	-	-	5(Pagatech Holdings Limited (Nigeria): A (lead, USD9mn-2012) & Bx2 (USD15mn-2015,USD10mn-2018), InterSwitch Limited (Nigeria): Unknown (USD10.5mn-2011), etc)
Venture Platform	VC	Establish US-Nigeria Council Fund and fund to attract investment from Nigerian companies to startups.	Lagos, Abuja	2016	Agribusiness, Education, Financial services, Healthcare, Internet, Mobile	Seed – Early (after MVP)	USD20k/250k*-1.1mn	-	-	25(23 in TC)(Connected Analytics: Venture (series unknown) (?, Oct 2018 & USD200k, Aug 2018) (lead), Gerocare: Seed (USD20k, 2017) (lead), etc)
Singularity Investments	VC	Join large-scale investment to Mines. IO and Asoko Insights in 2018.	Lagos	2014	Technology/media/telecommunication	Early - Growth	USD100k-1mn	1	Tapiture	13(18 in TC)(Mines. IO: Series A (USD13mn, 2018), Asoko Insight: Seed (USD3mn, 2017) (lead) & Series A (USD3.6mn, 2018), etc)
Co-Creation Hub/ Cc-Hub	Fund	Manage Growth Capital receiving small ordinary investment through online. Established Seed Fund (for Seed in 2014), Social Innovation Fund (for Early in 2015), and Growth Capital (for Growth in 2015).	Lagos	2014	Smart infrastructure, governance, health and well-being, fintech, education and digital security	Seed - Growth	USD5k-25k、USD50k-	0	-	23 (1 Million Teachers: Seed (?, 2017), Sarelo: Seed (USD5k, 2017) (lead), etc)

Name	Classification	Description	Location	Founded yr	Investment area		Amount	# of exits	Exit cases	Portfolio（Nigerian corporate）
					Sector	Stage				
Leadpath Nigeria	VC	Seed capital fund providing short, middle, long-term fund for small and medium business in high growth sectors such as software, web and mobile technologies.	Lagos	2014	High growth technology areas such as software, web and mobile technologies	Seed - Growth	Seed: NGN25k-100k Early & growth: USDxmn	-	-	18 (Piggybank: Seed (USD1.1mn, 2018), Uregista: Venture (series unknown) (?, 2014), etc)
Microtraction	VC	Invest to high potential startups in early stage, and support team building.	Lagos	2017	Technology	Seed - Early	USD15k*-65k/ USDxmn	0	-	9 (Riby Finance: Venture (series unknown) (USD15k, 2018) (lead), Connected Analysis: Seed (USD200k, 2018), etc)
Lagos Angel Network/ LAN	NPO	NPO consisted of seed investors for startups (business angels). Invest to early stage and provide mentoring.	Lagos	2013	Tech, high growth sectors including retail, agriculture, services	Seed - Early	USD5k-138k	-	-	MINES. IO, Techcabal, etc
Beta Ventures	VC	Invest to tech entrepreneurs in early stage.	Lagos	2017	Mobile, technology	Early	<USD 100k	-	-	Yuzah, ELephab, etc
Alithelia Capital	VC	Provide early-stage investment, growth capital/ working capital, mezzanine finance for fintech sector.	Lagos, accra	2007	Agribusiness, Creative, media and entertainment, Education, Financial services, Healthcare, Leisure and travel, Transport and logistics, Water, sanitation and hygiene, MFB (Micro-finance Bank)	Early – Growth (Working capital, Mezzanine)	USD0.27-4mn	1	Paga	1 (Lidya: Series A (USD69.mn, 2018))
Green House Capital	Fund	Established under Venture Garden Group/ VGG in 2016, and spined out in 2017.	-	2010	Fintech	Early (after MVP)	USD60k/100k-250k	1	-	17 (SureRemit: ICO (USD7mn, 2018), Adspread, etc)
Tony Elumelu Foundation	NPO	Invested USD25 million to over 4,460 startups by 2018. Provide invested startups at least USD5k of grant.	Lagos	2010	Various	Seed to Early (basically within 3 years from establishment)	USD5k-	-	-	LegitCar: Grant (USD14k, 2017), Tuteria: Grant (USD5k, 2016), etc
Neon Ventures	VC	Invest to platform business.	Lagos	2017	Technology enabled start ups	Early	-	0	-	4 (TaxiTV: Seed (USD50k, 2018), Kangpe, etc)
Platform Capital	VC	Local VC with characteristics of wide range of portfolio and pipeline covering FMCG, tech, building materials and so on.	Lagos	2002	Sector agnostic: Consumer services, FMCG, logistics, real estate, financials, technology, manufacturing & oil and gas	Seed - Growth	USD200k-xmn	0	-	9 (Presice Communications: (2018), Mano River Noodles & Packaging Incorporated: Majority, etc)

Name	Classification	Description	Location	Founded yr	Investment area		Amount	# of exits	Exit cases	Portfolio (Nigerian corporate)
					Sector	Stage				
8 Broad Street Capital/ 8BSC	Fund	Multi-sector fund under fundraising and establishing.	Lagos	2018	Infrastructure, RE, real estate, SMEs (women and youth-owned, technologically enabled), healthcare & education, financials, fintech, consumer and industrials	Growth	Not open	-	-	-

(-: no information posted)

Source: JICA Survey Team

3.2.5 Japanese Business Entry Environment

(1) Local Business Environment

Nigeria's business environment (Doing Business) ranking is 131 out of 190 countries (2020), the World Peace Index is 147 out of 163 countries (2020), and the Corruption Perceptions Index is 149 out of 180 countries (2020). It is hard to say that Nigeria has great business environment, however, its business environment ranking has significantly improved from 169 in 2017 to 146 in 2019. This can be attributed to the various measures taken by the "Presidential Enabling business Environment Council" which was established in 2016 directly under the president to improve the business environment. In particular, the introduction of the electronic registration approval system which improved the speed of business establishment and the introduction of electronic payment service for taxes influenced the ranking. By topics, ranking of funding environment and ranking of protection of minority investors are relatively high, while ranking of real estate registration, foreign trade, electricity supply, tax payment is particularly low.

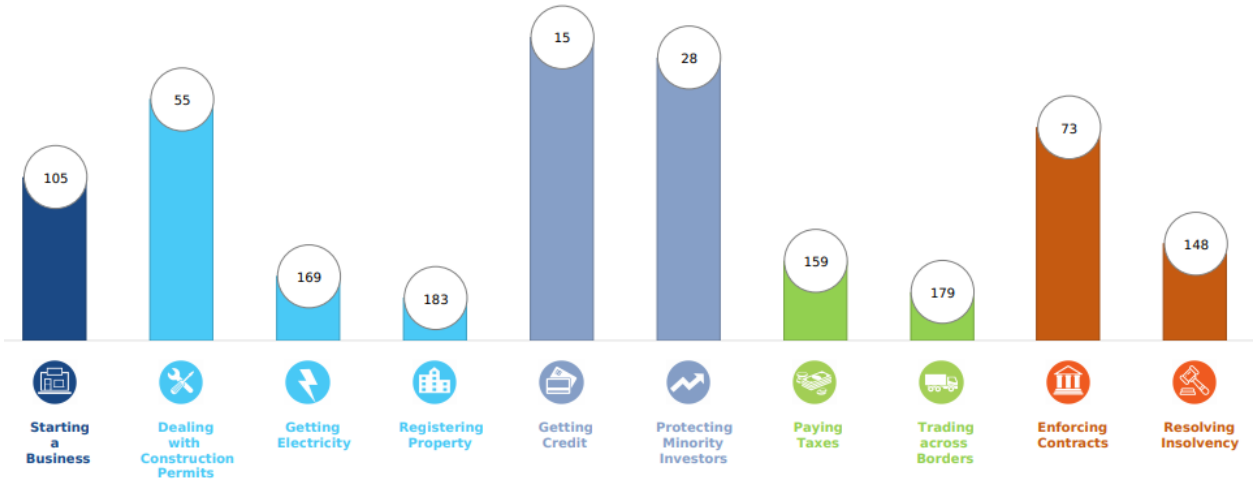


Figure 3-7 Local Business Environment (Nigeria)

Source：Doing Business 2020 Nigeria

The corporate tax rate in Nigeria is 30%, but the tax exemptions and incentives for startups and SMEs are immature. The “Pioneer Tax” system gives pioneer status to companies with assets of GN100mn/USD270k in sectors designated by the government, and the selected companies can receive up to 5 years of income tax exemption as well as preferential treatment such as withholding exemption on dividends, but the application criteria is unclear and utilization by SU is still limited.

Furthermore, the current public procurement regulation defines the obligation to submit accounting audit reports and tax payment certificates for the past three years and the minimum number of working years by industry, etc., which is a major barrier to entry of public bids by SUs.

There is no special foreign currency preferential treatment system. There are no restrictions on foreign capital.

(2) Japanese Corporates related to Digital Technology

There are 39 Japanese companies registered in Nigeria, and less than 15 Japanese companies are stationed in the country. The following is a list of Japanese companies related to the digital technology.

Table 3-11 Japanese Corporates related to Digital Technology in Nigeria, June, 2019

#	Company Name	Description	Headquarter	Founded yr	# of employees
1	NEC	Develops and sells information and communication related equipment, mobile phone base station equipment such as microwave communication system, submarine cable laying, ID system construction, smart energy system such as storage battery. In 2015, received an order for fingerprint and face recognition ID system from Lagos city.	Tokyo	1899 2012 (Lagos)	109,390
2	Afri-Inc	Development and sales of distribution management applications and systems for local companies. Offices in Uganda and Kenya, and established a base in Nigeria in August 2018	Tokyo	2015	-

(-: no information posted)

Source: JICA Survey Team

3.3 Uganda

3.3.1 Startup Ecosystem

- Abundant supports for startups by various incubation facilities:
  The representative incubation facilities, including The Innovation Village, Hive Colab and Outbox, in Kampala underpin the increase and growth of startups through the support including providing space, acceleration program, open innovation program, seminars, pitch events and so on. At the same time, these measures have an aspect of countermeasures for unemployment for the younger generation.
- Not many cases of fundraising through financial institutions and VCs:
  The fundraising methods for most startups are individual saving, support from family and donation, and there are not many cases of fundraising through financial institutions and VCs.
- Most startups are IT-based:
  It is hard to develop hardware domestically as manufacturing industries are underdeveloped in Uganda. Thus, the most startups are IT-based software developer. (When they need hardware, they outsource to China in most cases.)

3.3.2 Digital Technology related Corporates (Local and Foreign)

Local and foreign startups providing services related to the target technology area are as follows. Many startups in the FinTech field that offer services such as mobile payment utilizing M-PESA and loan services as well as in the healthcare field that provide diagnostic or telemedicine services using mobile phones can be observed.

Table 3-12 Local and Foreign Institutions in Uganda, June, 2019

#	Technology	Sector	Name of company	Description	Headquarter	Founded yr	# of employees	Funding status (amount, investor)
1	drone, IoT	Health, Energy	Innovex	Develops and provides ICT solutions utilizing state-of-the-art technology. Solutions include drone solutions, urine diagnosis kit using mobile, IoT monitoring system of solar system, etc.	–	–	–	–
2	AI, mobile app	Health	MamaOpe Medical	Provides biomedical application for early diagnosis and continuous monitoring of pneumonia patients	Kampala	2017	n/a	n/a
3	VR	Health	Wazi Vision	Provides 80% cheaper affordable eyeglasses as well as VR eye test kit	Kampala	2016	–	$800K, GreenTec Capital Partners
4	mobile app	Health	LabTECH Engineering Solutions Uganda Limited	Provides testing and diagnostic services of infectious diseases etc. for pregnant women utilizing mobile	Kampala	2018	1-10	n/a
5	mobile app	Health	HerHealth Uganda	Provides bacterial vaginitis test kit for women utilizing mobile	Kampala	2015	–	–
6	mobile app	Health	Matibabu	Provides malaria diagnosis service using smartphone	Kampala	2013	11-50	n/a
7	mobile app	Health	mscan	Develops portable ultrasound diagnostic device that can be connected to mobile phones and share images	Kampala	–		$60,000

#	Technology	Sector	Name of company	Description	Headquarter	Founded yr	# of employees	Funding status (amount, investor)
8	mobile app	Health	Digital Health Access	Provides services where you can consult with doctors and lawyers via chat	Kampala	2018	1-10	n/a
9	mobile app	Health	TEHECA	Provides remote medical healthcare, sends reminder of hospital visits and health education tips by SMS	Kampala	2016	1-10	n/a
10	mobile app	Health	GetIN mobile	Provides app that allows community health workers and midwives to register and follow up pregnant women	Kampala	2015	11-50	–
11	mobile app	Health	DigiHealth	Provides services for medical institutions and doctors that streamline patient information management with web platform and application	Kampala	–	–	–
12	mobile app, fintech	Health	clinicPesa	Provides savings, loans and payment services to medical institutions for medical insurance non-subscribers	Kampala	2016	11-50	n/a
13	SaaS	Health	ClinicMaster INTERNATIONAL	Provides information management platform for patient management, accounting, reservation, inventory management, etc. for hospital management improvement	Kampala	2009	11-50	–
14	mobile app	Agriculture	Akorion Company Limited	Provides services such as market access, sales management / analysis, agricultural land survey, disease diagnosis / advice provision, soil diagnosis, insurance, etc. through application “EzyAgric”	Kampala	2014	11-50	n/a
15	fintech	Agriculture	Agric Wallet	Provides credit without collateral by obtaining commercial transaction data of small farmers	Kampala	2017	1-10	n/a
16	fintech, mobile app	Agriculture	Quest Digital Finance Ltd.	Provides credit service to farmers and entrepreneurs	Kampala	2016	–	–
17	Edtech	Education	Yaaka	Provides online education service	Kampala	–	–	–
18	mobile app	Transportation	Trancpota	Provides peripheral information such as restaurant information etc by app	Kampala	2018	1-10	–
19	mobile app	Transportation	e-fundi	Provides platform connecting car repairmen and garages to consumers	Kampala	–	–	–
20	mobile app	Real estate	Nyyumba Real Estate	Provides real estate brokerage platform	Kampala	2018	–	–
21	blockchain	Financial Services	Coinpesa	Provides trading platform for crypto-currency	Kampala	–	–	–
22	IoT, bigdata	Financial Services	Thinvoid	GPS tracking service for vehicles and agricultural machines, micro credit / micro insurance, mobile payment service etc for farmers	Kampala	–	–	–
23	fintech	Financial Services	intelworld	Provides a mobile trading platform with mobile money	Kampala	2011	1-10	n/a
24	fintech	Financial Services	Redcore Interactive	Provides remittance service to mobile wallet	Kampala	2013	1-10	n/a

#	Technology	Sector	Name of company	Description	Headquarter	Founded yr	# of employees	Funding status (amount, investor)
25	fintech	Financial Services	Patasente	Provides an online supply chain platform that connects buyers and suppliers and simplifies processes of procurement and payment	Kampala	2015	–	n/a
26	fintech	Financial Services	African Vending Systems Ltd.	Develops and provides software that enhance convenience for payment of utility bills, tax, television and internet	Kampala	2009	11-50	n/a
27	fintech	Financial Services	Xente	Provides mobile payment service for mobile communication charges, etc	Kampala	2018	n/a	n/a
28	fintech	Financial Services	Beyonic	Provides mobile payment service for emerging markets. Based in US and Uganda	Kampala	2015	11-50	n/a
29	fintech	Financial Services	PesaMoni Ltd	Provides simple and easy remittance service via web	Kampala	2016	1-10	n/a
30	fintech	Financial Services	Swipe2Pay	Provides financial and inventory management app for SMEs, loan services utilizing acquired data and card and mobile settlement services. Serving in Kenya, Rwanda and Uganda	Kampala	2016	1-10	–
31	fintech	Financial Services	Smart Credit	Provides business intelligence engine for SMEs	Kampala	–	–	–
32	fintech	Financial Services	Skysente	Provides mobile payment service using QR code	Kampala	2013	–	–
33	fintech	Financial Services	Cytrone Pay	Provides payment platform that allows payment by installments to online stores	Kampala	2016	–	–
34	fintech	Financial Services	Yo! Uganda Limited	Provides SMS service connected to social networking services such as Twitter as well as mobile payment service	Kampala	2006	1-10	n/a
35	fintech	Financial Services	Four one Financial Services	Provides micro pension service and e-wallet platform	Kampala	–	–	–
36	fintech	Financial Services	Borrocracy	Provides loan service	Kampala	2016	–	–
37	mobile app, fintech	Financial Services	Chap Chap Africa Ltd	Provides deposit and mobile payment services	Kampala	–	–	–
38	AI	General	BotNiche	Provides customizable chat bots for multiple fields	Kampala	2017	1-10	$100K
39	AI, mobile app	General	ugandasoft	Develops software, web application, SMS service, etc.	Kampala	2006	1-10	–
40	mobile app	General	Krobits	Provides various ICT related services such as improving efficiency of web and mobile apps, data analysis, etc.	Kampala	2012	1-10	–
41	mobile app	General	Honexus	Develops software, web app, SMS service, etc.	Kampala	2012	1-10	–
42	mobile app, SaaS	Organizational	Kola Studios	Develops apps, provides data analysis, review, system	Kampala	2013	1-10	n/a

#	Technology	Sector	Name of company	Description	Headquarter	Founded yr	# of employees	Funding status (amount, investor)
		Management		maintenance, etc. according to customer's needs				
43	SaaS	Organizational Management	Numida	Provides business management software and applications for small businesses	Kampala	2015	–	–
44	blockchain, mobile app	Financial Services	Wala	Provides zero fee small amount payment by electronic currency "Dala" for consumers in developing and emerging countries. Provides service in UK, South Africa, Zimbabwe, Uganda and is planned to be deployed in Botswana, Ghana, Kenya, Mozambique, Nigeria, Tanzania, Zambia	London (UK)	2015	1-10	1.2M: Newton Partners, Techstars, Barclays Accelerator
45	blockchain	Financial Services	Eversend	Provides multi-currency e-wallet that can make payment, remittance and exchange at optimal rates	Paris (France)	2017	1-10	–
46	IoT	Health	Neopenda	Provides wearable IoT healthcare device for neonates	Chicago (USA)	2015	1-10	Concealed amount, Relevant Health
47	fintech	Organizational Management	Awamo	Provides SaaS Software on information management for microfinance institutions and banks	Frankfurt (Germany)	2015	11-50	$2.3M (FinLab, German Investment and Development Corp, etc)
48	mobile app, Big data	Agriculture	WeFarm	Q&A matching service among farmers through SMS	London	2015	11-50	n/a
49	mobile app	Agriculture	Smart Farming Uganda	Provides online marketplace for agricultural materials	Kamala	2016	11-50	-
50	mobile app	Agriculture	Spark Initiatives	Matching service for cultivation advice and agricultural material suppliers through call center	Kamala	2017	1-10	-
51	mobile app	General	SHOPTO	Develops app for POS and accounting for small and medium size retailers	Kamala	2017	1-10	-

(n/a: not applicable, -: no information posted)

Source: JICA Survey Team

3.3.3 Ecosystem Players

(1) Accelerators, Incubators, Co-working Space

Accelerators, incubators and co-working spaces has increased in Uganda; after the establishment of the first co-working space "Hive CoLab" in 2010, the number of tech hubs which was 5 in 2014 has increased by 16 in 2018[9]. This is the 8th largest number of tech hubs in Africa following South Africa, Nigeria, Egypt, Kenya,

[9]https://www.gsma.com/mobilefordevelopment/programme/ecosystem-accelerator/africa-a-look-at-the-442-active-tech-hubs-of-the-

Morocco, Ghana and Tunisia. On the other hand, many of these stakeholders are only functioning as co-working space, and the support service for the startups is limited.

The followings are the main stakeholders supporting the startups in Uganda. Innovation Village, Outbox Hub, Hive Colab and Makerere Innovation and Incubation Center have strong presence in Uganda considering their support menu and performance.

Table 3-13 Accelerators, Incubators, Co-working Space in Uganda, June, 2019

#	Name	Target sector	Founded yr	Description
1	Innovation Village	All sectors	2015	An incubator with strong presence in Uganda with over 2,000 entrepreneurs support experience. Offers 12 weeks accelerator program, network with investors, co-working space etc. Holds sector labs on climate, health, agribusiness, media, education and finTech sectors. Implements startup boot camp "#hack4refuges" for startups providing digital solutions to refugees, in partnership with UNCDF, DanChurgeAid and Mercy Corps. Also involved in the establishment of Uganda's investor community, Kampala Angel Investors Network, under partnership with Liquid Telecom
2	Outbox Hub	Agribusiness, creative, media & entertainment, education, financial services, healthcare, travel, logistics, transportation, water and sanitation	2012	Provides mentoring, trainings and co-working space. Implements "UpAccelerate" which provides mentoring, seed funding of up to 10 thousand USD and training to social entrepreneurs in reproductive health field, under partnership with the Ugandan government and UNFPA. Implements hackathon in collaboration with MTN Uganda and programming boot camp "Outbox EDU". Partner organizations include Google for Startups, UNFPA, MTN, Indigo Trust, SEACOM, stripe, etc. Graduates include mscan.
3	Hive Colab	Tech, education, finance, health, governance, agriculture etc.	2010	First tech hub established in Uganda. Holds hubs in Kampala and Mubarara and provides mentoring and leadership coaching, network with industry experts and investors. Sponsors include UNICEF, British Council, Indigo Trust and partners include DEMO Africa, SEACOM, Microsoft etc. Graduates include We Farm, Sula Pay, Dignited, Yoza App.
4	Venture Labs East Africa	Sustainable agriculture, infrastructure, toC tech	2014	Established by Clean Star Ventures which supports startups in India, Brazil and Africa. Provides incubation and co-working space
5	Space hub Africa	-	-	Provides incubation, acceleration, business development support and co-working space
6	Women in Technology Uganda (Witu)	All sectors	-	Provides training, mentoring, acceleration programs for women leaders, entrepreneurs, researchers, etc. Offers programming education for young women. Partners include Google and Hive Colab
7	Design Hub Kampala	All sectors	2017	Provides co-working space, opens events such as Creative Talks
8	Tribe Kampala	All sectors	-	Provides co-working space
9	Mara LaunchPad	Manufacturing, agriculture, tech, etc.	2010	Offers seed funding of 2,000 - 4,000 USD, provides co - working space
10	StartHub Africa	-	-	Offers 11 weeks design thinking workshop "Startup Academy", "StartHub Pitch Event" that provides networking opportunities to investors, mentoring opportunities, etc. Partnership with German universities (LMU, TMU).
11	Growth Africa	Agribusiness, education, ICT, fintech, financial services, renewable energy, water ·	-	Provides acceleration programs and investment opportunities to startups in Kenya, Uganda, Ethiopia and Zambia. Based in Kenya. Supported startups have raised $ 44m in total and include SOKO, savvy riders, Yenepay etc.

continent/

#	Name	Target sector	Founded yr	Description
		sanitation, health, manufacturing & processing, e-commerce, retail etc.		
12	Makerere Innovation and Incubation Center	All fields (fintech, software, agriculture, health, govtech, adtech, energy, education, data security, ecommerce, food & beverage, logistics, media, games etc)	2017	Incubation center of Makerere University to support the growth of tech entrepreneurs. Provides incubation, mentoring, pitch opportunities, co-working space etc.
13	Makerere University Food Technology Incubation Center	Food	2009	First university-based technology incubator in east and central Africa.
14	Uganda Industrial Research Institute	Agriculture	2002	Agribusiness incubator established under the Ministry of Tourism and Industry. Provides entrepreneurs education, mentoring, networking opportunities, technical support, etc.

(-: no information posted)

Source: JICA Survey Team

(2) Others (Universities, etc)

Table 3-14 Other Support Institutions in Uganda, June, 2019

Name	Description
Makerere University	Uganda's largest university established in 1922. The College of Computing and Information Science is one of the largest computing, ICT and information science vocational schools in Africa. Supports startups in Makerere Innovation and Incubation Center and the Makerere University Food Technology Incubation Center mentioned above
Mbarara University of Science and Technology	Established in 1989. Faculty of Applied Sciences and Technology and Institute of Computer Science conducts research and development in the tech field
Uganda Industrial Research Institute	Established in 2003. Supports training and incubation of startups to put in practical application of applied research conducted in universities
The National Agricultural Research Organization（NARO）	Established in 2005. Public research institution promoting research related to agriculture. Initiatives include development and release of digital platform to facilitate access to information on agricultural research

(-: no information posted)

Source: JICA Survey Team

(3) Points to Consider in Holding Operating Open Innovation Events

As mentioned in the next chapter, this survey conducted the first and second open innovation events in The Innovation Village based on the research of each accelerator, incubator, co-working space and other support institutions. The points for selecting places and partners when conducting open innovation in Uganda are as follows:

- Facility: A hub with enough space which is lively and frequently holds startup related events can be a potential partner. The Innovation Village meets conditions in the list above.

- Network with startups: Conducting an open innovation requires to have a network with startups (both members and non-members) and to be able to publicize it. In short, the Innovation Village satisfies this condition in the list above.
- Others: In Uganda, since the Innovation Village has accumulated experiences as an innovation hub and one of key players in startup community, our survey decided to carry out an open innovation event in the Innovation Village. Meanwhile, considering Outbox Hub's effort in advancing programming area, Outbox Hub will be a potential partner if holding an event related to engineering.

3.3.4 Investment Environment

(1) Recent Trends (number of funds, transition of investment, etc.)

In recent years, VC investment in African startups has become active, and Uganda is in the same situation. The amount of fund raised by Ugandan startups, which was 260 thousand USD in 2016, increased by 62 times in one year to 16 million USD in 2017. In particular, Uganda's high growth companies are attracting impact investment, and Uganda is the second largest impact investment destination in East Africa following Kenya. As of 2015, aside from development financial institutions, 82 investment funds are being operated, and high growth companies with social impact in areas such as agriculture, finance, healthcare and energy are attracting investment[10].

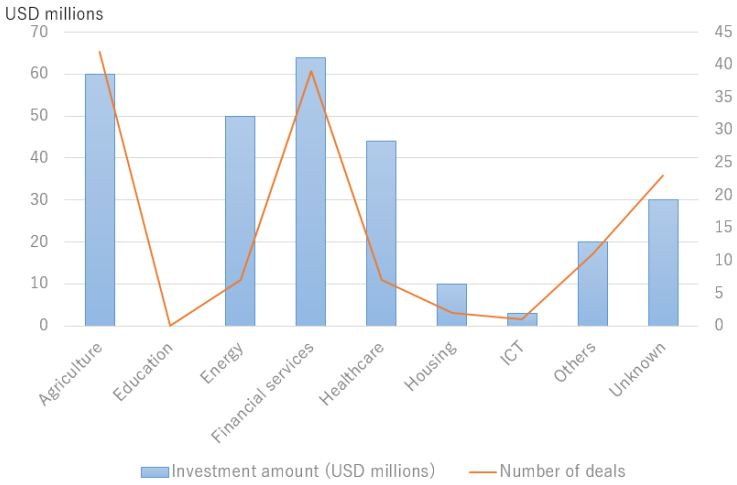


Figure 3-8 Non-Development Financial Institutions Impact Investment by Sector

Source: JICA Survey Team research based on GIIN & OPEN CAPITAL "THE LANDSCAPE FOR IMPACT INVESTING IN EAST AFRICA

[10] https://thegiin.org/assets/161025_GIIN_EastAfrica_FULL_REPORT%20(002).pdf

(2) VC and Funds

Table 3-15 VC and Funds in Uganda, June, 2019

Name	Classification	Description	Location	Founded yr	Investment area		Amount	# of exits	Exit cases	Portfolio (Ugandan corporate)
					Sector	Stage				
Mara Launch Uganda Fund	fund	First venture capital fund established in Uganda. Run by the Mara Foundation	Uganda	2012	IT, tourism, agriculture, manufacturing etc.	seed ~ early	$2,000-$4,000	–	–	–
Angels Initiatives	angel group	Raises capital from institutional and individual investors and invests in East African startups. Invested $ 1.2m in total	Uganda	2010	agriculture, construction industry, corporate development, Fintech, IT	early	$10,000-100,000	12	–	・Patasente ・Jojus Logistics ・Unreasonable East Africa ・Nkoola Agencies ・Rackmount Ltd ・Cooling Solutions
Kampala Angel Investor's Network (KAIN)	others	Holds quarterly pitch events to connect entrepreneurs and investors. Provides funding, Incubation and mentoring	Uganda	–		seed	–	–	–	–
Pearl Capital Partners	PE Firm	Impact investment company specializing in East African SMEs in the agricultural field. Runs funds such as Yield Uganda Investment Fund (Yield), African Seed Investment Fund (ASIF) etc.	Uganda	2005	agriculture	middle ~ later	$250,000-$2.5m	–	–	・Seaco Ltd. ・CECOFA ・KKI Foods
iungo capital	PE Firm	Impact investment company investing in small-scale SMEs in Rwanda and Uganda	Uganda	–	–	early	$50,000-500,00	–	–	・Kyogo Mazinga ・FFP/Mashamba ・Jojus Logistics
Mango Fund	fund	Impact fund that provides loans and investment to SMEs in East Africa. Partners with KOICA to provide loans to Ugandan SMEs	USA、Uganda	2011	manufacturing, agricultural product processing, technical Farming, healthcare	middle ~ later	$5,000-$50,000	–	–	・SEB Engineering Ltd. ・DEF.I.NI.TION Africa ・KadAfrica ・Teefe Plastics ・Don De Dieu
East African Development Bank	bank	In addition to various financial services, invests in startups	Uganda	1967	–	–	–	–	–	–

Name	Classification	Description	Location	Founded yr	Investment area		Amount	# of exits	Exit cases	Portfolio (Ugandan corporate)
					Sector	Stage				
Invested Development	fund	Impact investment fund. Offices in Nairobi, Boston and Houston	USA	2009	–	seed	–	–	–	・Solar Now
EWB Canada	fund	Operates EWB ventures program, an investment program for sub-Saharan Africa startups	Canada	2000	agriculture, water, hygiene, ICT etc	seed	-$100,000	—	—	・Numida Technologies
I&P	VC	Operates 4 impact funds worth 125 mil€ investing in SMEs in Africa (among the 4, IPDEV 2 and IPAE 2 fund are currently running). IPDEV 2 currently manages funds in Nigeria, Burkina Faso, and Senegal to invest in 550 early stage starups and will plans to operate in Madagascar and Cote d'Ivoire. IPAE 2 was established in 2017 and plans to invest 300 thousand - 3 mil€ to 30 - 40 startups in sub-Sahara, totaling € 80 mil. Has offices in Burkina Faso, Cameroon, Ivory Coast, Ghana, Madagascar, and Senegal	France	2002	agribusiness, health care, construction industry, renewable energy, microfinance, B2B service etc.	early	€30,000 - €3m	20	· Saphar (Niger, pharmaceutical wholesale business) · CAMED (Mali, wholesale business of generics)	–
Novastar Ventures	VC	Invests in East African startups	Kenya	—	—	early	$100,000-$6m	—	—	–
Savanna Fund	Fund	Has invested in 27 sub-Saharan African startups. With 500 Startups as partner, implements an accelerator program	Kenya	2012	tech	early	$25,000-$500,000	–	–	–
Global Partnerships	fund	Impact investment fund that invests and provides loans to growing companies in developing countries in sub-Saharan Africa, central America and the Caribbeans. Has financed 130 companies in 21 countries so far. Offices in Nicaragua and Kenya	USA	–	–	seed ~ later	–	–	–	・BRAC Uganda ・Fenix Intl ・NuCafe
TRIPLE I - Impact Investments	PE Firm	Runs Triple I fund which invests in SMEs in Southeast Asia, East Africa (Uganda, Rwanda, Tanzania, Kenya, Ethiopia), West Africa (Nigeria). Investment is focused in Vietnam, Uganda and Nigeria in particular	Netherlands	2014	agricultural products processing, consumer goods, etc	early ~ later	€100,000-€500,000	4	–	・Bee Natural Uganda ・Capstone
AgDevCo	PE Firm	Invests in SMEs in 8 African countries (Ghana, Malawi, Mozambique, Rwanda, Tanzania, Uganda, Zambia)	UK	2009	agriculture	early	above$1m	–	–	・GADC ・TALIAN

Name	Classification	Description	Location	Founded yr	Investment area		Amount	# of exits	Exit cases	Portfolio (Ugandan corporate)
					Sector	Stage				
DOB Equity	PE Firm	Invests in SMEs in Kenya, Tanzania, Uganda, Rwanda, and Burundi. Offices in Kenya and Tanzania	Netherlands	1997	Various	early	―	―	1	・Joseph initiative
TBL Mirror Fund	PE Firm	Invests in SMEs in Uganda, Kenya, Tanzania, and Nigeria	Netherlands	2007	ICT, health, consumer goods	early ~ later	€100,000-€1,000,000	–	–	・International Medical Group
TLG Capital	PE Firm	Invests in SMEs in Sub-Saharan Africa	UK	2009	medical, financial, consumer goods, real estate	later	―	9	Vero (food processing company in Uganda)	・Cipla Qci ・BAJ Service Station Ltd
Voxtra	PE Firm	Impact investment enterprises investing in companies in Kenya, Tanzania and Uganda. Norwegian Agency for Development Cooperation provides technical assistance	Norway	2008	agriculture	middle ~ later	$500,000-3,000,000	–	–	・Biyinzika Poultry International Ltd ・Amos Dairies

(-: no information posted)

Source: JICA Survey Team

3.3.5 Japanese Business Entry Environment

(1) Local Business Environment

Uganda's business environment (Doing Business) ranking is 116 out of 190 countries (2020), the Global Peace Index is 109 out of 163 countries (2020), and the Corruption Perceptions Index is 142 out of 180 countries (2020)[11]. It is hard to say that Uganda has better business environment comparing to other African countries, and Doing Business ranking is stagnant in these years. By items in Doing Business, the enhancement of business reform in "Trading across Border" and "Getting electricity" is observed in Uganda.

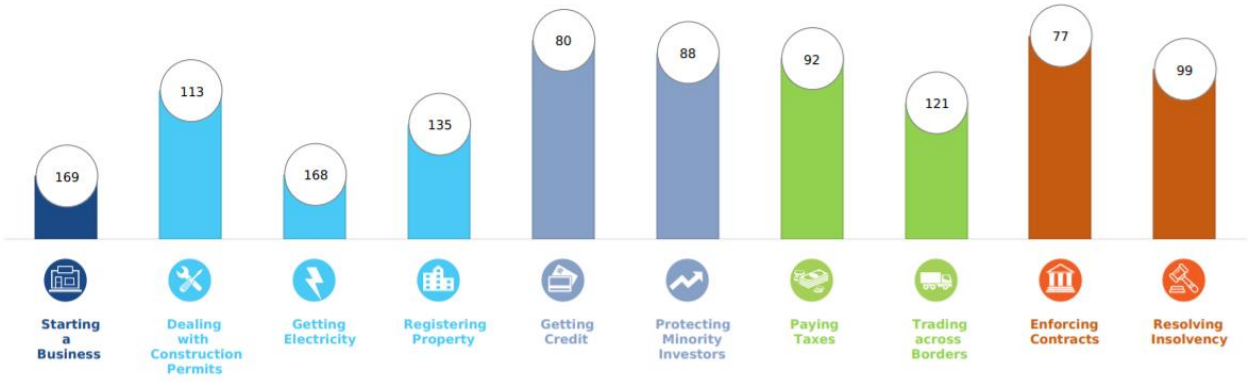


Figure 3-9 Local Business Environment (Uganda)

Doing Business 2020 Uganda

(2) Japanese Corporates related to Digital Technology

The following is a list of Japanese companies related to the digital technology.

Table 3-16 Japanese Corporates related to Digital Technology in Uganda, June, 2019

Technology	Sector	Company Name	Description	Headquarter	Founded yr	# of employee	Funding Status (Amount/ investors)
mobile app, SaaS	Organizational management	Africa Incubator	Provide sales and delivery management app called 「SENRI」 to local companies in Africa. The app is able to track sales and delivery service in real time via a web-based dashboard. Local subsidiaries in Uganda and Nigeria, and both have participated in the MORINAGA accelerator program.	Tokyo	2015	4	80 million/ USD (Morinaga Seika, Leapfrog Ventures, Zero One Booster, ANRI, Monex Ventures)

(-: no information posted)

Source: JICA Survey Team

[11] 2020 Global Peace Index, Corruption Perceptions Index 2020, Doing Business 2020

3.4 Rwanda

3.4.1 Startup Ecosystem

The Rwandan government has been strongly promoting ICT measures since it declared to become an IT nation in 2000 with the development of "VISION 2020". Rwanda has succeeded in creating a brand image as an ICT nation in Africa through hosting international conferences such as Transform Africa and becoming a PoC hub for promising startups. With the favorable business environment, it has succeeded in bringing in foreign promising SUs such as Zipline, Babylon Health, Andela, Mobisol, etc. The Smart Rwanda Master Plan (2015-2020), a development plan in the ICT sector, states its commitment to foster new ICT companies, and through strengthening ICT education and putting in place support services for young entrepreneurs, the establishment of new startups are gradually becoming active.

The number of incubators and accelerators supporting local SUs has increased, and since the government first established kLab in 2012, Inkomoko (private) was established in the same year, followed by Impact Hub (private) in 2015, FABLAB in 2016 (Government) and Westerwelle Startup Haus (private) and 250 Startups (government) in 2018.

Given these backgrounds, the funding amount of Rwanda SUs, which was $ 16 m in 2016, increased approximately 129% to $ 36.7 m in 2017. This amount is ranked fifth amongst African countries, accounting for about 6.6% of the total funding for the African SUs. In terms of SU funding in relation to the economy (GDP), Rwanda is by far the top in Africa with 0.4% in 2017.

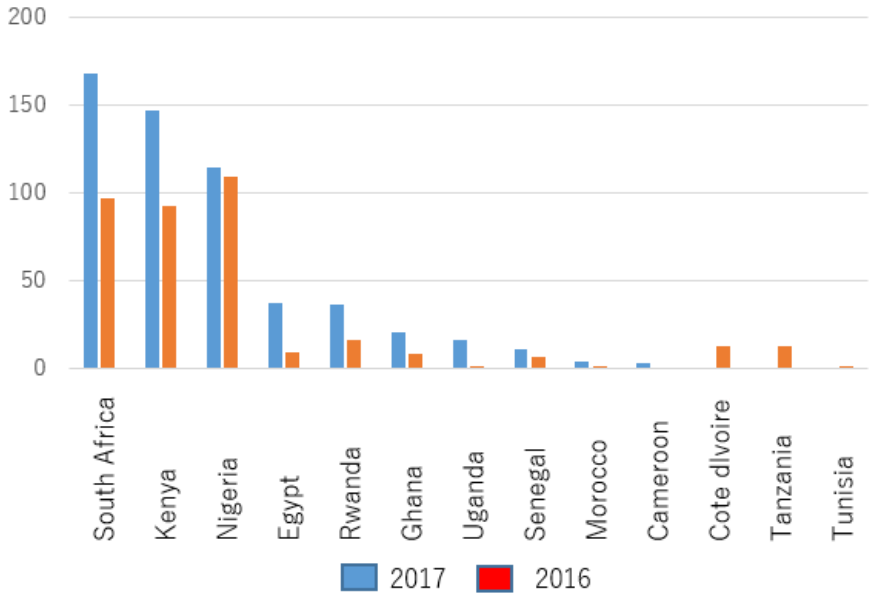


Figure 3-10 Funding for Startups in Africa 2016/2017 (million dollars)

Source: Ministry of Economy, Trade and Industry Survey Report on Funds and Other Related to African Business

As mentioned above, the SU ecosystem in Rwanda is developing, however, the number of SUs, incubators, accelerators and investors is still limited and in development stage. Further development of the ecosystem is expected by the operation of the $100m Rwanda Innovation Fund which will invest in Tech-related SMEs and SUs, and the implementation of the Kigali Innovation City plan.

3.4.2 Digital Technology related Corporates (Local and Foreign)

Rwandan startups are concentrated in the capital city of Kigali. As for sector, 34.5% of Rwandan startups are in the ICT sector (it does not include startups in other fields, such as energy, utilizing ICT). In addition, startups in areas of B2B service, manufacturing, construction and energy also occupy a high ratio.

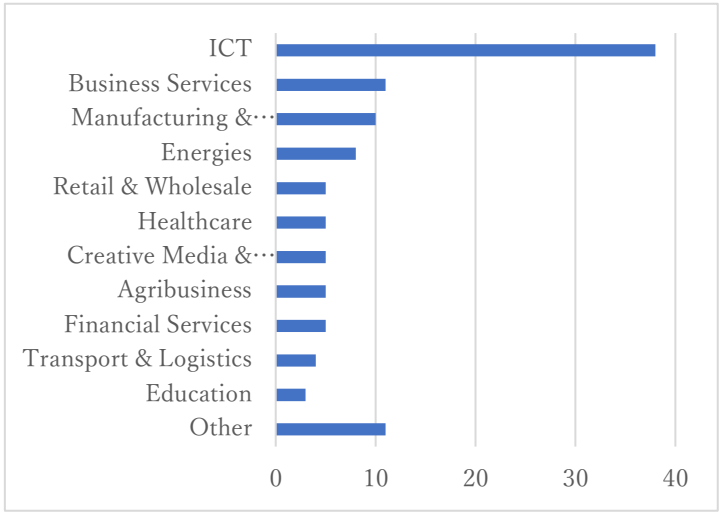


Figure 3-11 Number of Startups by Sector

Source: Ministry of Economy, Trade and Industry Survey Report on Funds and Other Related to African Business

The number of ICT companies registered with Rwanda ICT Chamber of Commerce is about 140, and the table below shows examples of Rwandan and foreign SUs that provide services related to the target technology fields. There are Rwandan SUs gathering attention such as the AC Group which provides Tap & Go service and DMM HEHE, a software development company led by a Rwandan female entrepreneur Clarisse Iribagiza, however, the level of technology and human resources of many other digital tech startups is yet to mature.

On the other hand, there is good presence of promising foreign startups such as Zipline, Andela, Mobisol, Yegomoto, Babylon Health, owing to the ICT policies of the Rwandan government including its flexible measures towards PoC and good business environment.

Table 3-17 Local and Foreign Startups in Rwanda, June, 2019

#	Technology	Sector	Name of company	Description	Headquarter	Founded yr	# of employees	Funding status (amount, investor)
1	finTech, mobile app	Energy	ARED Group	Provides free Wi-Fi and mobile charging services in solar energy powered kiosks. Also provides app that allows pre-payment of utilities and tax with digital money	Kigali	2013	-	-
2	mobile app	Energy	Inyenyeri	Developed a stove using biomass to prevent air pollution from the traditional wood stove. Provides stoves free of charge while the customers pay for biomass. People who can not purchase biomass can also exchange with raw materials for biomass. Based in US and Rwanda	Giseeni	2011	101-250	$1.2m: Oikocredit International netherland
3	IoT	Transportation, etc	AC Group	Offers Tap & Go cards (like SUICA) which can be used in transportation. Top up is possible via agents or bus. Plans to expand services to other sectors such as retail. Invested by DMM.com	Kigali	2015	n/a	n/a
4	mobile app	Transportation	SafeMotos	Uber 's Rwanda version. A service that calls a motorbike taxi in an application and can pay online	Kigali	2014	101-250	$131k: SOSV-USA GSM Ecosystem Accelerator-UK Carma Axlr8r – Ireland
5	mobile app	Transportation	KHENZ LTD	Provides digital ticket issuing platform for long distance bus companies	Kigali	2013	-	n/a
6	mobile app	General, Transportation	Raisin Ltd	Provides an event management system "Akokanya" that can handle online settlement to ticketing (QR codes). Targets entertainment, sports, conference, bus markets. Monetization model by fee and advertisement. Supported by 250 startups	Kigali	-	-	-
7	Blockchain, SaaS	Organizational Management, Financial services	exuus ltd	Provides business improvement software, ledger processing platform for saving groups	Kigali	2014	11-50	n/a
8	mobile app	Human Resource	eJobu	Provides an online platform that matches customers with freelancers, expert consultants, technicians, etc. with expertise	Kigali	2017	1-10	n/a
9	IoT, AI	Agriculture	AgriGo	Provides market information to farmers through SMS, develops IoT sensors to monitor soil	Kigali	-	8	Self-funded
10	IoT, mobile app	Agriculture	STES Group	Develops solar IoT device to monitor soil’s humidity, temperature and salinity, and solar pest monitoring device and analytics software.	Kigali	2015	12	Self-funded + hackathon prize

#	Technology	Sector	Name of company	Description	Headquarter	Founded yr	# of employees	Funding status (amount, investor)
11	IoT	Agriculture	SMAgri	Develops inexpensive and low power sensors to monitor water amount for farmers	Kigali	-	-	-
12	mobile app	Agriculture	Spiderbit	Provide platform connecting market information, farmers, and buyers	Kigali	-	-	-
13	IoT, mobile app	Agriculture	KizaAgriLab	Provide comprehensive management tool for cooperatives. The functions include staff and asset management, communication to cooperative members, connecting product information and buyers. Also develops IoT sensor for soil monitoring. CEO is the General Manager of Fablab.	Kigali	2018	3	Self-funded
14	mobile app	Agriculture	Hatchplus	Manufacturers and sells automatic egg incubators which can be managed by mobile phones. Supported by 250 startups	Kigali	2017	-	-
15	mobile app	Agriculture	Extra Technologies, Ltd.	Provides "AICOS" data collection, analysis, reporting, and management system specialized for agricultural cooperatives. Supported by 250 startups	-	-	-	-
16	Hardware	Agriculture	Freshbox	Develops made-in-Rwanda cold box and cold room for farm products. Winner of the Toyota Mobility Foundation ideathon.	Kigali	2018	2	$25k Toyota Mobility Foundation
17	Hardware	Agriculture	Volta Irrigation	Develops inexpensive and efficient irrigation pump system	Kigali	-	-	-
18	EC	Agriculture	Park & Pick	Provide direct delivery service of farm produce	Kigali	2018	-	-
19	mobile app	General	DMM.HEHE.Ltd	Spin-off of Kigali Institute Of Science and Technology. Develops software, systems, applications for government agencies. Also offers services to train high school and university students as engineers. Founder and chief executive Clarice · Irriaggisa is attracting attention as a young woman entrepreneur representing Rwanda, and has been chosen by Forbes magazine's most promising under 30 entrepreneurs. Acquired by DMM.com	Kigali	2010	n/a	-
20	SMS, mobile app	General	viamo	Provide mobile engagement service utilizing sound	Ghana	2012	-	-
21	Mobile App	Health	Babyl	Provides a mobile platform that connects doctors with patients, that allows making reservations by SMS, remote consultation by teleconference, sending prescription and examination results by SMS. Patients can receive drugs at a pharmacy. Payment can be made by electronic money	London (UK)	2014	11-50	n/a

#	Technology	Sector	Name of company	Description	Headquarter	Founded yr	# of employees	Funding status (amount, investor)
22	Mobile app	Health	Yapili	Provides consultation and follow up by matching doctors and patients online. Serving in Rwanda, Botswana, Kenya, Nigeria, Tanzania, South Africa, Uganda, Zambia, and Zimbabwe	Hague (Netherlands)	2014	1-10	
23	Drone	Health	Zipline International	Provide transportation services of blood products and vaccines by drones	San Francisco (USA)	2011	11-50	$40.6m: Sequoia Capital, Visionnaire Ventures, KatalystVentures
24	–	Human Resource, Education	Andela	Trains and produces software developers in Africa. Has agreed with the Rwandan government to setting up a base in Rwanda	New York (USA)	2014	1001-5000	$81m: Spark Capital, CRE Venture Capital, Chan Zuckerberg Itiative, etc
25	IoT	Energy	MeshPower Rwanda	Provides electricity at an affordable rate by utilizing solar power nano grid and smart meter system. Customers can use electricity at their respective homes through the community without having to purchase equipment or exchange contracts. Has been funded by Microsoft in 2018	London (UK)	-	-	-
26	–	Energy	BBOXX	Offers off-grid electricity service. In addition to solar power generation, conducting PoC for providing internet service to remote areas	London (UK)	2010	101-250	$100m: Khosla Impact, African Infrastructure Investment Managers, Essential Capital Consortium, Togolaise de Banque etc
27	-	Energy	Mobisol	Provide solar solutions for homes and business. Conducted pilot project in Kenya and Tanzania, and started operation in Rwanda in 2014	Germany	2011	750	$27.5M International Finance Corporation, Finnfund
28	IoT, mobile app	Mobility	Yegomoto	Provides government-approved taxis and motorbike taxi services in Rwanda where payment with mobile money is possible. Manages all taxis via their IoT platform	-	-	-	-
29	Mobile app	EC	Jumia	Provide Jumia Food, online food delivery service	Nigeria	2012	-	-
30	SaaS	Civictech	CrimsonLogic	Supports digitization of government services and has opened Rwanda office as a hub in East Africa.	Singapore	1988	800	-

#	Technology	Sector	Name of company	Description	Headquarter	Founded yr	# of employees	Funding status (amount, investor)
				Supported introduction of electronic ID authentication system in Mauritius				
31	LTE	Communications	KT Rwanda Networks	Established the first nationwide LTE network in Africa in which 95% of the population can access	Korea	2013	-	-

(n/a: not applicable, -: no information posted)

Source: JICA Survey Team

3.4.3 Ecosystem Players

(1) Accelerators, Incubators, Co-working Space

Main startup support actors are as follows. The number is still small compared to other countries, and some support actors have stated that it is necessary to strengthen cooperation among the limited actors.

Table 3-18 Accelerators, Incubators, Co-working Space in Rwanda, June, 2019

#	Name	Target sector	Target stage	Founded yr	Description
1	kLab 	IT	Seed	2012	Government run co-working space for entrepreneurs mainly in the IT field. JICA supported its establishment. Graduate startups include SafeMotos, etc.
2	 FABLAB	Manufacturing	Seed	2016	Established in 2016 under the partnership of ICT Chamber, Rwanda Development Board (RDB), JICA, SolidWorks Corporation MIT-CBA and Gasabo 3D. Open digital fabrication space with device such as 3D printers.
3	250 Startups 	IT	Seed～ Early	2018	Provide 6 months acceleration program for SUs with MVP(Minimum Viable Product)
4	 Westerwelle	All sectors	Middle	2018	Provide 6 months acceleration program, funded by GIZ, for SUs with existing product/service and been in operation for 2-3 years. Provides co-working space, conference rooms, networking activities and events
5		All sectors	Seed	2015	Provide “The Office” which is a co-working space for social entrepreneurs and artists, and hosts various events for networking and capacity building. Provides mentoring and trainings to entrepreneurs. Vast experience in running

#	Name	Target sector	Target stage	Founded yr	Description
	 IMPACT HUB/The Office				programs with various organizations such as UNDP, Toyota Mobility Fund, AIMS (developed design thinking curriculum), etc.
6	Inkomoko	All sectors	Seed	2012	Rwanda Office of African Entrepreneur Collective (AEC), a US-based accelerator. Provides 8 months acceleration program (mentoring, training, access to $50k funding) to SUs that have been in operation for more than 6 months. Aside from the office in Kigali, has offices in Musange and refugee camps

Source: JICA Survey Team

Unlike former incubators, there are accelerators who are taking a new approach, where in-house staff members gather stakeholders and experts who can provide solutions to form a project, and intentionally promote innovation.

For example, Co-Creation Hub (CcHub), a tech hub in Nigeria, established Design Hub in Kigali in February 2019 as an R&D center to promote digital solutions that have social impact. They plan to gather diverse human resources such as engineers, designers and researchers, and promote the application of technology to social issues by human centered approach.

In addition, in the project "Digital Solutions for Sustainable Development (DSSD)" implemented by GIZ, the Center for Digital Transformation is planned to be established by 2019 and operated with Rwanda Information Society Authority (RISA) to promote collaboration between local entrepreneurs and foreign companies and research institutes, etc. to promote digital solutions for social challenges.

(2) Others (Universities)

Rwanda has succeeded in inviting Carnegie Mellon University to Africa, and Center of Excellence for ICT, IoT, Data Science, and Cyber Security has been established at Carnegie Mellon University and Rwanda University. The following are some of the prominent universities that are producing tech talents.

Table 3-19 Others Support Institutions in Rwanda, June, 2019

Educational Institution	Description
Carnegie Mellon University Africa	Established in 2011 as Rwanda campus of Carnegie Mellon University. Provide high level post-graduate education in IT and engineering. The new campus will be in Kigali Innovation City where Innovation Labs and Robotics Labs will be established.
AIMS (African Institute for Mathematical Sciences) Rwanda	AIMS provide 1 year master's program in machine intelligence and mathematical science. Currently, there are 48 students in mathematical science, biggest in Africa, and 35 in machine intelligence. AMU will start entrepreneurship program for students from 2019 through funding by Master card Foundation. Sends students to banks and private corporates for 6 months internship program. Hosts scientific events such as Science Week in Africa.
Rwanda University College of Science and Technology	The University of Rwanda has 14 campuses and provides a wide variety of programs including undergraduate, master and doctoral courses. It has produced 7,050 alumni by 2018 and is the largest university in Rwanda. Entrepreneurship training is also provided. The College of Science and Technology was established by the Government of Rwanda in 1997 and is Rwanda's first technology-focused higher education institution. It has a $ 400 million computer lab and is included in the top 100 schools in the African continent.
Kigali University	Kigali University has campuses in Kigali and northern Musanze, and provides bachelor's and master's degrees, and there are programs to obtain qualifications such as certified public accountants, certified technologists and certified secretaries. In October 2018, Kigali University and the non-profit organization AFRODJANGO INITIATIVE will form a partnership to accelerate the promotion of python education in programming languages.
Technical and Vocational Education and Training (TVET) Tumba College of Technology	Rwanda's largest vocational training school. Tumba College of Technology was built by Japanese grant aid. JICA also supported the development of curriculums in three departments of IT, renewable energy, and electronic engineering through technical cooperation. Also supported capacity building for teachers and strengthening of school management.

Source: JICA Survey Team

(3) Points to Consider in Holding Open Innovation Events

In Rwanda, due to the lack of the facility capacity, the event was held at the Onomo hotel with cooperation by kLab, ImpactHub and Westerwelle on event publicity. In Rwanda, as JICA supports kLab, kLab would be the most potential partner, but if the facility capacity is insufficient, other spaces can also be taken into account.

- Facility: A hub with its own event space which is lively and often holds events for general public can be a potential partner. Whereas kLab, ImpactHub and Westerwelle satisfy the conditions, the facilitation capacity is relatively small. It is necessary to confirm whether they are able to accommodate an event.
- Announcement to SUs: since Rwandan ecosystem is small-scale, it is preferable to send event's invitation to each support institutions and ask them to announce it.

3.4.4 Investment Environment

(1) Recent Trends (number of funds, transition of investment, etc.)

The amount of fund raised by Rwandan startups, which was 16 million USD in 2016, rose by 129% to 36.7 million USD in 2017. This amount is fifth rank in Africa, accounting for about 6.6% of the total

financing by African startups. The number of deals raised rapidly from 2015, and the number of deals which was four in 2014 has increased to 12 in 2018. Factors may be attributed to the fact that the investment law was established in 2015 and the preferential tax rate was enforced, and to that opportunities for contact between entrepreneurs and investors increased with events being implemented such as the Transform Africa. As for fund raised by startups compared with the economic scale of the country, Rwanda is in the top place in Africa. Factors can be attributed mainly to the fact that funding environment and the foundation for minority shareholder protection are well-established in Rwanda[12].

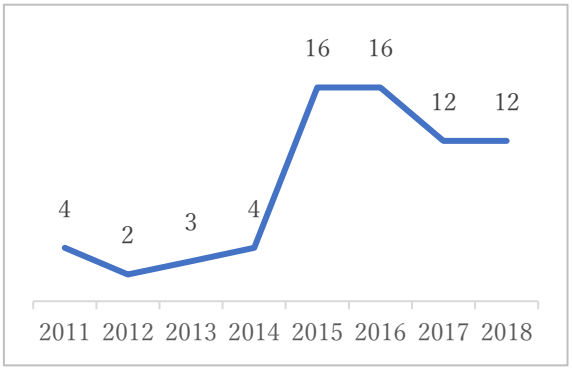


Figure 3-12 Number of Investment Cases by Rwandan Startups

Source: Ministry of Economy, Trade and Industry Survey Report on Funds and Other Related to African Business

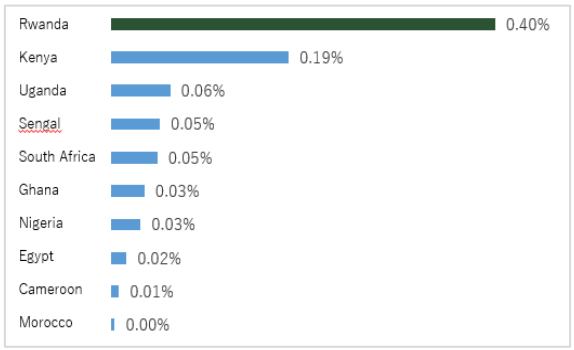


Figure 3-13 Invested Amount by Startups Per GDP, 2017

Source: Ministry of Economy, Trade and Industry Survey Report on Funds and Other Related to African Business

As for investment stage, the investment in the seed round accounts for about 30%, and the fund raised through non-capital funds such as subsidies is also large. In regard to sector, the number of investments to energy sector is largest, followed by ICT and healthcare.

[12] African Business Central "https://qz.com/africa/921982/african-startups-raised-over-366-million-in-2016-a-new-report-says/", QUARTZ AFRICA https://www.africanbusinesscentral.com/2018/02/26/startup-venture-funding-jumped-over-50-in-africa-last-year-to-a-record-high-infographics/#prettyPhoto,
Prepared by Double Feather Partners based on The World Bank "https://data.worldbank.org/indicator/NY.GDP.MKTP.CD"

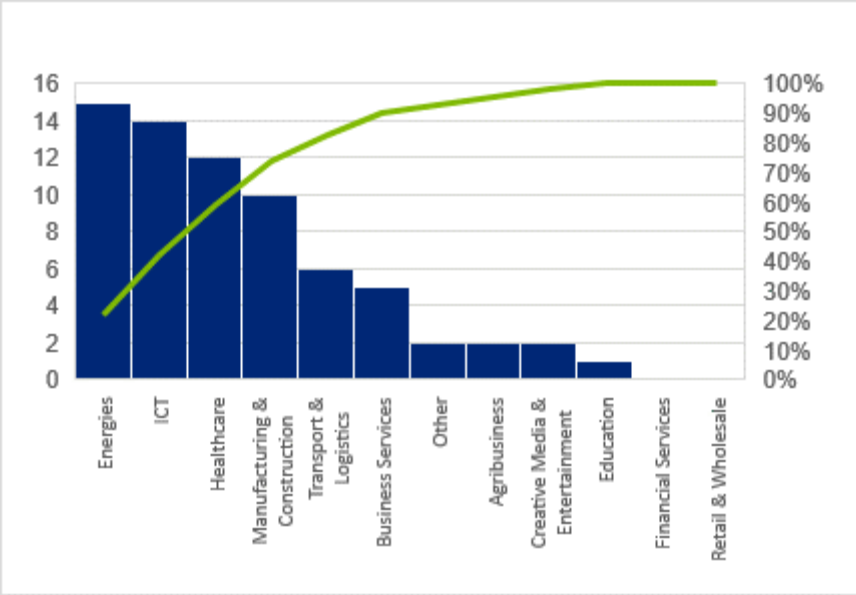


Figure 3-14 Number of Investment by Sector

Source: Ministry of Economy, Trade and Industry Survey Report on Funds and Other Related to African Business

The interest rate of loans from banks has been decreasing since 2016 but still high and has marked at around 17%. Thus, it is not common for start-up companies to receive loans from banks.

(2) VC and Funds

While the types of funds and risk capital accessible within Rwanda are extremely limited, the Rwanda government established the Rwanda Innovation Fund (RIF) in 2018 and will strengthen investment in SMEs and seed stage startups and ICT sector startups.

Table 3-20 VC and Funds in Rwanda, June, 2019

Name	Classification	Description	Location	Founded yr	Investment area		Amount	# of exits	Exit cases	Portfolio (Rwandan corporate)
					sector	stage				
Thousand Hills Capital	VC	Rwanda based VC with foreign capital (currently no activity can be observed)	Kigali, Denver (USA)	2006	-	-	-	-	-	・Rocket 2020 ・Orgatex ・Rwanda Investment Group ・DN International
Sobek Capital	VC	VC with headquarter in UK, investing in startups in Africa, Middle East and Europe. As one of the partners is from Rwanda, a base has been established in Rwanda	Kigali	2017	ICT, media consumer goods	early	$10,000 - $250,000	-	-	-
Rwanda Innovation Fund	Fund	Fund established by the African Development Bank for equity investment to Rwandan SMEs and ICT sector. Plans to also invest in seed stage startups. Aiming to scale to up to $300m within 10 years.	-	2018	Tech	various	-	-	-	-
Crystal Venture	PE	Fund in which the Rwandan Patriotic Front (RPF) party is the major shareholder and supports the activities of the political party. Mainly invests in core industries of Rwanda, but VC investment is also possible. Controversial as it is an extremely political investment institution.	Kigali	2009	Construction, manufacturing, real estate, communication, agriculture etc	later	-	-	-	・Inyange Industries ・NPD Ltd ・Bourbon Coffee ・ISCO Security ・RULIBA Clays ・Real Contractors ・E.A Granite Industries ・Nexus ・Stone Craft
National Green Fund for Rwanda	PE	Impact investment institution under partnership with the Rwandan government and international organizations. Centered in PE investment but some VC investment is also made for electric motorbike startups, etc.	Kigali	-	Environment, climate, energy, agriculture, transportation, water resources management etc.	-	-	-	-	-
BDF	PE	Established in 2011 to support SMEs as a subsidiary of Rwanda Development Bank. Provide start-up companies with loans and capital	Kigali	2011	Agro-processing, agro-value add services	early	$25,000-1.5m	-	-	-
Fusion Capital	PE	Invests in SMEs in Kenya, Uganda, Tanzania and Rwanda. Has offices in	UK	2006	Service, real estate, manufacturing industry					

Name	Classification	Description	Location	Founded yr	Investment area		Amount	# of exits	Exit cases	Portfolio (Rwandan corporate)
					sector	stage				
		Nairobi, Dar es Salaam, Kigali and Kampala								
Fanisi Venture Capital Fund	fund	$50m scale fund established by Norway Investment Fund and Amani Capital. Invests in SMEs in Rwanda, Kenya, Tanzania and Uganda	Kenya	2009	Agribusiness, health care, education, retail etc.	early ~later	$1-9m			・Minimex Ltd. ・Sophar Ltd.
Global Partnerships	fund	Impact investment fund investing and financing development firms in Sub-Saharan Africa, Central America and the Caribbean. Has invested in 130 companies in 21 countries so far. Capital investment is about 2% of total investment. With headquarter in Washington, US, has offices in Nicaragua and Kenya	USA	–	–	seed~later	–	–	–	・Rwanda Trading Co.

(-: no information posted)

Source: JICA Survey Team

3.4.5 Japanese Business Entry Environment

(1) Local Business Environment

Rwanda's business environment is ranked as 38th globally (Doing Business)[13]; this is the second place in Africa after Mauritius. Rwanda is a very business and entrepreneur-friendly environment. By topics, the ranking of real estate registration ease and funding environment is particularly high, and the ranking of minority shareholder protection and tax payment environment is also high. Moreover, the Global Peace Index is 81 out of 163 countries (2020), and the Corruption Perceptions Index is 49 out of 180 countries (2020)[14].

Figure 3-15 Local Business Environment (Rwanda)

Source: Doing Business 2020 Rwanda

With regard to "easiness of establishing business" which directly connects to ease of entrepreneurship, it is in third place in Africa after Burundi and Mauritius; the registration process completes in four days by accessing the Rwanda Development Board's account and filling in the required items online. In addition, there is no cost for establishing the company itself. 40,000 RWF (equivalent to about 5,000 yen) is incurred as trading license each year after the company is established. However, the trading license fee differs depending on sales and whether or not they are VAT registrants.

Foreign ICT companies can consult for necessary support and networks by visiting RISA and the ICT Chamber. The regulatory window would be RURA.

[13] Doing Business 2020, Rwanda
[14] 2020 Global Peace Index, Corruption Perceptions Index 2020.

(2) Japanese Corporates related to Digital Technology

Japanese corporates related to digital technology in Rwanda are as follows.

Table 3-21 Local Japanese Corporates in Rwanda, June, 2019

#	Company Name	Description	Headquarter	Founded yr	# of employees	Funding Status(amount・investors)
Companies registered in Rwanda						
1	ict4r	Implement IT business and programming education. using PC kit	Fukui	2013	–	–
2	Wired in Rwanda	Provides software and application development, planning and design of web services, development and management support, and consulting services for Japanese companies expanding into Africa. Offshore destination of Rexvirt Communications	Tokyo	2009	–	–
3	DMM. HeHe	Subsidiary of DM. Conducts EC and software development business in Rwanda. Established the Africa division in 2015, has acquired HeHe Labs, a software development company for mobile phones in Rwanda in 2017, and has invested in AC Group Ltd that conducts electronic money business for public transportation	Tokyo	1999	1,597	10 million in capital stock
4	Brain Works	Registered in Rwanda in 2016. Support promotion of ICT business and entry of Japanese companies into Africa. Signed a MOU with ICT Chamber to establish the East African Cyber Security Consortium, and as a cyber-security technology hub in East Africa, plans to promote human resource development in Rwanda and East Africa.	Tokyo	1994	100 (group-wide)	230.42 million in capital stock
Companies doing business in Rwanda						
5	Monstar Lab	Implements ICT-related projects of African companies and governments, localization and marketing support for Japanese companies entering Africa, and provides Monster Lab’s products and solutions. Partners with Rwanda's software development company HeHe Labs	Tokyo	2006	1,000	2.4 billion in capital stock
6	Momo	Develops applications and web systems. Has begun sales of systems to streamline agricultural work for Rwanda coffee farmers	Kobe	2016		200 million in capital stock (Huck Ventures, Yoshimoto Investment, Fucha Venture Capital, etc.)

#	Company Name	Description	Headquarter	Founded yr	# of employees	Funding Status(amount・investors)
7	Kobe Digital Lab	Develops applications, web systems, wearables etc.	Kobe	1995	162	200 million in capital stock (Mizuho Capital, Resona Capital, Japan Venture Capital, etc.)

Source: JICA Survey Team

Chapter 4

Possible Collaboration with Stakeholders in Japan for Open Innovation

Chapter 4 Possible Collaboration with Stakeholders in Japan for Open Innovation

4.1 Suvery on Possible Collaboration

The interview survey on the possibility of collaboration among the domestic stakeholders focuses on obtaining information that can be utilized as a reference when considering the open innovation event and its follow-up system. Interviews were conducted mainly with Japanese companies with digital technology which can contribute to the solution of issues in Africa, companies already doing business and activities in Africa, universities, funding institutions, international organizations, etc. Questions for the interview are outlines of businesses and activities related to Africa, interest and expectations regarding collaboration in an open innovation context with JICA, and possibilities of specific collaboration among others.

4.2 Result and Analysis

As a result of the interview survey (see the table below for the summary), even though overall positive responses were obtained regarding collaboration with JICA, for companies that have not yet implemented business in Africa including the target countries at this time, it is said that Africa is far away, and even for companies doing business, collaboration with local companies has obstacles.

In this context, in order to promote collaboration with domestic stakeholders for the realization of open innovation in Africa, supports to improve awareness, to establish community and to create an effective solution (high-quality matching and commercialization) should be two main points to be considered.

In either case, in order to get cooperation from important actors, the incentive design for them is particularly significant. For example, in the case of conducting an open innovation event as such done in this survey, the advantages for participants should be clarified such as the follow-up system for future commercialization, etc., and an asset / support menu that can be provided by JICA, etc.

As points to be noted by actors, in the case of large corporates, there were voices from multiple interviewees that they wished to build a medium- to long-term cooperation relationship with JICA beyond a project. To respond to these voices, it is important to represent an overall picture of JICA's vision to solve social problems in Africa through open innovation, mid- and long-term direction, role sharing with each actor, and support schemes to achieve it.

In case of venture companies, although their technological capabilities are developed, they are financially and organizationally vulnerable, and their priority tends to approach outside of Africa rather than internal Africa due to high business risk in Africa. In order to obtain the cooperation of a promising venture company in this context, it will be necessary to examine the development of a new support menu as well as improvements in existing support schemes such as enabling private-sector collaboration scheme to cover labor costs, and simplifying reporting requirements. Furthermore, in order to assure the cooperation of venture companies with technologies and services that contribute to the resolution of social problems in Africa, it will be important to establish a coordination with private professional firms with high sourcing and scouting capabilities of venture companies.

With regard to financing, which is an important point toward final commercialization, it is also effective to cooperate with organizations that invest in African startups to create a system that utilizes private funds.

As for international organizations, many organizations are carrying out open innovation efforts with the same purpose as JICA, and the Japanese office of each organization is facing a similar challenge as JICA in terms of promoting the participation of Japanese companies. Given the challenges, it may be considered as a proposal to streamline support by implementing an acceleration program for solving social problems in Africa in collaboration with these international organizations.

Table 4-1 Possible Collaboration with Stakeholders in Japan, June, 2019

Interviewee	Level of Interest	Interests	Conditions and Restrictions
Large Corporates	High	・Medium- and long-term cooperation with JICA, not just for single projects. JICA takes root in the region and implements the project, and expects non-business perspectives ・ Financial support and guarantee of credit risk (Credit will be connected if JICA stands in between). ・Further simplification and cutting time for existing support scheme. ・ Local networks such as government officials	・ It is necessary to clarify the benefit of participating in the event, including the follow-up mechanism for commercialization after the event.
Funding Institutions	High	・ Cooperation by providing funding for startups supported by JICA, and to create business tie-ups with Japanese companies thereafter. ・ Promote collaboration between multiple companies in supporting companies in the value chain, or to advance efforts to fill missing pieces with Japanese companies.	・Clarify the benefits of participating in the event. ・ Collaboration in medium- and long-term framework making
Venture Companies	Mid	・Clarify in what areas of each country JICA desires to introduce technology and what assets can be provided	・Clarify the assets that can be provided as JICA and the benefits of participants in the event
Academic Institutions	Mid	・Utilization as assets students OB from Africa	・Clarify the benefits of participating in the event.
International Institutions	Mid	・Collaboration for fostering momentum for TICAD 7	・If the Tokyo office does not have a project budget, it is necessary to discuss on a headquarters basis.

Source: JICA Survey Team

Chapter 5

Implementation of Open Innovation

Chapter 5 Implementation of Open Innovation

5.1 Whole Picture of Implementation of Open Innovation

In this survey, the survey team conducts open innovation in the target 4 African countries (Kenya, Nigeria, Uganda and Rwanda) and Japan (Tokyo and Fukuoka).

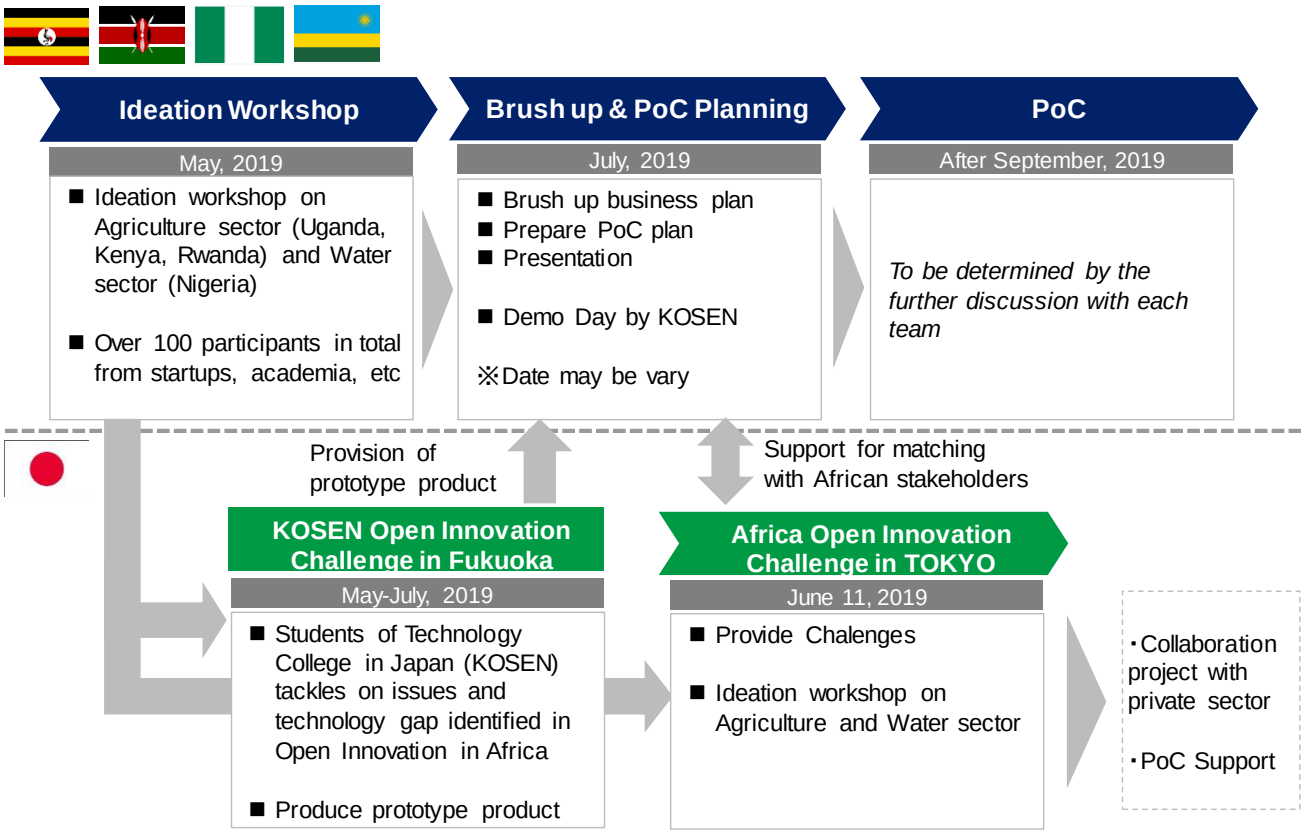


Figure 5-1 Whole Picture of Implementation

Source: JICA Survey Team

5.2 Outline of Implementation of Open Innovation in Kenya

5.2.1 Deepening the Applicability and Implementation Challenges of Disruptive Digital Technologies

(1) Narrowing Down the Application Areas and Issues of Disruptive Digital Technologies

Based on the proposed list of candidate projects for the target countries described in Chapter 2, the issues were narrowed down while taking into consideration the background of Kenya. First of all, we considered the need to clearly provide the benefits to the participants of the event (= JICA's ability to follow up in some form) and the fact that the outputs are likely to develop into future JICA projects. Assuming that JICA

can provide a relatively flexible follow-up response in collaboration with individual experts dispatched and technical professionals (directly managed), JICA, through consultations with the JICA Kenya Office, narrowed down the proposed issues for each country to three alternatives.

Table 5-1 Alternatives, Kenya

	Issue	Proposal for commercialization
Alternative 1	Agriculture sector such as the Smallholder Income Enhancement Program	• Support for quality control, traceability, marketing and other value chains • Appropriate technology is required to contribute to problem solving rather than applying new technology, since activities are mainly conducted on the ground.
Alternative 2	Health Sector	• Application of the hypothesis to the Health System Strengthening Program for Improving Universal Health Coverage • Application to the Infectious Diseases Control Program involving Nagasaki University
Alternative 3	African Innovation Promotion and JKUAT/PAU/AU Network Project	• Possibility of Collaboration with Promotion of Utilization of Supplied Equipment such as 3D Printers • Projects were extended by the end of FY2019

Source: JICA Survey Team

Next, the first field survey confirmed the status of projects under implementation or preparation in each development issue area, and grasped the status of the application of digital technology. In addition, the activities of private enterprises that utilize digital technology in each development field were also summarized. As a result, the agricultural sector was selected for the following reasons.

1. It has good practices in wide-area projects such as SHEP, and a wide range of human networks based on long years of experience have been established, and deep issues have been discussed.
2. In Uganda and Rwanda, too, the agricultural sector is expected to be considered, so it is likely to be easier to deepen the analysis by comparing them.
3. In particular, the application of digital technologies that contribute to rural development is expected to have a significant impact.

(2) Key Comments from Interviews

Based on the results of the interviews with relevant parties and organizations in the first field survey, information on the application of digital technology and the selection of the agriculture sector as described above is described below.

- Head of Agriculture Sector at JICA Office:
  - During the county system transition, the Ministry of Agriculture and the county are able to share responsibility for policymaking and public administration, and the introduction of digital technology may be the intention of the county.
  - In the transition to a county system, capacity-building activities such as SHEP in agriculture tend to have lower priorities for governor measures from the standpoint of immediate effectiveness.
  - In the future, the development of a value chain linking farmers to the post-harvest market in addition to production activities will be a priority agenda for agricultural development.
- Director of Market Development and Advisory Services, Crop Service, Ministry of Agriculture (Director-General level):
  - Traditional export items, such as coffee and tea, have a supply chain that leads to post-harvest exports, whereas horticultural products, which are mainly consumed domestically, have almost no supply chain.
  - Establishment of national standards for quality and safety of residual agricultural chemicals is urgently needed.
  - The activities of farmers' groups or cooperatives are weak.
  - The number of extension workers has not been sufficiently replenished after retirement, and the number of farmers per extension workers has increased (worsened).
  - The Agricultural Statistics Group and the Market Intelligence Group were recently established in the Ministry of Agriculture (Cross-Departments with the Livestock Industry Agency, Fisheries Agency, etc.). Each of them has about 5-8 employees at the same time. They process the data reported by County on a daily basis and update the market information the next day. (Frequency of use, etc. unknown)
  - The WB's Kenya Climate Smart Agriculture Project is working to integrate weather information with cultivation and harvest plans.[15]
  - According to the JICA advisor, the Ministry of Agriculture will have a rapid generation change in which managers will remain at the time of the transition to a county system and about 50% will retire in the next two years.
  - According to the JICA advisor, the ASTGS implementation structure will be led by a new ATO (Agricultural Transformation Office) under the direct control of the Vice-Minister of State above the respective agencies.
- JICA Agriculture Promotion Advisor:
  - At ASTGS, there are nine flagships. To raise the income of smallholder farmers, the government will improve the capacity of small and medium-sized enterprises that have direct contact with farmers. The government will train Accelerator and SMEs who can provide advice to farmers through financing and value-chain formation, etc., and create impacts on farmers through the Monitoring (including Scoring) system.

[15] http://projects.worldbank.org/P154784?lang=en

- To expand the scope of subsidy reforms for smallholder farmers and to provide transparent subsidies by introducing an e-voucher system based on farm registration.
- As a successful enabler, the program will train 3,000 young (private) extension workers with e-Extension skills, led by the Ministry of Agriculture rather than counties.
- In addition, as open data, use cases will be developed where information supporting farmers' decision-making, such as farming Q&A platforms, agricultural technology and agriculture-related traders, is widely gathered and made accessible, and farmers actually use it to increase their incomes. The three priority areas are SME evaluation, subsidy effect, and decision on the sale and purchase of food stocks.
- The feasibility of ASTGS depends on whether the program implementation responsibility is the Ministry of Agriculture or the county.
- In addition to county agricultural extension workers, the intention of private sector utilization can be seen, such as increasing the number of private sector extension workers.

➢ FAO Program Coordinator:

- To support the implementation of ASTGS, the EU and FAO have jointly proposed the concept of the application of digital technology to the Ministry of Agriculture. It presents a concept for Kenya based on the success of ZIAMIS (Zambia Integrated Agriculture Management System).[16]

[16] http://www.szi.gov.zm/?page_id=5382

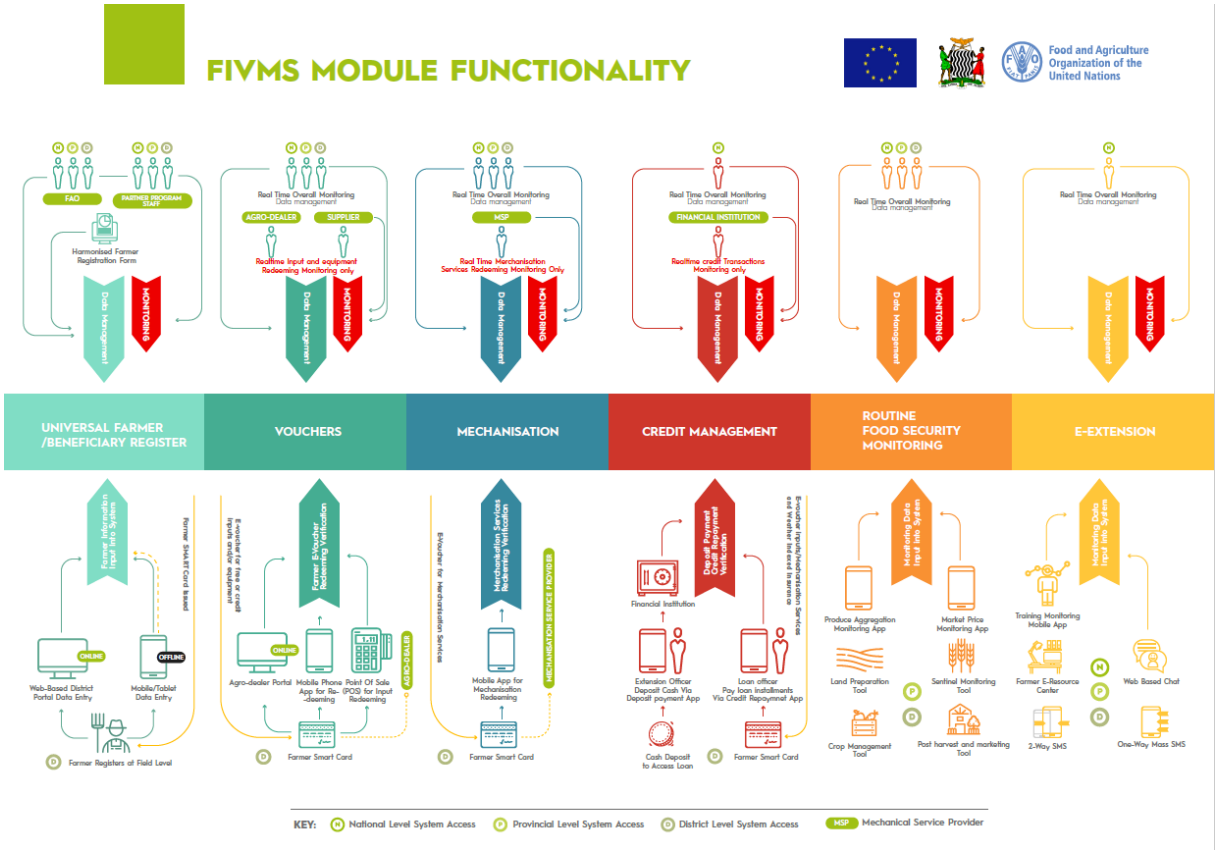


Figure 5-2 Applied Concepts of Digital Technologies (Kenya)

Source: Documents Provided by FAO

- Digital technology platforms will have one common mechanism across the country, and counties will be expected to use the necessary components to pay usage fees. Various cases are conceivable for the main body of maintenance.
- The EU is experimenting with the subsidy system, which will be the basis for the e-Voucher, in some counties, and is planning to propose a national deployment.
- Because of the wide range of digital technologies proposed in ASTGS, most of the components for which development Partner support has not yet been decided.

➢ SHEP PLUS Chief Advisor/Cultivation Advisor:

- The extension workers are full of production guidance and are not involved in distribution processing.
- Civil servant extension workers mainly support basic cultivation techniques, while extension or agronomist workers mainly provide more sophisticated technical support for the market, such as quality (timing of harvest such as growth rate and size), quantity, and shipping timing.
- In the past, USAID had tried a fee-based advisory service in conjunction with a grant, but this was not sustained.

- The impact of the SHEP PLUS is not spreading as far as you think. Depending on the County, the budget for activities such as gasoline cannot be allocated, and the extension workers cannot leave the office. The company believes that passing on skills of extension workers and bringing about ripple effects of skills through exchanges between Sub-County and County is a challenge.
- There are many kinds of SMS exchanges of agricultural market information and lists of websites. However, there is a time lag in general, and updates are not frequent. In addition, there are many cases in which the purchase price is not at the selling price of the market, and the accuracy of the information is questioned. Therefore, I have never heard of farmers' use of the information.
- As a proposal for the utilization of digital technology
  - Meteorological data (rainfall, etc.) shall be acquired from the sky at high density and publicized for use in production.
  - Develop a business model that facilitates cancellation of transactions related to the purchase of seeds and other production transactions. (Easy transfer cancellation of M-PESA)
  - If a system can be created to prevent penalties from being imposed by transactions such as those that fall short of the predetermined delivery volume because the expected harvest volume is not reached, the psychological resistance of farmers to finding new business partners can be reduced.
  - If many farmers do not purchase agricultural insurance and there is a business model that allows them to pay quickly when insurance premiums fall, the subscription rate may increase.
  - Because it takes time and effort to teach people from person to person through the diffusion of production technology, can we aim to reduce time through digitization?
  - Even if it is possible to reduce time by digitizing the dissemination of technology, whether farmers actually use it to produce results is another issue, and it is necessary to implement measures that will lead to changes in farmers' behavior.
  - In exchange for technical guidance such as disease diagnosis, etc., such as plantwize, it would be better to create a system that can obtain the data at the time of instruction and further improve the instruction.[17]

➢ SHEP PLUS Operations Coordination Expert:

- SHEP has been working on "alleviation of asymmetry of information" between farmers and market participants, and has established face-to-face relationships such as meeting forums.
- The challenge for smallholder farmers, such as those targeted by the project, is to acquire new reliable business partners.
- When trading partners look at the same problem, it is difficult to understand the reliability and creditworthiness of smallholder farmers who have never done business.
- Moreover, smallholder farmers need to invest in order to expand the scale of their business.

[17] https://www.plantwise.org/about-plantwise/plant-clinics/kenya/

- In order to do so, it is important to grasp the current state of farming records and sales records, but the number of farmers who keep such records and plan to invest through such records is still small.
- Digital technologies that complement these elements may contribute to the growth of smallholder farmers.
- The conventional information system was limited to providing information and did not consider how to use it for decision-making, so it might have been difficult for farmers to use it.
- It is important to provide tools that farmers want to use psychologically. For example, market participants and farmers' scores (e.g., Facebook friends and Uber drivers' ratings) may motivate farmers to increase their awareness and reputation, as well as to select business partners.
- For smallholder farmers, feature phones (call + SMS) seem to be more common than smartphones (smartphone applications).
- Laminated educational materials carried by extension workers should be bulky and compact with tablets.

➢ JETRO Nairobi Office:

- Private companies usually try to develop new businesses by offering customers new ways of spending money, but public services have a strong tendency to pay taxes for something. When considering the design of public services, when private companies participate in open innovation, it seems that it is not necessarily clear whether or not the viewpoint of private companies can be used and the motivation for private companies to participate is not necessarily clear.
- In the provision of subsidies, it might be better to prevent consumption for other purposes by making it impossible to cash out vouchers given to farmers, and by means of a system whereby actual goods are provided by selected traders. If micro insurance is compulsorily incorporated in the system to protect smallholder farmers by hedging risks in the event of crop failure, and it can be chosen from multiple private agricultural insurance, the model of collaboration between the public and private sectors will prevent collusion between traders and contribute to raising the income of smallholder farmers.
- The Kenyan government has achieved positive results in its efforts for e-government, and it can be seen to be convenient for registering foreign residents. When the public sector makes use of digital technology in agriculture, it may be effective to bring it as far as possible to these successful platforms.
- Some Japanese IT companies conduct surveys in Kenya with the aim of expanding their operations from Southeast Asia and India.
- Kenya has a large offshore optical cable capacity to India and has access to large-scale cloud services such as Amazon AWS in India. Therefore, Kenya has a high degree of freedom to deploy development and operation engineers and does not necessarily have to have a full set of technologies.

- Start-up companies and other private companies
  - Transactions with smallholder farmers are costly and would like to expand transactions with larger-scale farmers.
  - Private companies in Kenya generally have poor cash flow and late payments. Accordingly, we believe that the actual payment information is valuable as credit information.
  - Can M-PESA's fees be too high, or can we use a block chain to settle transactions with almost no commissions?
  - Digital technologies are being considered for use only after the scale of the business has increased to a certain extent.
  - The labor costs of IT engineers are not cheaper than those of Japan and other countries. It is expensive in technical fields and communication.
  - Funding is basically sourced in Europe, North America, and Japan, while value tends to be low in Kenya local areas.
  - There is nothing to expect from the government sector, so don't make strange regulations. Only business with private businesses is considered.
  - If there are any large Japanese companies that have long been committed to business growth, I would like to collaborate with them.
  - I would like to form a project in collaboration with JICA.
  - I would like to see the private sector playing a leading role in TICAD and make the most of the attractiveness of advancing into Africa.

(3) Deep Cultivation of Implementation Issues

Taking into the results of the above interviews account, it was decided to set the agenda for the application of digital technologies in the agricultural sector, particularly in supporting smallholder farmers and developing post-harvest value chains.

1. In the agriculture sector, both the public and private sectors are active in using digital technologies. In particular, the public sector is expected to see significant growth in its use based on the new sector strategy.
2. Despite issues such as policy priorities in counties, livelihood improvement through smallholder farmer support has a large development impact and is considered an appropriate candidate area for the application of digital technology.
3. Private companies are willing to deal with large farmers in order to achieve profitability (e.g. Twiga Foods plans to increase contracts with larger farmers to reduce tariffs), and there is a risk that small farmers will be left out of high-efficiency, high-value-added farming and trading activities using digital technology. As the sector strategy (ASTGS) for this challenge has been largely developed, the use of digital technology in supporting smallholder farmers will be more relevant in the public sector in the future.
4. In post-harvest value chain development, in addition to the development of a fresh food distribution network for the domestic market, the expansion of large farms and the development

of agro-processing hubs will increase the need for the development of soft infrastructure such as orders, inventory, container management, transportation tracking, high-cost payments, and HACCP (Food Safety).

5. Ideathon's theme is the whole value chain, including both smallholder support and post-harvest value chain development. Consider the formation of a PoC (pilot for verification of concept).

The value chain of the agriculture sector is generally shown in the figure below.

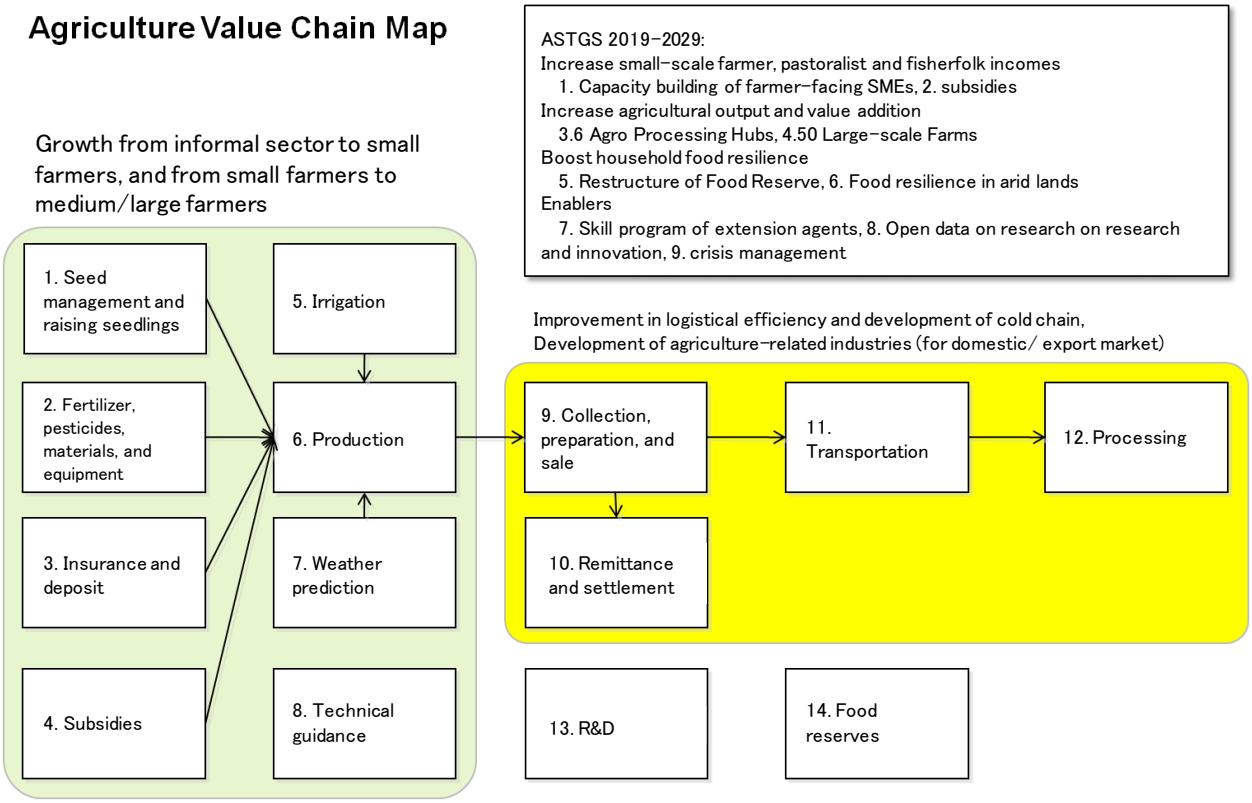


Figure 5-3 Agriculture Value Chain Local Business Environment (Kenya)

Source: JICA Survey Team

Green shaded areas are the main areas of smallholder support, and yellow shaded areas are the main areas of post-harvest value chain development.

Challenges from information gathering include the following:

Table 5-2 Issues Identified from Information Gathering, Kenya

Farmer's challenge	
1	High yields cannot be guaranteed due to lack of knowledge of appropriate materials/agricultural methods.
2	No informative weather information available for sowing, fertilization, or harvesting
3	Inadequate farm management due to labor and financial constraints
4	Low level of education, difficulty in collecting information and acquiring new technology by one person
5	Farmers' purchasing and selling power are weak, and union activities are not active.
6	Failure to meet the quality, volume, and delivery requirements of the market makes it possible to be bought by a broker who does a fickle business.
7	The sharing of agricultural market information is delayed, infrequent, different price types, inaccurate
8	Difficulty in acquiring new reliable customers
9	Farmers who don't know where to sell and processors who don't have quality concerns can't get it.
10	Large amount of penalties for transactions makes it difficult to find new customers, and there is no business model that can easily be cancelled.
11	Small-scale farmers need to invest themselves in order to expand the scale of the project, but it is difficult to raise funds.
12	It is important to ascertain the current state of farm management records and sales records, but only a few farmers maintain these records and plan to invest in them.
Issues faced by SMEs in contact with farmers	
13	Shortages in cash on hand and delays in payments
14	It is difficult to understand the reliability and creditworthiness of small farmers who have never done business.
Issues with extension workers	
15	Changes in farmers' behavior are challenging (conservative in nature)
16	It's too time-consuming for extension workers to tell by mouth.
17	The skills and support of private extension workers are not communicated to farmers.
18	Lack of budgets for costs and activities for public servant extension workers prevents the implementation of dissemination activities
19	Poor governance, such as retirement of public servants and replacement of Ministry of Agriculture staff
Market challenges	
20	The supply chain for horticultural crops, which are mainly consumed in Japan, is almost undeveloped.
21	There are no national standards for quality and safety of residual agricultural chemicals.

Source: JICA Survey Team

This section provides an overview of the activities of the FLAGSHIPs of ASTGS, which benefit to farmers and partner.

Table 5-3 Overview of ASTGS (Kenya)

#	FLAGSHIP (Project)	Benefiting farmers	Partner's activities	Potential of digital technology
1	Capacity building of SMEs in contact with farmers	Directly		SME evaluation
2	Subsidy program	Directly	The EU is experimenting with e-Voucher.	e-Voucher
3.	6 Agro Processing Hubs	Indirect	UNIDO is Ethiopia Partnership EU supports Makueni County's plant JICA's Master Plan on Improvement of the Northern Corridor Logistics Network (Florists, Fruit Products, Livestock)	SCM
4	50 Large-scale Farms	Bigger farmers		Precision agriculture
5	Food Reserve Reform	Indirect		Automatic decision on sales transactions
6	Dryland adjustment reform	Regional nature	22 billion yen in aid by 2025	CAPI
7	Extension Staff Capacity Development	Directly	The affinity with SHEP PLUS is high.	e-Learning Extension worker/farmer evaluation
8	R&D Open Data	Depend on things	35 billion yen in weather-related projects by the World Bank	Precision rainfall temperature monitoring Market information
9	Crisis management	More indirectly		

Source: JICA Survey Team

Structural understanding of the issues involved in improving the livelihoods of smallholder farmers in the future in the matrix of actors (e.g., ministries, agencies, counties, extension workers, farmers, equipment suppliers, buyers, transportation agents, retailers, financiers) and value chains (e.g., marketing, financing, material procurement, cultivation, post-harvest processing, processing, distribution, and sales). Challenges for the introduction of digital technology are also described.

FIGURE 28: MAP OF POTENTIAL AGRO-PROCESSING HUB LOCATION IN KENYA

SOURCE: Ministry of Agriculture and Irrigation; ASTGS Working Team Analysis

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Figure 5-4 Agro Processing Hub Candidate Sites: 4 Sites in National (red) and 2 Sites in Next Proproty (green)

Source: ASTGS

5.2.2 The 1st Edition Open Innovation

(1) Implementation Policy

The survey team set the following 3 challenges, focusing on application of digital technologies in above-mentioned support for small holders and development of post-harvest value chain.

1. How can we spread out horticulture crops among small-scale farmers?
2. How can we stimulate SME dealers to increase the supply of agric-input materials (seed, fertilizer, pesticides, etc.) and the purchase of harvest crops of small-scale farmers?
3. How can we create domestic supply chain for the agro-processing industry and to expand the value-added agriculture?

(2) Open Innovation Outline and Preparation

A website for PR and registration was established. The excerpt of the page is as follows.

The 1st Edition: Ideation Session

ABOUT

Kenya Open Innovation Challenge powered by JICA invites talented entrepreneurs, developers, etc that can change business-as-usual and bring more efficient and effective solution to the challenges in the agricultural sector in Kenya.

In the 1st Edition event which will take place on May 8th 2019, an overview of the challenges in the agriculture sector and JICA Projects in Kenya will be presented by experts. Afterwards, there will be an intensive ideation session utilizing ideation frameworks to deep dive into the challenge and ideate innovative solutions.

The great ideas with potential impact will have a chance for a Proof of Concept project with JICA, followed by possible scale-up.

THE CHALLENGE

Startups and entrepreneurs with innovative digital solutions to the following challenges are invited.

1. How can we spread out horticulture crops among small-scale farmers?
2. How can we stimulate SME dealers to increase the supply of agric-input materials (seed, fertilizer, pesticides, etc.) and the purchase of harvest crops of small-scale farmers?
3. How can we create domestic supply chain for the agro-processing industry and to expand the value-added agriculture?

BENEFIT FOR PARTICIPANTS

- Great ideas will get a chance for Proof of Concept project with JICA
- Chance for networking and brushing up your ideas with JICA & potential partners
- Possible chance to network with Japanese corporates

TARGET PARTICIPANTS

- Startups, entrepreneurs, etc (with digital technologies) that are interested in launching a business or have already launched a business in the above challenge areas.
- Government officials, development partners, NGOs and private corporates that are interested in collaborating with startups for the above challenges.
- Stakeholders related to JICA Projects in agriculture sector

The survey team paid attention to the following things when we conduct this event.

1. To invite participants from 2 parties in well balance; i) participants from agricultural sector with issues, and ii) participants from startups which have solutions.
2. To make groups based on each preference in the event as networking with other participants (not to make groups with known participants.)
3. To inform not for purely profitable business, and to let participants understand about JICA's projects.

(1) Implementation Result

1) Applicants

25 participants (almost capacity)

2) Grouping

Firstly, participants worked for individual work, wrote down their ideas on challenge of their interests, and made presentations. Based on the presentation, each participant voted to the great presentations, and the top 5 ideas were selected. By recruiting participants who wanted to support the selected ideas, 5 groups were made.

3) Evaluation

As this open innovation aimed for idea creation, the evaluation was not conducted.

4) Presented Ideas

The following 5 ideas were presented.

Table 5-4 Overview of Ideas (Kenya)

	Challenge	Presented ideas
1.	How can we spread out horticulture crops among small-scale farmers?	- Project to provide Q&A service to small-scale farmers in face-to-face and mobile basis (including the farming in demo farm)
2.	How can we stimulate SME dealers to increase the supply of agric-input materials (seed, fertilizer, pesticides, etc.) and the purchase of harvest crops of small-scale farmers?	- Automation of production of fertilizer and feed made of black soldier fly grown up by utilizing organic waste. - EC Platform with recording of trading agriculture products for cooperatives.
3.	How can we create domestic supply chain for the agro-processing industry and to expand the value-added agriculture?	- Agricultural products distribution project with preservation technology by utilizing renewable energy such as solar power. - Cultivation history system for direct sales of organic vegetables.

Source: JICA Survey Team

5) Photos

Lecture

Presentation

- **Questionnaire Result**

  The satisfaction of participants on this event was mostly high as 7 out of 10 participants (who submitted the questionnaire) answered "very satisfied" (70%) and 3 answered "moderately satisfied" (30%). The major reason of satisfaction was i) good opportunity to create idea with other participants in interactive manner, ii) to collect information of issues on agriculture in Kenya, iii) good coordination.

5.2.3 The 2nd Edition Open Innovation

(1) Open Innovation Overview and Preparation

PoC Planning Workshop was held on July 17. The outline of this event is as follows:

The 2nd Edition: PoC Planning Session

ABOUT

Kenya Open Innovation Challenge powered by JICA invites talented entrepreneurs, developers, etc that can change business-as-usual and bring more efficient and effective solution to the challenges in the agricultural sector in Kenya.

In the 2nd Edition event which will take place on July17th 2019, there will be a Proof of Concept (PoC) Planning Session to brush up business model and plan PoC Project to maximize social impact. The great ideas with potential impact will have a chance for a PoC project with JICA, followed by possible scale-up.

JICA plans to support PoC project of innovative ideas in agriculture sector in Kenya by funding about maximum US$25,000 and plans to fund about maximum US$350,000 for scale-up project additionally, judging from the result of the PoC Project. The participants with the great ideas in the 2nd Edition event have possibility to be exempt from the 1st screening in the selection process of the planned PoC Project support.

THE CHALLENGE

Startups and entrepreneurs with innovative digital solutions to achieve SDGs Goal 2 are invited. The specific challenges in Kenya are as follows:

1. How can we spread out horticulture crops among small-scale farmers?
2. How can we stimulate SME dealers to increase the supply of agric-input materials (seed, fertilizer, pesticides, etc.) and the purchase of harvest crops of small-scale farmers?
3. How can we create domestic supply chain for the agro-processing industry and to expand the value-added agriculture?

ASSUMED TECHNOLOGIES

Assumed technologies to apply are:

1. AI, Block chain, Drone, IoT, ICT platform, and etc.
2. Any other technologies that enables enormous impacts with the minimum cost and innovative solutions which deliver such impacts to those who could not benefit.

BENEFIT FOR PARTICIPANTS

- Great ideas will get a chance for Proof of Concept project with JICA
- Chance for networking and brushing up your ideas with JICA & potential partners
- Possible chance to network with Japanese corporates

TARGET PARTICIPANTS

Startups, entrepreneurs, corporates, NGOs, etc (with digital technologies) that are interested in launching a business or have already launched a business in the above challenge areas.

SELECTION CRITERIA

Criteria	Rating	Description
Impact	15	Potential impact of the solution to SDGs Goal 2, the challenges and the JICA Project
Uniqueness	15	Uniqueness and innovativeness of the solution
Scalability	10	Feasibility and scalability of the business model
Team	10	Strong management team to implement the project

The following points were taken into consideration in the implementation of this event.

1. Ensure that each company has the flexibility to make proposals while taking into account JICA's follow-on projects (under planning).

2. Details of the project to be planned are explored so that PoC activities become specific.

(2) Results and Challenges of Open Innovation

From the ten applications, the top seven companies were invited to the PoC Planning Workshop in light of the selection criteria in the preceding paragraph. Each company presented a proposal for the PoC proposal. In addition, one venture capital firm, one incubator, and two Japanese companies listened to the PoC project presentations of the participating companies.

Table 5-5 Overview of PoC Planning (Kenya)

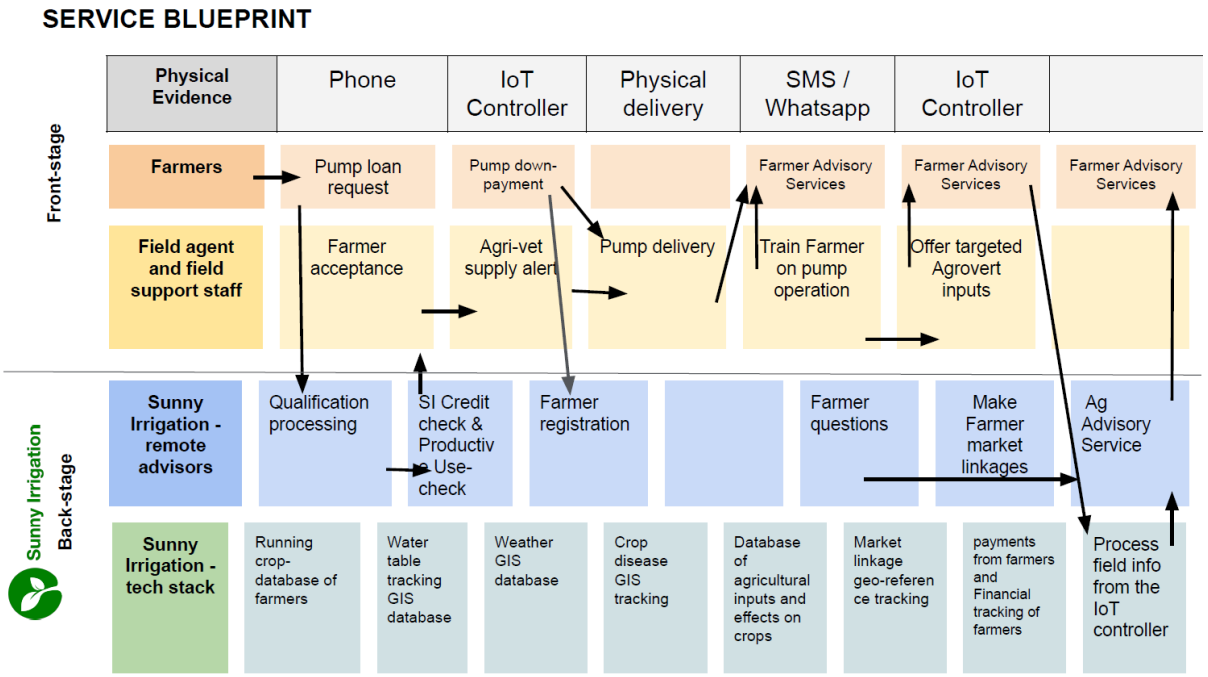
	Company Name	Proposed Business and PoC Content
1.	Company A	- Agritech business, which utilizes block chains and AIs and combines agricultural guidance, sales of agricultural materials and crops, and loans for the purchase of agricultural materials
2.	Company B	- Automation of organic fertilizer and feed production business using flies grown from food waste
3.	Company C	- Agritech business, which utilizes a block chain and AI, combines guidance on cultivation, such as remote diagnosis of pests and diseases, with credit sales of agricultural materials
4.	Company D	- Agritech business that combines existing agricultural information SNS with loans for purchasing agricultural materials, crops, and crops
5.	Company E	- Combining IoT and solar pumps to provide value-added solutions that enable agricultural irrigation to support remote cultivation, such as from temperature and humidity
6.	Company F	- Production and sales of Pay-As-You-Go solar threshing machines and provision of solutions that combine remote maintenance services
7.	Company G	- Introduction and operation of a smart meter prepaid system for irrigation and water utilities that promotes the use of irrigation and ensures that fees are collected.

Source: JICA Survey Team

When designing the PoC mentioned above, we introduced the three tools of Service Blueprint, Technology Blueprint and Javelin Board, and asked the participating companies to implement them in order to make the activities of PoC more specific. Although the degree of understanding of each tool varied among participants, improvements were seen in the content of the project, such as prioritization from the comprehensive service area of the project plan submitted beforehand by deepening the content of the project using the tool.

In addition, the completeness of the PoC plan is not sufficient at the present point in time, as there are unclear points in the verification items in the PoC, and the PoC range is wide and there are questions about the feasibility of the plan. It is assumed that the plan will not be completed sufficiently within the day's workshop, and we confirmed that each company will take it back and make improvements.

After the workshop, Japanese companies and other parties that attended the workshop met and exchanged information with the participating companies.



Example: Sunny Irrigation's Service Blueprint

5.3 Outline of Implementation of Open Innovation in Nigeria

5.3.1 Deepening the Applicability and Implementation Challenges of Disruptive Digital Technologies

(1) Narrowing Down Application Areas of Disruptive Digital Technologies

Based on the list of candidate projects for the target countries described in Chapter 2, the issues were narrowed down while taking into consideration the background of Nigeria. First of all, we considered the need to clearly provide the benefits to the participants of the event (= JICA's ability to follow up in some form) and the fact that the outputs are likely to develop into future JICA projects. Assuming that JICA can provide a relatively flexible follow-up response in collaboration with individual experts dispatched and technical professionals (directly managed), JICA, through consultations with the JICA Nigerian Office, narrowed down the proposed issues for each country to three proposals.

Table 5-6 Potential Areas for Application (Nigeria)

Area	Potential collaboration with JICA projects
Power Supply Improvement Program	• Implementation of PoC under JICA's advisor of Ministry of Industry, Trade and Investment
Water Resources Management Program	• Collaboration with the advisor planned to be dispatched

Transport and transport programs	• Collaboration with the Abuja city master plan development survey planned to start from FY2019

Source: JICA Survey Team

Next, as a result of consultations with the parties concerned in the first field survey, it was decided to plan open innovation in areas of improving tariff collection for the water and power sector, which has high applicability of digital technologies and directly improves the profitability of the business entity.

(2) Key Comments from Interview

- Federal Capital Territory Water Board (FCTWB):
  1. There are challenges in each steps of meter reading, billing, collecting (details are mentioned in (3))
  2. In terms of bill receipts, the company had previously contracted to a Revenue Consultant to form a business contract with a bill collection agency, such as a bank or a web payment agency, but the contract is scheduled to expire this summer. The tariff collection will be made to FCTWB's eight bank account from time to time and will be made weekly to CBN's federal capital account.

- Abuja electricity distribution companies:
  1. The company is switching to advance payments to improve tariff collection. Currently, advance payments are deployed by about half (around 1 million contracts) of the customers, and 900,000 is planned to be shifted to advance payments in the next few years. ==> This measure is expected to have considerable progress in tariff collection, and the necessity of JICA's involvement in this issue is considered to be decreasing.

- Nigeria's IT Development Agency (NITDA):
  1. All projects need to comply with the information protection and information security policies established in the e-government's efforts.

- GIZ:
  1. The Make-IT Project was launched in October 2017 to promote the use of digital technology. It consists of three components: Access to the market, to the finance, and to the training.
  2. Access to the market, which collaborates with other GIZ projects, support prototype development activities. Access to the finance has formed alliances with large companies such as IBM/SAP/Siemens/Airbus to provide accelerator programs at their expense. The program period is nine months, and in 2018 (the first), 192 applications were received and 13 companies were selected. The selection criteria are largely for contribution to the SDGs and technology utilization and do not judge whether the businesses are high growth. The content of the program is determined by the sponsor company and includes product

development and internships at European workplaces and mentorship in Nigeria (mainly advice from specialists in areas such as management strategy, financial management, and technology).

(3) Deep-Dive into the Challenges

In the electricity sector, since the switch to advance payment would lead to improved bill collection, we conducted a deep dive into the issues of meter reading, billing, and payment processes that had already been identified through the Federal Capital Territory Reduction of Non-Revenue Water Project. The issues in meter reading, billing, and collection are organized along the process as follows.

1) Meter reading service

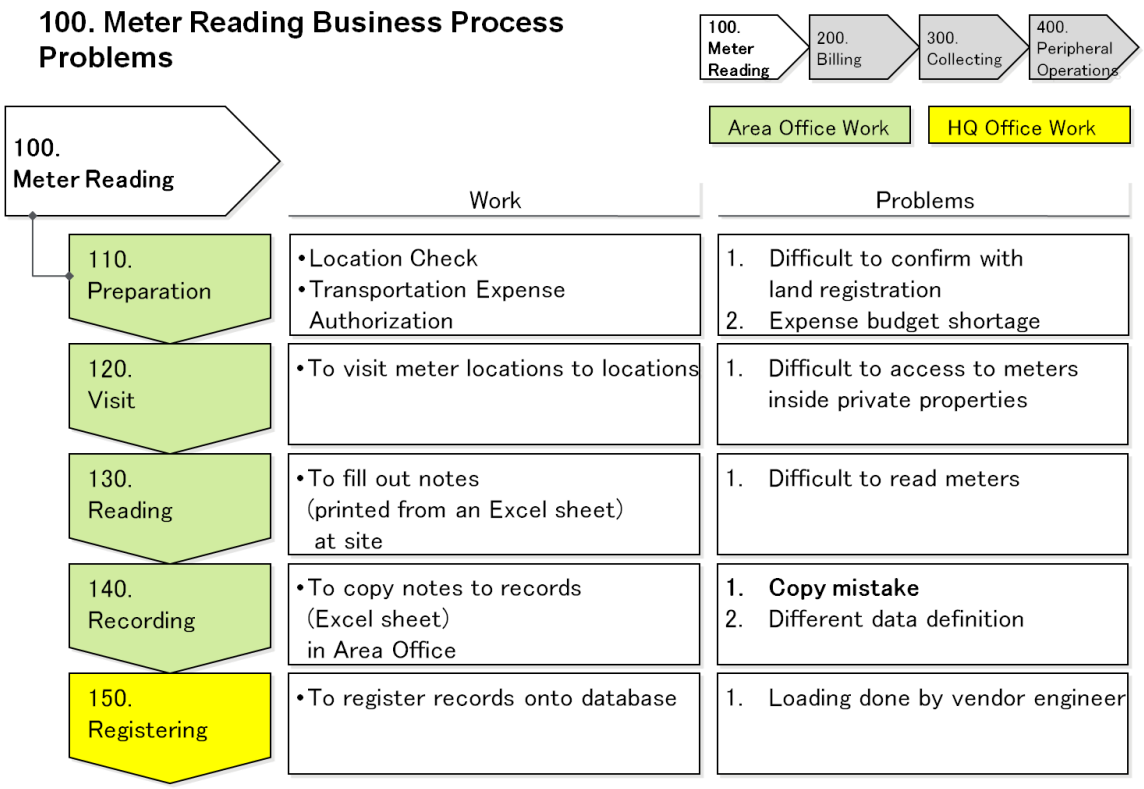


Figure 5-5 Challenges of Master Reading at FCTWB (Nigeria)

Source: JICA Survey Team

The major challenge in metering operations is the need and error of inputting data from paper records to Excel. Also, grasping the accurate address at the time of customer registration is also an issue.

2) Billing

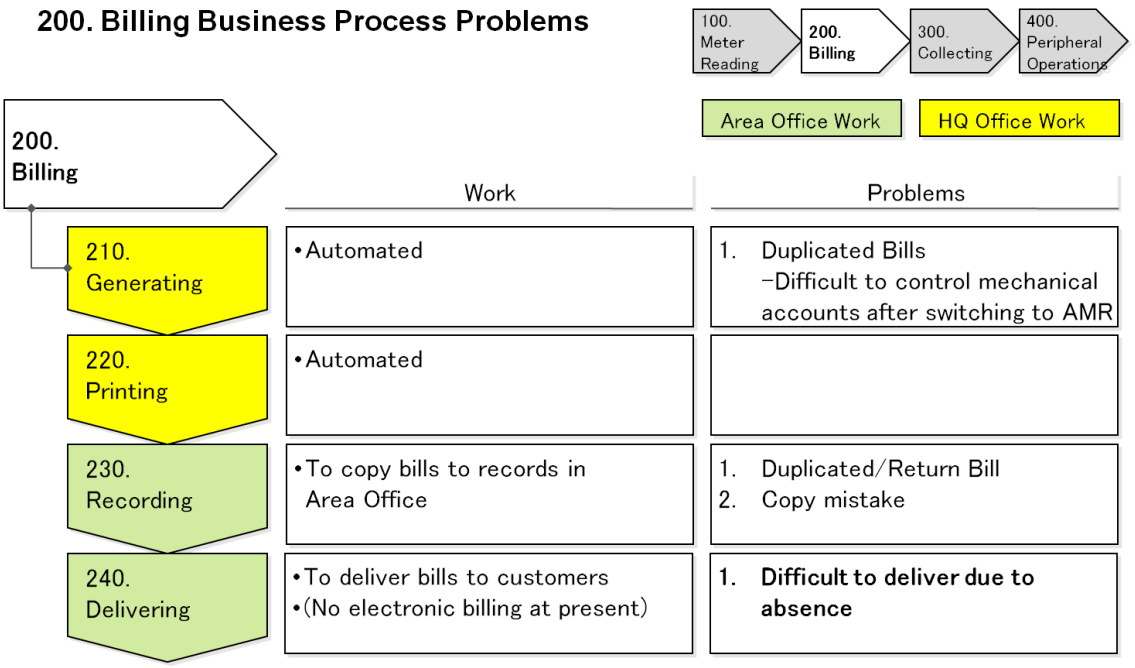


Figure 5-6 Challenges of Billing at FCTWB (Nigeria)

Source: JICA Survey Team

The main challenge in billing is that only paper invoices are distributed, and the meter reader must return many times when the user is absent.

3) Collection Operations and Other Operations

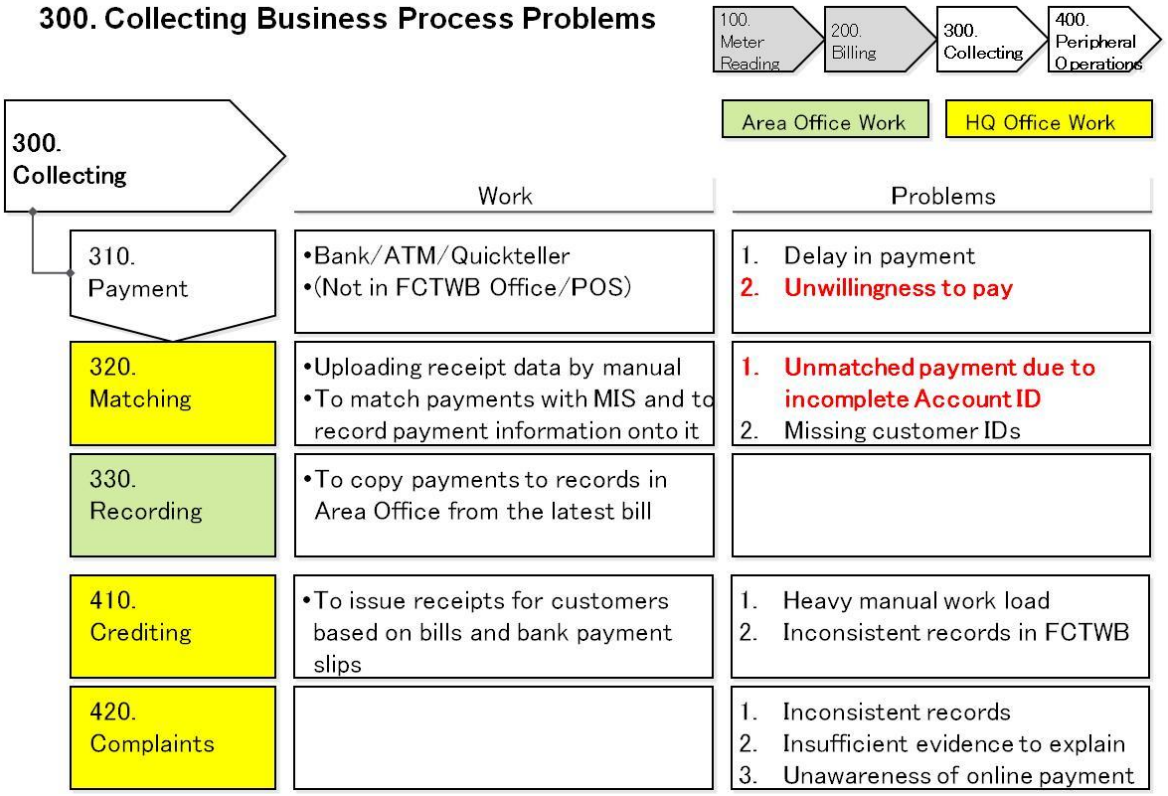


Figure 5-7 Challenges of Collection and Other Process at FCTWB (Nigeria)

Source: JICA Survey Team

The main challenge in the collection operation is the inadequacy of account ID entries for bank and ATM payments, making it impossible to process invoices. Also, the customers' low willingness to pay is also a challenge.

5.3.2 The 1st Edition Open Innovation

(1) Implementation policy

In order to formulate business ideas in line with FCTWB needs and through dialogue with FCTWB officials, it was decided to hold an Ideation Session to introduce FCTWB challenges to participating companies. In addition to issues related to meter reading, billing and payment, it was also decided to include issues to improve water supply services by FCTWB and to consider new business models for FCTWB to gain new revenue.

(2) Open Innovation Outline and Preparation

A website for PR and registration was established. The excerpt of the page is as follows.

The 1st Edition: Ideation Session

ABOUT

Nigeria Open Innovation Challenge powered by JICA invites talented entrepreneurs, corporates,

developers, etc that can change business-as-usual and bring more efficient and effective solution to the challenges present in the water sector in Nigeria.

In the 1st Edition event which will take place on May 15th 2019, an overview of the challenges faced by the Federal Capital Territory Water Board (FCTWB) will be presented. Afterwards, there will be an ideation workshop to bring together different knowledge and ideas to ideate innovative solutions.

Great ideas with potential impact will have a chance for a Proof of Concept project funded by JICA, followed by possible scale-up.

THE CHALLENGE

Startups, corporates, etc. with innovative digital solutions to the following challenges are invited.

1 How can FCTWB improve its metering and billing process?
2 How can we improve the ease of payment for customers?
3 How can FCTWB improve its water supply service? Is there a new business model which FCTWB can adopt to increase revenue?

AN OVERVIEW OF THE CHALLENGE

1 Major challenges of meter reading and billing are:
a) inaccuracy and workload of copying hand-written meter reading to Excel sheet and
b) delay and workload of delivering paper bills due to absence of customers.
2 Major challenges of payment and collection are
a) unmatched payment due to incomplete account ID, which causes the customer complaints against wrong billing statements with missing payment receipts and
b) inadequate motivation of payment for water.
3 The mission of FCTWB is to supply safe water for all people in a consistent manner. Therefore, FCTWB is open to seek for other supply solutions assisted by digital technology aside from piped water. It is also welcome to other business related to water supply which increases profits and enables FCTWB to improve its water supply service.

100. Meter Reading Business Process Problems

Area Office Work | HQ Office Work

100. Meter Reading

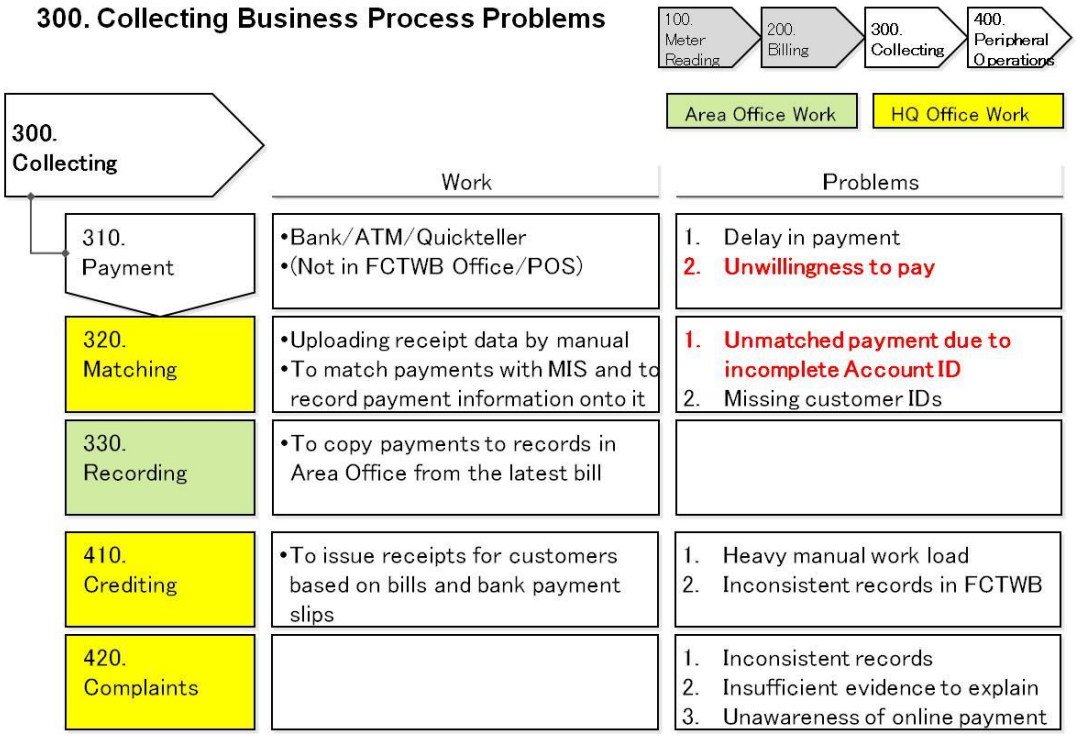
	Work	Problems
110. Preparation	•Location Check •Transportation Expense Authorization	1. Difficult to confirm with land registration 2. Expense budget shortage
120. Visit	•To visit meter locations to locations	1. Difficult to access to meters inside private properties
130. Reading	•To fill out notes (printed from an Excel sheet) at site	1. Difficult to read meters
140. Recording	•To copy notes to records (Excel sheet) in Area Office	**1. Copy mistake** 2. Different data definition
150. Registering	•To register records onto database	1. Loading done by vendor engineer

200. Billing Business Process Problems

Area Office Work | HQ Office Work

200. Billing

	Work	Problems
210. Generating	•Automated	1. Duplicated Bills –Difficult to control mechanical accounts after switching to AMR
220. Printing	•Automated	
230. Recording	•To copy bills to records in Area Office	1. Duplicated/Return Bill 2. Copy mistake
240. Delivering	•To deliver bills to customers •(No electronic billing at present)	**1. Difficult to deliver due to absence**



BENEFITS FOR PARTICIPANTS

1 Chance to know the challenges, needs and opportunities of FCTWB
2 Great ideas get a chance for a funded Proof of Concept project by JICA followed by chance for scale up
3 Chance for networking with FCTWB and JICA
4 Possible chance to network with Japanese corporates

PROGRAM

<DATE>

May 15th, Wednesday, 2019 9:00-15:45 (tentative)

<VENUE>

Civic Innovation Lab, Abuja

<TARGET PARTICIPANTS and ELIGIBILITY>

Startups, entrepreneurs, corporates, etc. that are interested in launching a business or have already launched a business in the above challenge areas.

<CAPACITY>

20 persons (In case the number of applications exceed the capacity, selection will be conducted on the viewpoint of participants' diversity)

<TIME TABLE>

※Please note that program contents may change without notice

- Reception 9:00-10:00
- Opening and ice break 10:00-10:10

- Input of the Challenge 10:10-10:45
- Q&A 10:45-11:00
- Coffee Break 11:00-11:15
- Ideation Session and discussion with stakeholders 11:15-13:30
- Presentation 13:30-14:30
- Feedback and Closing 14:30-14:45
- Networking Lunch 14:45-15:45

<FOLLOW-UP>

May 31st Announcement of selection result for July 2nd Edition Event※1

July 16th Nigeria Open Innovation Challenge 2nd Edition

August Announcement of selection for funded PoC project※2

※1 Please note that announcement will only be made to those selected.

※2 Please note that in case no startups meet the criteria, no startups may be selected.

(3) Implementation Result

1) Applicants

While the capacity was 20, there were 37 applicants (5 of whom were excluded as they applied after the application deadline). 22 participants were selected, screened mainly on whether the solution and interest areas described in the application form match the challenges of FCTWB described in the web site.

2) Grouping

7 groups were formed. While trying to put members with similar interest into the same group, the diversity within the group and the placement of FCTWB members that can respond to the themes of the group was also considered.

3) Evaluation

Presentation was divided into 2 groups, and the ideas were evaluated according to the following criteria.

Table 5-7 Selection Criteria (Nigeria)

Criteria	Rating	Description
Validity	20	The appropriateness of the solution to the needs of FCTWB and the target sector
	20	The priority of the solution within FCTWB and the target sector
Impact	30	Impact of the solution to FCTWB's functional improvement and to the target sector
Uniqueness	15	Uniqueness of the solution
Organization	15	Whether there is strong management team to implement the project

Source: JICA Survey Team

4) Presented Ideas

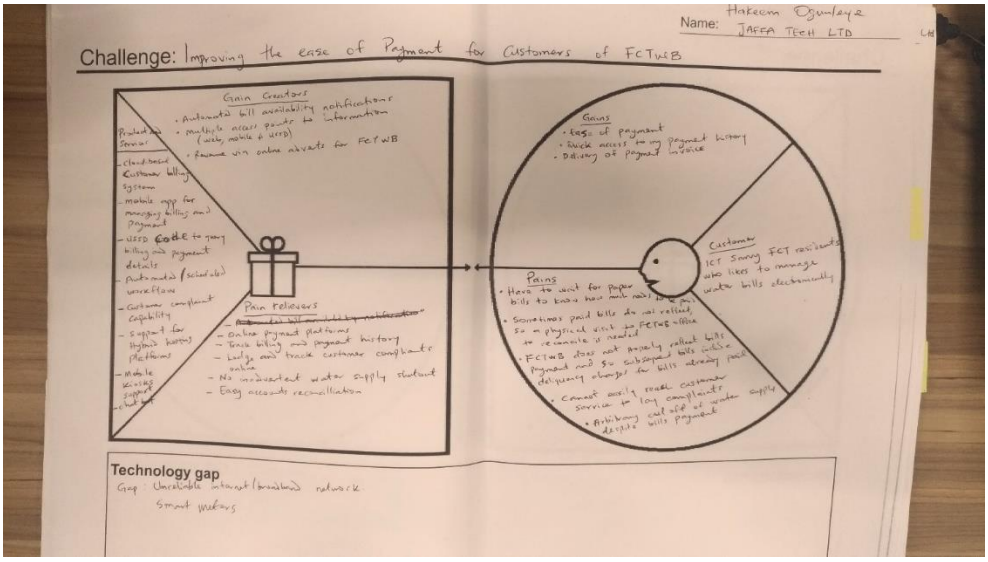
A total of 18 business ideas were presented. The ideas with high evaluation score are described as follows.

Table 5-8 Presented Ideas (Nigeria)

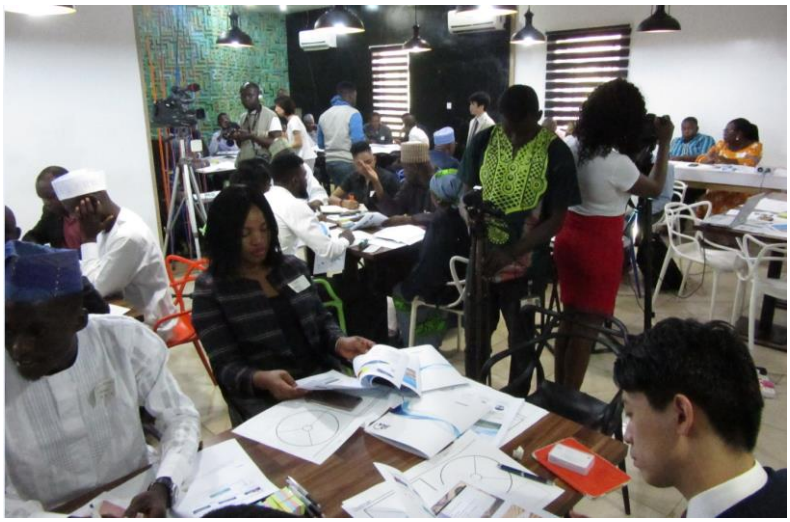
	Challenge	Proposed Ideas
1	How can FCTWB improve its metering and billing process?	- Combination of self metering service utilizing QR tags for individual homes/offices and e-payment service (Tracology) - Combination of smart meter, billing and payment system, and leakage detection system (Nazarion+MILDEV+Spunvertek Enterprise)
2	How can we improve the ease of payment for customers?	- E-payment system utilizing wallet and salary credit functions (Systemspecs(Remita)) - Introduction of billing and electronic payment system using dedicated terminal by meter reader (fets) - Providing a cloud service for billing and payment systems that takes into consideration the convenience of users, such as billing confirmation with portable kiosk terminal services and chat bots in addition to mobile applications (Jaffa Technologies)
3	How can FCTWB improve its water supply service? Is there a new business model which FCTWB can adopt to increase revenue?	(water leakage detection was proposed together with the above challenges)

Source: JICA Survey Team

An example of the value proposition canvas is shown below (Jaffa Technologies Ltd)



5) Photos



Ideation workshop

Discussion

Presentation

6) Questionnaire Result

The participants' satisfaction was generally high. Out of 20companies that submitted the questionnaire, 16 (80%) responded "very satisfied" and 4 responded "moderate satisfied" (20%). Out of 15 members from the FCTWB, 14 (93%) responded "very satisfied" and 1 (7%) responded "moderate satisfied". In particular, there were many positive comments from participant companies that they were able to clearly understand the issues while interacting directly with FCTWB and that they were able to discuss ideas with other entrepreneurs. From FCTWB, there were many positive comments on the process of considering solutions while exchanging opinions with entrepreneurs and corporates and that they were able to know many ideas.

5.3.3 The 2nd Edition Open Innovation

(1) Background and Objective

Based on requests from the FCTWB, a total of 11 companies, including the top nine companies in the first Open Innovation event and the top two companies in the CRM system development bid evaluated by JICA and FCTWB, held presentation sessions on the business contents and PoC plan, to select a company to implement PoC with JICA's support.

(2) Implementation Method

A presentation and a question-and-answer session were held for 11 companies over two days, on July, 31st and August 1st. One hour was allocated for each company. The following items were presented by the participating companies, based on the template shared in advance. After the presentation, the evaluation meeting was taken place between FCTWB and JICA.

1.	TEAM	Describe your management team
2.	PROBLEM	Describe the social challenge you are trying to solve
3.	SOLUTION	Describe your product/service
4.	IMPACT	Describe the impact of your product/service on social challenges quantitatively & qualitatively
5.	BUSINESS MODEL	Describe key stakeholders involved and flow of money (refer to the tip). Include sense of cost
6.	SERVICE BLUEPRINT	Describe work flow necessary to provide the service including front office and back office, clarifying the system design
7.	DELIVERY BLUEPRINT	Describe technical components to deliver the products and services

8.	**POC PLAN**	
a.	**What to verify**	• What do you want to verify through PoC? • How is it positioned in your business plan?
b.	**How to conduct PoC**	• What do you do as PoC? • Who is the stakeholders in the PoC? • What is the necessary materials for PoC?
c.	**How to evaluate the result of PoC**	• How do you evaluate the result of PoC? • What is the criteria to go on to next step?
d.	**Period**	• How long doe it take to complete PoC? • This time, the period of PoC shall be within 6 months.
e.	**Cost estimation**	• How much do you need to conduct PoC including all necessary costs? • This time, the budget of PoC shall be less than USD100k.
f.	**Implementation structure**	• Who is the responsible person to conduct the PoC? • Who are the team members to conduct the PoC?

Figure 5-8 Presentation Items (Nigeria)

Source: JICA Survey Team

The evaluation was conducted based on the following criteria.

Table 5-9 Selection Criteria (Nigeria)

Evaluation Items	Score	Evaluation points
Validity	10	Are they matched to the needs of the implementing agency and the subject area?
	10	Priority among implementing agencies and subject areas
Impact	20	Impact on FCTWB's improved function or stable water supply
Advantage of the idea	10	Is the idea unique, is there clear differentiation from alternative services?
Organization	25	Is there a strong management team and a system in place to execute this project?
Appropriateness of business model, feasibility of PoC plan	25	Is the business model well thought out? Is the PoC plan feasible?

Source: JICA Survey Team

Method of examination

Table 5-10 Selection Method (Nigeria)

	JICA		Survey Team		Average	FCTWB		Average
	Person A	Person B	Person C	Person D		Person E	Person F	
Company A								
Company B								
Compnay C								
Company D								
Company E					③			③

②

Source: JICA Survey Team

i) 60 points as cutting line and above 80 for recommendation
ii) Exclusion of outliers
iii) Calculation of average of "JICA+ survey team" and "FCTWB"
iv) 3:2 weighting by JICA+ survey team and FCTWB
v) Ranking
vi) Determination of PoC-supported companies after discussion at the review meeting

(3) Results of Implementation

One company was unable to attend, and 10 of the 11 planned companies made presentations.

Table 5-11 Proposed PoC Plans by Participating Companies (Nigeria)

	Company	Proposed Business and PoC Content
1	Company A	- Proposal for improvement in the field of billing and collection services. In particular, use an AI (statistical learning) to estimate the customer's missing payment data and contact the customer to prompt him/her to cancel the bill. (The meter reading, both mechanical and automatic, is processed from the data loading area.)
2	Company B	- Use CRM (Customer Management) Package Solutions to improve all operations for meter reading and billing collection. Proposal for improvement of meter reading by sending photographic data and automatic reading using mechanical meter reading.
3	Company C	- Improvement of metering operations, mainly through the development of original smart water meters. - Prototyping a mini-grid combining separate water sources such as rainwater and wells with a smart meter.
4	Company D	- Using CRM Package Solutions, we propose to improve operations by collecting all metering bills.
5	Company E	- Covers the entire collection of meter readings. Improvement of rate collection by QR code tag and self-reading.
6	Company F	- Proposal of online payment service. (Firms that provide salary transfer services for federal government employees)
7	Company G	- Develop CRM solutions to improve operations in all areas of meter collection, including the development of smart water meters.
8	Company H	- Improvement of operations for the entire collection of meter bills, including full

	Company	Proposed Business and PoC Content
		replacement with smart water meters.
9	Company I	- Development of CRM solution to improve operations in all cases of collection of meter readings.
10	Company J	- Proposal of online payment service.

Source: JICA Survey Team

During the 40-minute question and answer session, the FCTWB asked many questions, mainly on the technical aspects, and a lively discussion ensued.

As a result of evaluating the presentations of the 10 companies considering the screening method described in the previous section, Company A, which received the highest score, was given the first priority for contract negotiations, and Company B, which was close behind, was given the second priority. As a result of contract negotiation with the company and FCTWB and JICA, it was decided to adopt the PoC project (Jaffa Technologies) for a smart billing platform that uses AI to estimate customers and facilitate the elimination of missing payment data in conjunction with smart meters. Since the PoC project itself is out of the scope of this survey, it was decided to implement it under the supervision of JICA Nigeria Office.

At the evaluation meeting, as a general comment on the open innovation event, it was said that the dialogue with external companies, mainly start-ups, provided an opportunity for counterparts to consider their own work from a broader perspective and with a new approach.

5.4 Outline of Implementation of Open Innovation in Uganda

5.4.1 Deepening the Applicability and Implementation Challenges of Disruptive Digital Technologies

(1) Narrowing Down the Application Areas and Issues of Disruptive Digital Technologies

Based on the list of candidate projects for the target countries described in Chapter 2, the issues were narrowed down while considering the background of Uganda. First of all, we considered the need to clearly provide the benefits to the participants of the event (= JICA's ability to follow up in some form) and the fact that the outputs are likely to develop into future JICA projects. Assuming that JICA can provide a relatively flexible follow-up response in collaboration with individual experts dispatched to Uganda and with technical professionals (directly managed) currently in operation, JICA, through consultations with the JICA Uganda Office, narrowed down the proposed issues for each country to three alternatives.

Table 5-12 Alternatives (Uganda)

	Issue	Proposal for commercialization
Alternative 1	Northern Region Peacebuilding and Development Support Program Northern Uganda Livelihood Improvement Project	• SHEP: Promoting horticultural crop planting and market distribution in line with market needs • Collaboration from Phase 2 Concept Development Stage
Alternative 2	"Rice Development Program" to develop irrigation facilities in the area along the Atari Basin	• Application of digital technology to the protection of the world's wetlands and the monitoring of the use of irrigation • Coordination with detailed design scheduled for autumn 2019 • Coordination with attached technical professionals
Alternative 3	"Rice Development Program" rice development project phase 2	• Application to support the dissemination • Possibility of adding components, although RD has already been executed

Source: JICA Survey Team

(2) Key Comments from Interviews

- JICA Office:
  - Since digital technology is a development tool, I want you to summarize the applicability so that the benefits to end users can be seen. Both candidate projects are likely to be more amenable to sub-county extension worker level.
  - Since investment in start-up is accompanied by risks, it is necessary to take into consideration the reasons why JICA must assume the risks associated with start-up-related projects.

- Northern Uganda Livelihood Improvement Project:
  - In addition to market-oriented agriculture, support will be provided for the socially vulnerable (including those separated from their families and persons with disabilities after the civil war) in order to improve their livelihoods, and the content of nutrition business will be included.
  - One extension worker per 6,000 households. The remuneration is paid by the central government, which is hired by the prefecture and assigned to the county. Costs for activities, such as gasoline costs for transportation, are also budgeted.
  - Nepal and other countries are collecting agricultural data on extension workers, but it has not been carried out much in northern Uganda.

- The challenge for the extension workers in Kitgum Province, in addition to the expansion of the extension activities, is to ensure that each farmer's household stores the income from harvesting for the procurement of food.
- The head of the Kitgum District extension worker owns a laptop and uses it for e-mail checks, Internet information gathering, and business report documentation. Plantsize is used to collect agricultural information. It is connected to the Internet via the mobile phone network and purchases a 5 GB pack per month on a prepaid basis. Almost all other extension workers own smartphones.[18]
- Kitgum has only one IT shop and no software developers. Universities have branches at Gulu University, but do not have IT.
- A group of farmers (less than 30 households) reported that laptop owners were watching videos. The smartphone owners are only 2-3 households, and the rest are feature phones. I talk every day but listen to music, etc. Mobile money remittances are used directly by individual farmers, but not by family members or agricultural traders.
- Many Village Savings & Loan Accounts (VSLAs) are formed, and cash is usually stored there. Remittance is made only when necessary through mobile money.
- Only 10-20% of the population can read and write in local languages.
- Distribution of fake seeds, fertilizers and pesticides.
- Agricultural chemicals, etc. have shelf-life, and it is difficult to determine the quantity and timing of shipments. (Residual Risk)
- Some businesses with stores in the Kitgum market have secured suppliers of vegetables by providing farmers with seeds and other items and deducting the costs at the time of the post-harvest purchase.
- Kitgum sells tomatoes and cabbages on the market mainly from Mbale during the dry season, and many of them from nearby farmers during the rainy season.
- In ICT, the first outbreak prediction system for potato and potato diseases (FLABS) is one of the successful cases in Japan.

➢ Rice Development Project:

- The extension workers in the Ministry of Agriculture are distributing a Pocketbook for Extension Activities, and there is information that KOIKA is considering support for computerization.
- There are two types of dissemination of rice technologies: dissemination by NARO engineers through extension workers, and dissemination through direct training of core farmers to other farmers. In addition to transmitting knowledge, extension workers plan demonstration site training, and during the training, core farmers divide the labor among themselves by showing practical skills.

[18] https://www.plantwise.org/

- The Rice Development Project plans to make it possible to record and analyze data on the activities of extension workers using smartphones, etc. as part of the monitoring of project activities.
- The activities of farmers' associations are voluntary and are not very active in Uganda. (Some objections)
- Since the irrigation water users' association is compulsory and pays fees, it may be suitable for the use of digital technology.
- Some Ministry of Agriculture officials have taken a negative view of the use of forced-on digital technologies from abroad, partly because of the unsuccessful introduction of E-Voucher by the developer Partner.

➢ Ministry of Agriculture, Livestock and Fisheries:
- Information gaps between farmers and materials suppliers and crop producers are a development issue.
- Agricultural statistics have not conducted the original survey for the past 10 years and rely solely on estimates.
- Some of the USAID-supported climate change programs are collecting data.
- Two senior officials from the General Extension Service and the Planning Department were willing to participate in the May 2 Open Innovation.
- NARO provides information on research results such as vaccine development in the livestock industry through smartphone applications and the NARO Information Hub, and promotes its use with the support of the World Bank.[19]

➢ Information and Communications Ministry officials:
- The possibility of developing an Innovation Hub as a public organization is being studied.
- Based on the ICT Strategic and Investment Plan (2015/16-209/20), the development of ICT infrastructure is being promoted.
- Especially in rural areas, the UCC is working to improve the communication network through the Rural Communications Development Fund (RCDF) (about 40 billion yen in construction of optical fiber backbone network and 3G mobile communication).[20]
- It is also possible to hold the event of this investigation in the conference room of the Ministry of Information and Communications.

➢ USAID
- The Uganda Office of USAID has six staff members (Advisor, Officer, Agronomist, etc.) in charge of the agriculture sector for the Global Food Security program.
- Although there is no dedicated staff in charge of digital technology in the office, there are many proposals for the active use of digital technology from the viewpoint of efficiency and

[19] http://www.naroinfohub.org/
[20] https://www.ucc.co.ug/rcdf/

enhancement of effectiveness in project formulation, and many of these proposals are added to the points awarded in the project adoption.

- While USAID does not directly or strategically introduce digital technologies, it uses various digital technologies in the agricultural sector because USAID rejects proposals from Implementing Partner (Implementing Partners) and implements them.
- In particular, Akorio has become a private enterprise based on the dissemination support projects that have been implemented in recent years, and this can be regarded as a successful example of the utilization of digital technology.[21]

➢ Private sector companies and organizations such as start-up companies:

- Administrative operations, such as corporate registration and foreign resident registration, may suddenly change and interfere with corporate activities.
- The National Payments System Bill (equivalent to part of the Japanese Banking Law and Payment Law) is expected to be passed and enforced in 2019. Initially, the bill had questions about its application and operation, such as license applications and licenses. However, the bill was justified after coordination with the Fin-Tech industry, and contributed to the development and improvement of the Fin-Tech industry as a whole by eliminating inappropriate traders due to the enforcement of the law.
- Agric-Wallet will start a business of brokering a bridge loan from a bank and receiving 0.5% of the loan as a commission to reduce the 30-90 day grace period for purchases from smallholder farmers. It has already succeeded in a trial run with five vendors, enabling almost immediate cash payment from one small sale of USD2. Similar to Micro Invoice Financing. The trial system was developed by three people in Uganda, and off-shore development of the backend was conducted in India with USD 15,000 (self-expense). Ensure robust processing by raising USD 100,000 funds overseas and building a block chain of transaction records for the full-scale introduction of the project.[22]
- In WeFarm, there are many people who cannot read and write (when operating agricultural Q&A via SMS), and the use of SMS is hindered. However, in many cases, their sons and daughters use SMS by word of mouth. The Voice Recording System was also considered for verbal question, but it was abandoned for both the system development cost and the telephone charge during operation (which is more than SMS). At present, a rapid shift from feature phones to smartphones is underway in rural areas, and they are considering transferring the technology base to smartphone apps and web apps.[23]
- Smart Farming Uganda has launched a marketplace for the sale and purchase of agricultural materials on its website. However, due to the low rate of use of smartphones and PCs by farmers, it is trying to develop a trading system using the USSD code for feature phones.[24]

[21]
[22] https://agricwallet.com/
[23] https://wefarm.co/
[24] https://www.smartfarmingug.com/

- Smart Farming Uganda and Spark Initiatives (service name: BUUZA Agro-Info Call Center) plan to start a new business by applying for Digital Innovation Challenge for Agriculture (sponsored by UNCDF).[25]

(3) Deep Cultivation of Implementation Issues

1) Direction of investigation

In the following circumstances, the Government will continue to conduct research on the development of smallholder farmers and the application of digital technologies to rice development in the agriculture sector.

1. The agriculture sector is active in using digital technologies, mainly in the private sector. There are a number of Agritech-related start-ups, and there are identified companies that are interested in participating in open innovation.
2. There is a plan to test the use of digital technology in the current JICA projects, and there is a foundation for planning collaborative efforts.
3. Private companies are looking to do business with a particular market (e.g., to seek profitability). In Kenya, Twiga Foods plans to increase contracts with larger farmers to reduce tariffs; in Uganda, WeFarm does not operate because the northern market is considered to be small; and in Kenya, there is a risk that small farmers will be left out of efficient, high value-added farming and trading activities using digital technology. In the public sector, the use of digital technologies in supporting smallholder farmers is likely to be significant.
4. There is a need to devise ways of using power supply measures (off-grid in rural areas), wireless networks (2G in rural areas), mobile phone holdings (more than half the local feature phone owners), and literacy rates (10-20% of the tribes are literate).

2) Problem analysis

The value chain for the agriculture sector is generally as shown below.

[25] https://cda.ug/i4a/

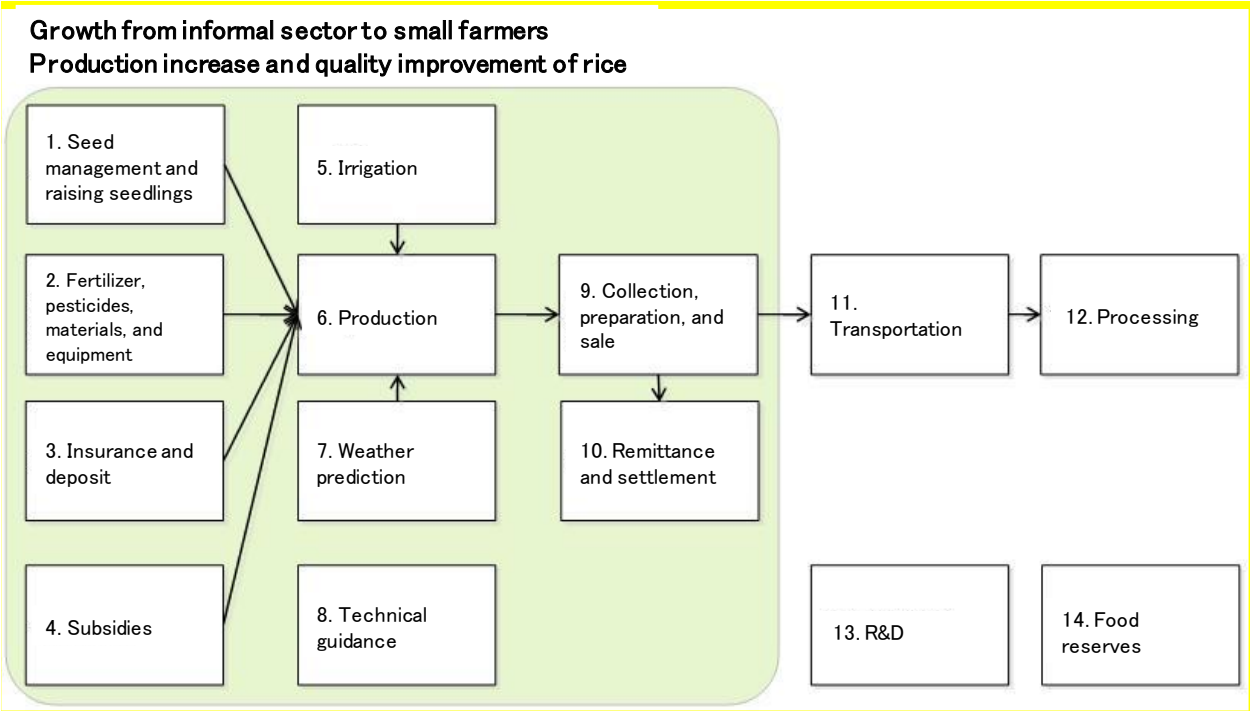


Figure 5-9 Agriculture Value Chain (Uganda)

Source: JICA Team Survey

In the northern region, where JICA supports livelihood improvement, it aims to foster small-scale farmers from the informal sector, focusing on vegetable cultivation, and to expand the area planted and improve the quality of rice development nationwide. Rather than adding value to agriculture at the downstream side of the value chain, the company is focusing on improving the functionality of the value chain, mainly at the upstream side of production. It is hoped that digital technology will be utilized in a consistent manner.

Issues for each actor, such as farmers, extension workers, agricultural material dealers, and agricultural product dealers, can be viewed as an issue of information asymmetry among actors as a result of collecting information including literature surveys and interviews in neighboring Kenya. Digital technologies are expected to be utilized to mitigate this issue. The following table shows the issues that are currently being resolved.[26]

[26]Investigation Report on Alleviation of Asymmetry of Information:

Table 5-13 Issues Identified from Information Gathering (Uganda)

Farmer's challenge	
1	High yields cannot be guaranteed due to lack of knowledge of appropriate materials/agricultural methods.
2	No informative weather information available for sowing, fertilization, or harvesting
3	Inadequate farm management due to labor and financial constraints
4	Low level of education, difficulty in collecting information and acquiring new technology by one person
5	Farmers' purchasing and selling power are weak, and union activities are not active.
6	Failure to meet the quality, volume, and delivery requirements of the market makes it possible to be bought by a broker who does a fickle business.
7	The sharing of agricultural market information is delayed, infrequent, different price types, inaccurate
8	Difficulty in acquiring new reliable customers
9	Farmers who don't know where to sell and processors who don't have quality concerns can't get it.
10	Large amount of penalties for transactions makes it difficult to find new customers, and there is no business model that can easily be cancelled.
11	As soon as I receive cash, I am exhausted and have no money to plant.
12	High fees for mobile money
13	Small-scale farmers need to invest themselves in order to expand the scale of the project, but it is difficult to raise funds.
14	Unable to grasp the current status using farm management records, sales records, etc.
15	A few farmers still plan to invest on the basis of records
16	Many mobile phones are 2G (feature phones), and the use of smartphones from 3G onwards is still low.
17	Inability to read and write
Issues faced by agricultural material dealers and agricultural product dealers in contact with farmers	
18	Shortages in cash on hand and delays in payments
19	It is difficult to understand the reliability and creditworthiness of small farmers who have never done business.
Issues with extension workers	
20	Changes in farmers' behavior are challenging (conservative in nature)
21	It's too time-consuming for extension workers to tell by mouth.
22	The ability of extension workers tends to be biased toward knowledge gained through classroom studies, and farmers tend to lack the farming information and practical skills they need.

Based on the above, we hypothesize the introduction steps as shown in the figure below, in order to expand the use of digital technologies for smallholder farmers and rice farmers.

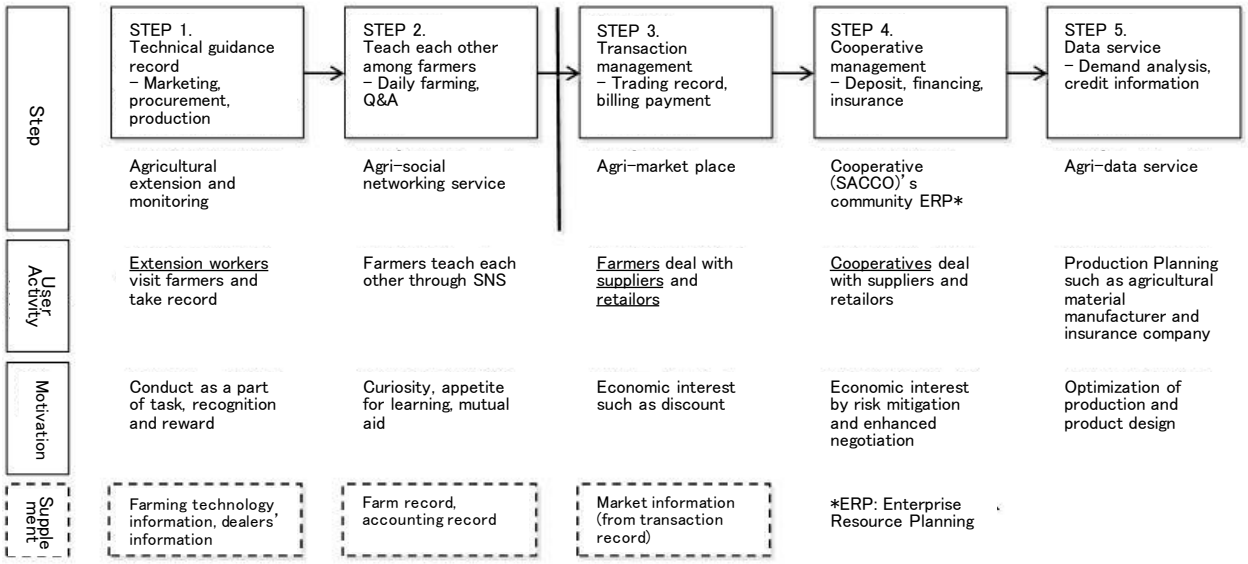


Figure 5-10 Implementation Steps of Digital Technologies, Hypothesis (Uganda)

Source: JICA Survey Team

Considering the effects on farmers, it is necessary to consider measures to utilize digital technologies by farmers themselves, including extension workers. In order to promote participation in economic activities from the informal sector and to raise incomes, it is also necessary to find opportunities to support transactions with agricultural equipment sellers and agricultural product sellers.

5.4.2 The 1st Edition Open Innovation

(1) Implementation Policy

Based on the on-going and planned projects supervised by Uganda office, the survey team conduct open innovation on agricultural sector which some project already tried to apply digital technologies to.

- Northern Uganda Farmers' Livelihood Improvement Project
  - Possibility to promote horticulture crops responding to market needs and to expand market distribution.
- Promotion of Rice Development (PRiDe) Project in Uganda Phase 2
  - Possibility of collaboration with trial of recording of extension workers' activities and farmers' cultivation.
  - Possibility to apply to extension support.

(2) Open Innovation Outline and Preparation

A website for PR and registration was established. The excerpt of the page is as follows.

The 1st Edition: Ideation Session

ABOUT

Uganda Open Innovation Challenge powered by JICA invites talented entrepreneurs, developers, etc that can change business-as-usual and bring more efficient and effective solution to the challenges in the agricultural sector in Uganda.

In the 1st Edition event which will take place on May 2nd 2019, an overview of the challenges in the agriculture sector and JICA Projects in Uganda will be presented by experts. Afterwards, there will be an intensive ideation session utilizing ideation frameworks to deep dive into the challenge and ideate innovative solutions.

The great ideas with potential impact will have a chance for a Proof of Concept project with JICA, followed by possible scale-up.

THE CHALLENGE

Startups and entrepreneurs with innovative digital solutions to the following challenges are invited.

1. How can we accelerate the bi-directional communication among farmers and extension workers in order to improve the productivity and revenue of farmers in the rural area?
2. How can we increase the supply and the variety of agric-input materials (seed, fertilizer, pesticides, etc.) in order to get more planting options of farmers in the rural area?

3. How can we enforce the function of farmers' cooperatives (internal financing, group purchasing/selling, etc.) in order to expand the trade/transaction of agric-materials and harvest crops?

BENEFIT FOR PARTICIPANTS

- Great ideas will get a chance for Proof of Concept project with JICA
- Chance for networking and brushing up your ideas with JICA & potential partners
- Possible chance to network with Japanese corporates

TARGET PARTICIPANTS

- Startups, entrepreneurs, etc (with digital technologies) that are interested in launching a business or have already launched a business in the above challenge areas.
- Government officials, development partners, NGOs and private corporates that are interested in collaborating with startups for the above challenges.
- Stakeholders related to JICA Projects in agriculture sector

The survey team paid attention to the following things when we conduct this event.

1. To invite participants from 2 parties in well balance; i) participants from agricultural sector with issues, and ii) participants from startups which have solutions.
2. To make groups based on each preference in the event as networking with other participants (not to make groups with known participants.)
3. To inform not for purely profitable business, and to let participants understand about JICA's projects.

(3) Implementation Result

1) Applicants

40 participants (over capacity of 25)

2) Grouping

Firstly, participants worked for individual work, wrote down their ideas on challenge of their interests, and made presentations. Based on the presentation, each participant voted to the great presentations, and the top 6 ideas were selected. By recruiting participants who wanted to support the selected ideas, 6 groups were made.

3) Evaluation

As this open innovation aimed for idea creation, the evaluation was not conducted.

4) Presented Ideas

The following 6 ideas were presented. The survey team is going to invite the solution provides of 3 ideas among them to the next edition (PoC Planning) in priority basis as recommended ones.

Table 5-14 Presented Ideas（Uganda）

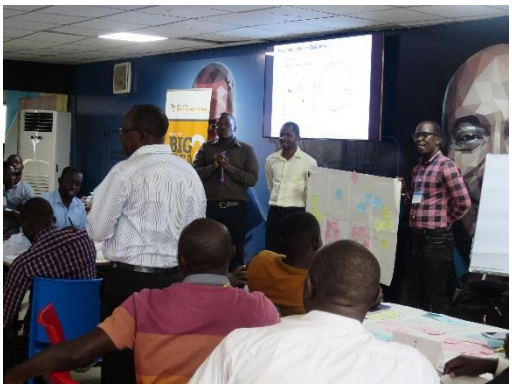
	Challenge	Presented ideas
1	How can we accelerate the bi-directional communication among farmers and extension workers in order to improve the productivity and revenue of farmers in the rural area?	- Support for extension activities (information provision, recording, etc) - Matching between questions from farmers and extension workers.
2	How can we increase the supply and the variety of agric-input materials (seed, fertilizer, pesticides, etc.) in order to get more planting options of farmers in the rural area?	- Information provision service on agricultural materials demand through cultivation. - Matching between farmers and agricultural materials dealers
3	How can we enforce the function of farmers' cooperatives (internal financing, group purchasing/selling, etc.) in order to expand the trade/transaction of agric-materials and harvest crops?	- Micro credit finance (invoice financing and factoring)

Source: JICA Team Survey

Especially, the challenge 1 has high affinity with JICA projects to enhance capacity of extension workers, and it is expected to collaborate. The selected idea (as recommendation) was as follows:

5) Photos

Presentation of individual work



Presentation of group work

6) Questionnaire Result

The satisfaction of participants on this event was relatively high as 16 out of 33 participants (who submitted the questionnaire) answered “very satisfied” (48%) and 15 answered “moderately satisfied” (45%). The major reason of satisfaction was good opportunity to create idea with other participants in interactive manner.

5.4.3 The 2nd Edition Open Innovation

(1) Open Innovation Overview and Preparation

PoC Planning Workshop was held on July 23 and 25. The outline of this event is as follows:

The 2nd Edition: PoC Planning Session

ABOUT

Uganda Open Innovation Challenge powered by JICA invites talented entrepreneurs, developers, etc that can change business-as-usual and bring more efficient and effective solution to the challenges in the agricultural sector in Uganda.

In the 2nd Edition event which will take place on July 23th& 25th 2019, there will be a Proof of Concept (PoC) Planning Session to brush up business model and plan PoC Project to maximize social impact. The great ideas with potential impact will have a chance for a PoC project with JICA, followed by possible scale-up.

JICA plans to support PoC project of innovative ideas in agriculture sector in Uganda by funding about maximum US$25,000 and plans to fund about maximum US$350,000 for scale-up project additionally, judging from the result of the PoC Project. The participants with the great ideas in the 2nd Edition event have possibility to be exempt from the 1st screening in the selection process of the planned PoC Project support.

THE CHALLENGE

Startups and entrepreneurs with innovative digital solutions to achieve SDGs Goal 2 are invited. The specific challenges in Uganda are as follows:

1. How can we accelerate the bi-directional communication among farmers and extension workers in order to improve the productivity and revenue of farmers in the rural area?
2. How can we increase the supply and the variety of agric-input materials (seed, fertilizer, pesticides, etc.) in order to get more planting options of farmers in the rural area?
3. How can we enforce the function of farmers' cooperatives (internal financing, group purchasing/selling, etc.) in order to expand the trade/transaction of agric-materials and harvest crops?

ASSUMED TECHNOLOGIES

Assumed technologies to apply are:

1. AI, Block chain, Drone, IoT, ICT platform, and etc.
2. Any other technologies that enables enormous impacts with the minimum cost and innovative solutions which deliver such impacts to those who could not benefit.

BENEFIT FOR PARTICIPANTS

- Great ideas will get a chance for Proof of Concept project with JICA
- Chance for networking and brushing up your ideas with JICA & potential partners
- Possible chance to network with Japanese corporates

TARGET PARTICIPANTS

Startups, entrepreneurs, corporates, NGOs, etc (with digital technologies) that are interested in launching a business or have already launched a business in the above challenge areas.

SELECTION CRITERIA

Criteria	Rating	Description
Impact	15	Potential impact of the solution to SDGs Goal 2, the challenges and the JICA Project
Uniqueness	15	Uniqueness and innovativeness of the solution
Scalability	10	Feasibility and scalability of the business model
Team	10	Strong management team to implement the project

The following points were taken into consideration in the implementation of this event.

1. Ensure that each company has the flexibility to make proposals while taking into account JICA's follow-on projects (under planning).
2. Details of the project to be planned are explored so that PoC activities become specific.

(2) Results and Challenges of Open Innovation

The PoC Planning Workshop was held on July 23 and 25. The following is an excerpt from a press release of the event.

From 23 companies, the top six companies were invited to the PoC Planning Workshop in light of the selection criteria in the preceding paragraph.

In the first day, we introduced the three tools of Service Blueprint, Technology Blueprint, and Javelin Board to the participating companies in the planning of PoC activities.

On the second day, five out of the six companies presented proposals for PoC. In addition, accelerator Growth Africa, fund management Pearl Capital Partners, and government agency Ministry of STI (who is responsible for sourcing to the Ministry's Innovation Fund) attended the presentation on the PoC project.

Table 5-15 Proposed PoC Plans by Participating Companies (Uganda)

	Company Name	Proposed Business and PoC Content
1.	Company A	Credit sales support services for farmers through cooperatives. Vendors sell agricultural materials on credit and recover them from farmers' sales of harvested crops. Cooperatives pool credit, determine whether it can be sold to farmers, issue electronic tickets for purchase, and pay the traders after the purchase of agricultural materials.
2.	Company B	Credit rating and loan disbursement services for farmers based on sales and purchases of agricultural materials and crops at the marketplace.
3.	Company C	A service in which agricultural materials and harvested crops are purchased and sold through a combination of loans using a digital platform, including lending of agricultural equipment and farming guidance, through an association.
4.	Company D	A service that uses digital platforms to support farming training and VSLA operations, and to trade agricultural materials and harvest crops in the future through associations.
5.	Company E	Microfinance receivables lending support service. Banks finance crop

	Company Name	Proposed Business and PoC Content
		buyers and operate transaction platforms for farmers to recover cash quickly.
6.	Company F	We offer digital platforms for transactions, payments and factoring between farmers and associations, and between cooperatives and crop buyers. The proposing firm itself manages the fund. (Absence on Presentation Day)

Source: JICA Survey Team

Although the degree of understanding of each tool varied among participants, improvements were seen in the content of the project, such as prioritization from the comprehensive service area of the project plan submitted beforehand by deepening the content of the project using the tool.

5.5 Outline of Implementation of Open Innovation in Rwanda

5.5.1 Potential Application of Disruptive Digital Technologies and Deep- Dive into Challenges

(1) Narrowing Down Application Areas of Disruptive Digital Technologies

Based on the list of candidate projects for the target countries described in Chapter 2, the issues were narrowed down while considering the Rwandan background. First of all, we considered the need to clearly provide the benefits to the participants of the event (= JICA's ability to follow up in some form) and the fact that the outputs are likely to develop into future JICA projects. Assuming that JICA can provide a relatively flexible follow-up response in collaboration with individual experts dispatched and technical professionals (directly managed), JICA, in consultation with the office of JICA in Rwanda, narrowed down the proposed issues for each country to four proposals.

Table 5-16 Potential Areas for Application

Area	Potential projects
Nutrition (ODA loan) (planned)	• Application to stakeholder training, advocacy, marketing, etc. • Utilization of digital technology in auxiliary technical professionals scheduled for the future
Smallholder Market-Oriented Agriculture Project (SMAP) under the Program for Promoting Value-Added Agriculture and Business	• Utilization of digital technologies in post-harvest and marketing
Coffee Value Chain Project (CUP) under the Program for Promoting Value-Added Agriculture and Business	• Use of digital technologies in marketing and other areas • Ongoing but Possible Components
"Science and Technology Education and Training Program"	• Possibility of setting up a framework for this investigation in an ongoing trial activity as a collaborative activity
ICT Innovation Ecosystem Enhancement Project	

Source: JICA Survey Team

Next, in the first field survey, it was conducted to narrow down the fields to either nutrition or agriculture. As a result, the agricultural sector was selected from the following perspectives.

1. The involvement of government agencies is thought to be important not to end the OI event as a single event, but to ensure that the human networks and outputs created there are continuously utilized. The results of interviews with the RISA (Rwanda Information Society Authority

Innovation) and the ICT Chamber also underscored the importance of selecting areas that are aligned with the policy. The agriculture sector is one of the seven priority areas of the government's SMART Rwanda Master Plan, and MINAGRI (Ministry of Agriculture and Animal Resources) has announced a clear strategy "National ICT 4RAg Start (2016-2020)" as an ICT utilization policy.

2. Two technical professionals are under way: the Coffee Value Chain Strengthening Project and the Smallholder Farmer Market-Oriented Agriculture Project, which can present specific challenges and have already established a wide human network.
3. One of the activities of the ICT Innovation Ecosystem Enhancement Project, the 250 Startups Program, covers the agricultural sector, and this project could potentially be linked to the project.
4. In Kenya and Uganda, too, the agricultural sector is likely to be the target of consideration, so it is likely to be easier to deepen the analysis by comparing them.
5. In addition to the fact that Japanese companies (from SUs to large companies) have confirmed multiple companies interested in entering the agricultural sector (Rakuten, Ricoh, etc.), there are also many Agri-tech service providers (FreshBox, Agrigo, KizaAgriLab, etc.) and agricultural companies (SINA GERARD, Bloomhills Rwanda) that can provide specific issues, which are highly likely to be matched.

[Comparison with the Nutrition Sector]

In Rwanda, a yen loan project for nutrition improvement will start (disbursement is expected to start within FY2020). JICA is also one of the themes of the idea song in Fukuoka City on March 18, 2019, and a certain number of stakeholders on the Japanese side, including Kyushu University, has conducted specific research. However, the National ICT 4RAg Strategy (2016-2020) did not report nutrition improvements. In the health sector, although the importance of such policies as "FOURTH HEALTH SECTOR STRATEGIC PLAN (July 2018-June 2024)," "NATIONAL FND AND NUTRITION POLICY (2013-2018)," and "NATIONAL SOCIAL AND BEHAVIOUR CHANGE COMMUNICATION STRATEGY FOR INTEGRATED ECD, NUTRITION AND WASH (2018-2024)" is clearly stated, there are no clear policy documents regarding the use of ICT for nutrition improvements. In addition, it was decided that the OI events in this survey should not be included in the scope of the study, since the agricultural sector is not as important in terms of whether specific issues can be presented or whether there is a wide network of human resources.

Table 5-17 Comparison of the Agriculture and Nutrition Sectors (Rwanda)

Evaluation tool	Agriculture	Nutrition
Priority Areas of Japan's Country Assistance Policy and Rolling Plans	○ Developing a Value-Added Agriculture and Business Promotion Program (Enhancement Program) as a priority area	△ Agriculture is the focus but not the health.
Rwandan government's policies and measures from the standpoint of ICT	○ One of the seven priority areas of the SMART Rwanda Master Plan is the presence of the National ICT4RAg Start (2016-2020).	× One of the seven focused areas of the SMART Rwanda Master Plan, but there are no ICT-specific strategic documents

utilization		
Possibility of presenting specific issues as much as possible	○ Information from technical professionals (CUP and SMAP) and survey results on issues and solutions within ICT technical professionals are available. It is also possible that Bloomhills Rwanda, a Japanese-run company, provided information.	△ It is possible for JICA to provide explanatory materials for the ideas held in Fukuoka City and to cooperate with Kyushu University in providing information.
Personal network	○ The human network constructed by the on-going technical professionals (CUP, SMAP) can be utilized.	△ Cooperation from CP for ODA loan projects is possible, but JICA projects are not currently being implemented.
Possibility of specific follow-up	○ ・ Adoption of ideas within the CUP or by those involved in the CUP (agricultural cooperatives) ・ Adoption of ideas by the Ministry of Agriculture and Animals ・ Adoption of ideas by Bloomhills Rwanda ・ Adoption of the "Pilot Project Support Program in Rwanda" (¥2 million) by ICT technical experts	○ ・ Utilization of Ideas in Professional Engineers Incidental to ODA Loans ・ Adoption of the "Pilot Project Support Program in Rwanda" (¥2 million) by ICT technical experts

Source: JICA Survey Team

(2) Key Comments from Interviews

Based on the results of the interviews with relevant parties and organizations in the first field survey, information on the application of digital technology and the selection of the agriculture sector as described above is described below.

- JICA Rwanda Office
  - It is important to grasp the problems in the field. This survey should identify who should be invited and discussed, and who should be involved in the activities other than the start-up. It's only when people who can look at the whole picture come together that new ideas come up.
  - Open innovation events exit from the ODA and private sector partnership schemes. The key is to look for a Japanese Partner that promotes innovation. Building a network with Japanese stakeholders is beneficial to local stakeholders as well
  - Since the agriculture sector was the target area for the second batch of 250 start up, the issues and potential solutions in the agriculture sector have already been investigated, and the contents were explained to SU at the 250 start up second batch recruitment meeting.

- Technical experts in the ICT Innovation Ecosystem Enhancement Project
  - Since field-based SUs do not understand the issues in the field, methods of presenting issues are important. Other OI events may combine field visits within the program.
  - Local SU capacity is not high enough to produce high-quality output in one-day ideas only.

- It is also possible to support SUs who have made good ideas at this OI event with a technical professional of 250 startups, provided there is an MVP as of June.
- If local companies can match up with Japanese companies through this OI event, it is possible to apply for the "pilot project support program in Rwanda" (up to 2 million yen in funding support) of this professional (if the agreement can be obtained from ICT Chamber, RISA, etc., it can be considered to be the second winner of the local OI).
- Once the C/P ICT Chamber and RISA have been approved, it is possible to allow SUs who have made excellent ideas at the OI event in this survey to proceed to the 250 Start-up review process.

➢ Technical professional coffee value chain enhancement project (CUP)

- Some coffee value chain officials are interested in using ICT, and RCCF (Rwanda Coffee Cooperatives Federation: 1/3 of 300 washing stations nationwide are operated by RCCF) is active in new initiatives.
- Technoserve Rwanda, which provides coffee projects and Agri-tech solutions, has concluded a MOU. Technoserve Rwanda is a U.S. NGO that provides IT-based services for coffee farmers. Specifically, the company provides a web platform for loans. (Washing Station operates a deficit, but provides loans using the status of transactions as credit information. The company also collects accounting information, quality and quantity information.) About 50 agricultural cooperatives joined. With support from the Master Card Foundation, we are considering privatization this year.
- As part of the Platform's activities, there are opportunities to gather people concerned and discuss issues every few months. Up to now, issues such as varieties and sediment discharge have been discussed. Participants included RCCF (Rwanda Coffee Cooperatives Federation), CEPAR (Coffee Exporters Processors Association of Rwanda), RYAF (Rwanda Youth in Agribusiness Forum), NGOs, researchers, and coffee bean exporters.
- Major issues in the coffee field are as follows.
  - Priority: Fry odor
  - Second priority: Selection of red, ripe fruit with high sugar content at harvest
  - Priority Issue 3: The coffee bean identification process extends over a number of stages. The sorting machine developed by the rice milling machine manufacturer Satake is purchased by NAEB (National Agricultural Export Development Board). This is an area where identification using big data and AI is possible, which may also identify potato beans.
  - The fourth priority issue is soil fertility. Chronic nutrient deficiencies.
- We are looking for a new material that can be provided through the Platform activities as a project, and we would like to positively consider cooperation with this survey. In the past, we introduced AICOS operation and management apps for agricultural cooperatives, which are 250 Startups graduate startups, as part of the Platform activities. There is a case in which some agricultural cooperatives actually introduced AICOS.

- It is also possible to cooperate with OI events as a provider of issues. In addition to the expert's own participation, it is possible to involve a certain number of stakeholders, including pilot farm visits, participation of Platform members (RCCF, CEPAR and RYAF), and farmers who are actually using satellite-based weather information services (Weather Safe in the United Kingdom).

➢ Technical Pro Smallholder Market-Oriented Agriculture Project (SMAP)

- There are no basic data (rainfall, weather data) to use technology in the first place. The rate of electrification is said to be 50%, but there is not enough stable power supply in rural areas.
- MINAGRI-led E-SOKO services have been stayed at some point. MINAGRI seemed to have provided and entered the relevant data into E-SOKO, but it is speculated that it stopped because of the inability to assign personnel and the inability to make a budget.
- MINAGRI has launched a service that allows users to place orders for fertilizer and seeds on their mobile phones (Smart Nkunganire, which is a system where the government pays for the use of the Smart Nkunganire service) but does not continue to do so after the initial campaign.
- Local views on ICT use are too optimistic. There is no data available and users do not have sufficient skills and knowledge.
- The OI theme setting requires a more narrowly defined theme because the agricultural field is too broad to be heard.
- Even if it focuses on farmers, it does not make money in a business model in which farmers collect fees from farmers. The downstream of the agricultural value chain can be targeted to the mass (consumers and traders).

➢ RISA

- Key stakeholders in Rwandan innovation are as follows:
  - Policy: Ministry of ICT
  - Implementation: RISA, ICT Chamber
  - Academia: CMU, AIMS (big data, AI, etc), African Leadership University, University of Rwanda IoT Center of Excellence, Big Data Center of Excellence, etc. (12 Centers of Excellences in Rwanda (IoT, Bigdata))
- The RISA is reforming its procurement system in order to accept proposals from SUs in government procurement. Instead of conventional E-Procurement, it accepts proposals, narrows down to about 20 proposals, and makes a boot camp. It actually meets local challenges, refines solutions, and narrows them down to three. The top three companies conduct demonstration experiments. The demonstration will be conducted for about six months and the government will pay 500,000 RWF. So far, three PoCs have been implemented. Approximately 3 months from tender to PoC.
- The theme (for the OI event in this survey) should be in line with government policy. Otherwise, it would be difficult for the government to follow up (without a budget).

- Experience with many OI events suggests that Ideas usually spend a few days. It's hard to get valuable outputs at the idea song in a day. First, it is important to carefully analyze the issues and specify the issues as much as possible. There is a tendency to propose specific solutions for specific issues.
- OI event concept notes can help advocate and talk to the required participants. More detailed arrangements may be requested from the ICT Chamber.

➢ ICT Chamber

- The utilization of ICT requires three points: technology, people, and processes. If you focus only on technology, you fail. Collaboration with the private sector has been relatively successful.
- A multi- disciplinary approach is required to solve a large problem. Involvement of technology experts, process experts, and sector experts is important. Issues should also be clarified.
- 250 Startups focuses on education and agricultural start-ups in this batch. A high quality SU at the OI Event can be included in the selection process of 250 Startups.
- As an ICT Chamber, it is not a problem to participate in the OI Event as a feedback.

➢ NIRDA (National Industrial Research and Development Agency)

- NIRDA is under the Ministry of Commerce and Trade. Strong relationship with the Ministry of ICT. NIRDA's mission is to promote industries by introducing and applying technology to each industry.
- The government has prepared a Proof of Concept Hub report. The Rwandan market is small, but it has a good governance environment, a good business environment and a low level of corruption. Therefore, it is highly valuable to use it as a place of PoC.

➢ MINAGRI

- E-SOKO, Farmer's Management and Information Systems (a database that collects and manages age, sex, crop, land information, etc. for all farmers) are already being implemented in the National ICT 4RAgr Strategy, while Smart Nkunganile (farmers can place orders for fertilizer, etc. and receive subsidies) is being implemented in the bidding process.
- The areas in which the use of digital technology is particularly needed are as follows:
  - Pest and Diseases (especially coffee and tea)
  - Data collection by drawing
  - RAB (Rwanda Agricultural Board) requests soil mapping solutions
  - Agricultural insurance, loans
  - Monitoring the Milk Collection Center (automatic report entry and collection)
  - We also want to collect private land information so that foreign investors can access it. Manage the Smart Agreement Information Center (E-SOKO, Agricultural Land Information System).

- Common Data Warehouse (a government simplification system that enables governments to obtain all information)

・ When considering a solution, it is important to first understand the reality of the farmer.

➢ RAB (Rwanda Agriculture Board)

・ Due to budget and human resources issues, the implementation of ICT policies is still around 50%. How farmers use ICT is a challenge.

・ Preparing for the development of the Rwanda Animal Resource Management System, which compiles domestic animal information and other data, bidding will be carried out in the future. The system for asset management is also scheduled to be developed.

➢ FAO

・ National ICT 4AG Policy and Strategy Consultant (formerly MINAGRI and responsible for ICT 4Ag) is in charge of the area of digital technology utilization.

・ FAO is currently implementing the "Agricultural Services and Digital Inclusion in Africa" which focuses on Digital Innovation. The target countries are Rwanda and Senegal.

- http://www.fao.org/in-action/africa-digital-services-portfolio/en
-

・ Technologically, we are focusing on the following four points, and plan to implement five measures including measures against failure armyworm.

- Cure and Feed your livestock
- e-Nutrifood
- Weather and Crop calendar
- AgriMarketplace

・ In 2018, FAO will hold two ICT Chamber and Hackason meetings on Italy's case studies.

・ The Dutch company Technical Centre for Agricultural and Rural Cooperation (CTA) and Huckason in conjunction with kLab have also been implemented.

➢ Start-up and other private companies

・ After the OI event, what specifically does JICA commit? End goals? Otherwise, some participants will drop by July.

・ Previously, we had discussions with two Japanese companies, but there were no specific exits, and finally it was impossible to obtain funding. Japanese companies do not have Strong wills to collaborate with Rwandan companies. There are elements of aid and mercy that do not succeed.

・ Take another year is a waste of time (after explaining the possibility of applying in cooperation with a Japanese company for the JICA scheme).

・ SU is used to the event. JICA should map its resources and values to clearly demonstrate the advantages of working with JICA.

- (Intention to participate in the OI Event) is being undertaken not only for money but also for the future of agriculture in Rwanda. Networking with stakeholders is a valuable opportunity and we are willing to participate.
- Farmers have only feature phones (USSD (SMS) only).
- Only 35% of the Rwandan population speak English. Local language services are required for farmers.
- E-SOKO was a mere agent model for asking about market prices. The user will not use the information unless it is updated in a timely manner. In other words, the lack of user experience is one of the reasons for the failure.
- Smart Nkunganire (a service launched by MINAGRI over the past two years) allows for orders for fertilizers and seeds on a mobile phone. The government pays 50% of the cost if it is used. However, local fertilizer and seed vendors prefer face-to-face cash trading rather than waiting for a refund from the government, so there are cases where they do not approve of this service, which is a barrier to its dissemination.
- The need for a cold chain is high. KUAWE Logistics, a three-to four-year SU who is a U.S. CEO, used to be a truck Uber, but now it is working on a cold chain.

➢ Incubator/accelerator/coworking space/investor

- Ideas should be narrowed down. Even workshops where only issues are discovered take one full day to reach government human resources. One-day Idethon is unprecedented and requires at least three days.
- As for ICT4D, too early to judge is sought, but first of all, donors are required to have local SUs understand the reality of the issue.
- In Rwanda, the number of civil engineers increased as infrastructure was developed, but software engineers still have limited opportunities to test their capabilities.
- It is important to assure the winner of the Hackathon that it can be carried out without fail and to support the implementation. If there is no clear benefit to the winner, the participant is discouraged.

(3) Deep Cultivation of Implementation Issue

1) Obstacles to Implementation of Destructive Technologies

In the agriculture sector, there are already many solutions using digital technology, and multiple efforts are being made in Rwanda. However, MINAGRI's introduction of E-SOKO has not necessarily been successful. In addition, there are cases in which the ICT for Agriculture initiative, which is discussed in academic conferences and news, is overvalued. For example, we visited World Vision and AgriProFocus, which operate E-hinga, which were announced at the ICT4D Conference in 2017. Although these visits are beneficial and informative for farmers, they were all funded by donor funds, and we had no choice but to question the sustainability. Based on the results of interviews with ICT Chember, RISA, agricultural SU,

etc., referring to the Onion-ring Model for identifying issues in the ICT 4D sector, the following issues are considered to exist when introducing digital technologies in the agricultural sector in Rwanda.[27]

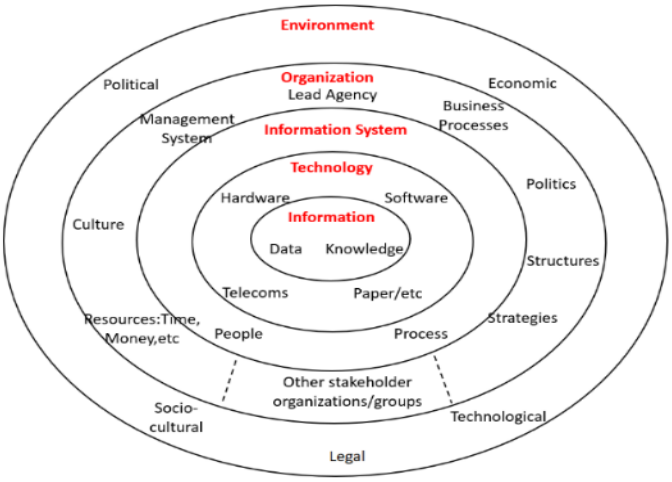


Figure 5-11 Onion- Ring Model

Source: Heeks 2018

- Data: Agricultural productivity requires a large amount of data on rainfall, climate, crop conditions, and many other solutions that use data, such as AI-based Big Data analysis. However, since smartphones are not widely used among farmers, there is no data that can be effectively used at present.
- Knowledge: Solution providers lack knowledge of agriculture. Many SUs in Kigali are urban born and live in urban areas, and do not know the farming scene.
- Hardware: The penetration rate of smartphones in rural areas is around 10%, making it difficult to disseminate services using apps (cheap Rwanda smartphones are scheduled to be released by the MARA group in the future).
- Infrastructure: Although the penetration rate of mobile phone networks is said to be more than 90%, some JICA experts say that there are areas where mobile phones cannot be used in rural areas.
- Connectivity: The penetration rate of mobile phone networks and the Internet alone covers rural areas, but in reality, there is an issue of not being able to pay for smartphones and not being able to use the Internet due to lack of smartphones. Although Internet coverage has spread almost nationwide, there are some groups who cannot only use SMS.
- Language: Many people in rural areas cannot speak English, and local languages are essential.
- Acceptance: Without a certain level of awareness, farmers will not be able to access new services.
- Regulation: There are areas where new technology regulations such as IoT and handling of personal information data (to what extent they can be stored on the cloud) are inadequate.

[27] Source: Richard Heeks (2017), Information Communication Technology for Development (ICT 4D)

- Resources: Although there are many services such as E-SOKO that distribute market prices, it is not possible to sustain the services without sufficient resources (human resources and funds) because it requires human resources to update the database.

While the above issues were confirmed in the field survey, it was also possible to confirm Rwanda's unique strengths in providing services that even farmers with low skills can use, even if they have low ICT skills and design, and the abundance of human resources who can develop such software. It was also possible to confirm the case of Smart Nkungamire, a project in which MINAGRI and RAB collaborated with local company BK TecHouse Ltd. The process by which the government transfers subsidies was digitized, with one million subscribers.

2) Countermeasures for Introducing Disruptive Digital Technologies

As a countermeasure against the above-mentioned problems, first of all, the fundamental concept is to take an approach that focuses on the issues rather than digital technology. Second, in addition to technology, it is important to consider solutions from a larger perspective, such as the users who use them and the processes they use.

One of the practical measures based on this concept is "to understand the issues as concretely as possible." If we can clarify the details of the issues, such as where and where, who is the user, and what specific problems are to be solved, it will be possible to avoid thinking about non-realistic solutions to the problems that the solution provider might imagine as a preconceived idea. For this reason, it is necessary to actually visit the site and hold hearings with those who can speak on behalf of farmers and farmers who are facing problems.

The second measure is to incorporate the views of stakeholders with different and wide-ranging perspectives. Solutions providers who sell digital technologies tend to take the approach of solving all the problems with digital technology or searching for solutions with digital technology, such as "having a hammer makes everything look like a nail." However, many of the development challenges cannot be solved simply by a single solution, and many cannot be solved without implementing multiple measures in a variety of areas, including policies, institutions, and culture. In order to avoid such a limited perspective, it is necessary to have a system that incorporates the opinions of stakeholders with different perspectives, such as government officials, research institutes such as universities, and agricultural cooperatives.

Possibility of Introducing Disruptive Digital Technologies in the Agriculture Sector

MINAGRI has formulated the National ICT 4RAg Strategy (2016-2020) as a policy for the utilization of digital technology in the agricultural sector. The strategy is based on three points: ① modernization of agriculture; ② emphasis on agricultural and rural development; and ③ monitoring and evaluation. This strategy is consistent with both the Rwandan National Development Strategy and the Agricultural Sector Development Policy, including VISION2020, EDPRSII, the 7-Year Government Program, the Strategic Plan for Agricultural Transformation Phase III (SPATIII), and the SMART Rwanda Master Plan.

Therefore, considering the use of digital technology in accordance with this strategy will lead to further government involvement and follow-up. This strategy is also consistent with the objectives of this survey since it focuses on the provision of farmer-centered solutions and the strengthening of public-private partnerships, rather than the need for digital technology. The strategy begins the agricultural value chain in phases and organizes the information needed for each phase.

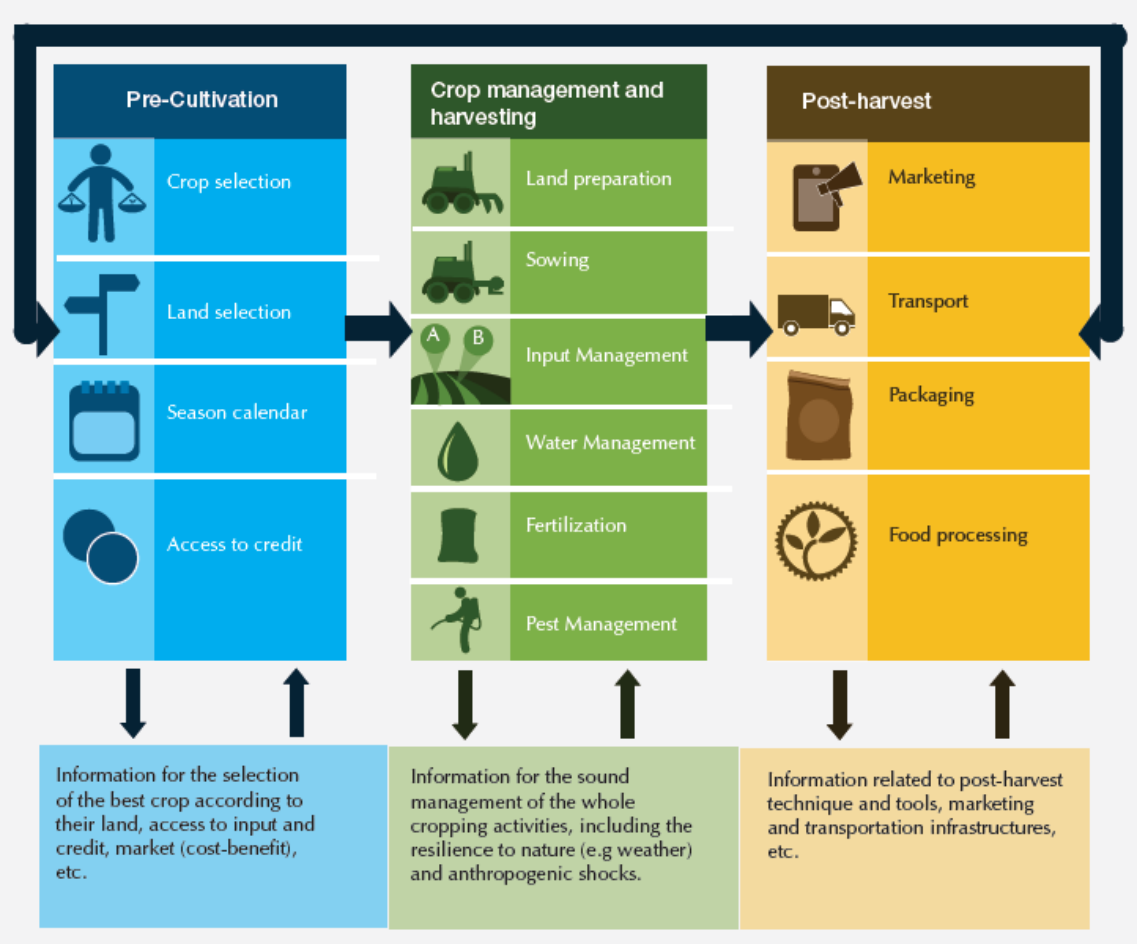


Figure 5-12 Information Required in Agriculture Lifecycle (Rwanda)

Source: MINAGRI

Next, digital solutions to provide the required information for each phase are illustrated in the diagram below.

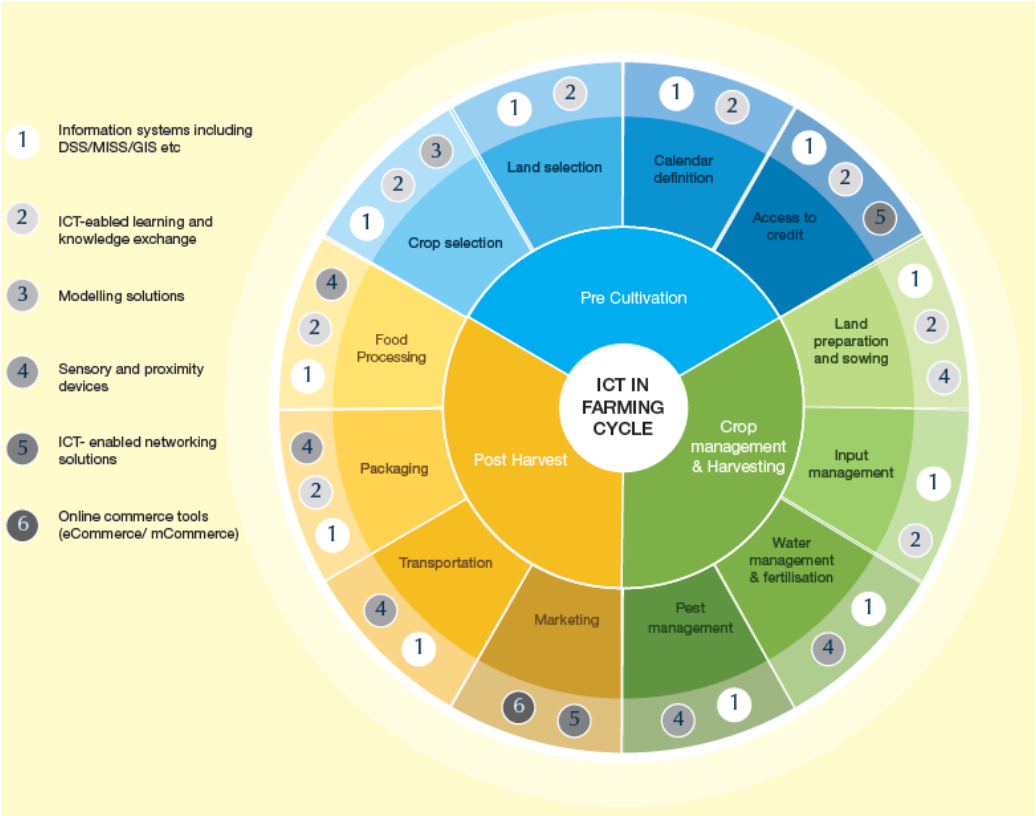


Figure 5-13 Information and Services Requirements for Different Stages of Lifecycle (Rwanda)

Source: MINAGRI

As stated in the aforementioned "Countermeasures to the Challenges of Introducing Disruptive Digital Technologies" in line with the direction of introduction of digital technologies suggested by the Strategy, it is considered possible to introduce appropriate digital technologies by setting specific issues as much as possible and considering solutions from a broad perspective. Taking into account this point of view and the results of discussions with stakeholders in the first survey, we decided that it would be optimal to consider the possibility of utilizing digital technology in collaboration with the Coffee Value Chain Enhancement Project (CUP), which can present concrete issues in open innovation.

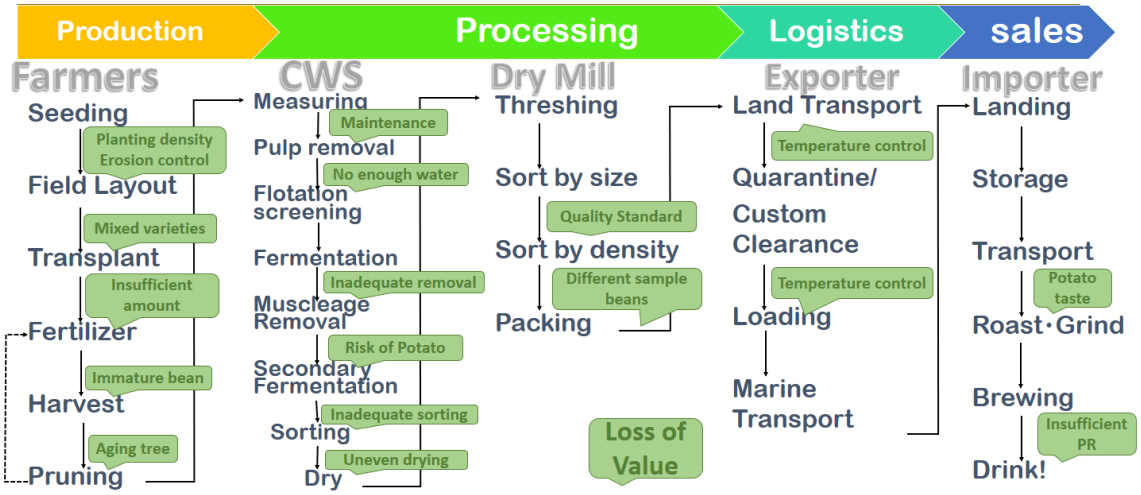


Figure 5-14 Challenges in Each Process of the Coffee Value Chain (Rwanda)

Source: CUP

5.5.2 The 1st Edition Open Innovation

(1) Implementation Policy

The open innovation challenge was set in the agriculture sector as there were two ongoing projects in the agriculture sector, namely the Project for Strengthening Coffee Value Chain in Rwanda and Smallholder market Oriented Agriculture Project, and specific challenges and need for ICT solutions could be posed. Also, it was expected that in case there were great ideas worth trial, site for PoC could be provided through the ongoing projects. The following challenges were set:

1. How can we improve knowledge of farmers?
2. How can we improve financial access of farmers?
3. How can we decrease post harvest loss?
4. How can we add value to agricultural products?

To stimulate discussion, various stakeholders such as startups, experts of agriculture and ICT, those actually facing the challenges such as cooperatives, were invited and mixed into groups.

Also, as the sector for next batch 250 Startups was set as agriculture and inclusion into the program's fast-track selection process was also expected for appropriate startups, members from 250 Startups were also be invited.

(2) Open Innovation Outline and Preparation

A website for PR and registration was established. The excerpt of the page is as follows.

The 1st Edition: Ideation Session

ABOUT

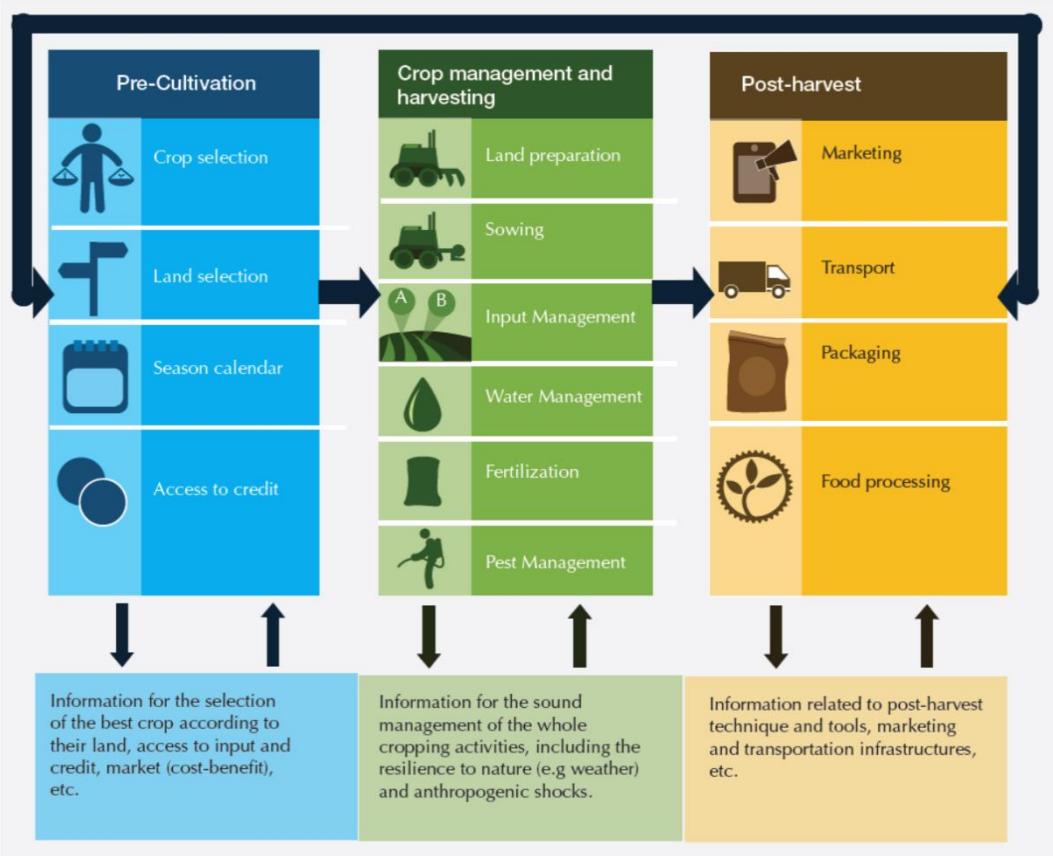
"Rwanda Open Innovation Challenge" powered by JICA invites talented entrepreneurs, developers, etc that can change business-as-usual and bring more efficient and effective solution to the challenges present in the agricultural sector in Rwanda.

In the 1st Edition event which will take place on May 22nd 2019, an overview of the challenges in the agriculture sector in Rwanda will be presented by experts. Afterwards, there will be an intensive ideation session utilizing ideation frameworks to deep dive into the challenge and ideate innovative solutions.

Great ideas with potential impact will have a chance for a Proof of Concept project funded by JICA, followed by possible scale-up.

TARGET SECTOR

ICT innovation is a key element to spur growth in agriculture sector. In fact, the National ICT4RAg strategy (2016-2020) illustrates overall information and services requirements for different stages of crop lifecycle to consider how to utilize the power of ICT in agriculture sector as below.



Source: ICT4RAg strategy (2016-2020)

THE CHALLENGE

Startups, corporates, etc. with innovative digital solutions to the following challenges are invited.

1 How can we improve knowledge and skills of farmers and improve productivity?
2 How can we improve access of farmers to necessary supplies and financial services?
3 How can we decrease post-harvest loss?
4 How can we add value to agricultural products?

BENEFITS FOR PARTICIPANTS

1 Great ideas get a chance for a funded Proof of Concept project by JICA
2 Chance to learn ideation methods
3 Chance to know the challenges, needs and opportunities in agriculture sector
4 Chance for networking and brushing up your ideas with potential partners
5 Chance for enrollment into the selection process for 250 startups program ※
6 Possible chance to network with Japanese corporates

※ Only startups that are registered within 3 years and with working prototype are eligible

PROGRAM

<DATE>

May 22nd, Wednesday, 2019 8:30-15:00

<VENUE>

Onomo Hotel, Kigali

<TARGET PARTICIPANTS and ELIGIBILITY>

- Startups, entrepreneurs, etc that are interested in launching a business or have already launched a business in the above challenge areas.
- Government officials, development partners, NGOs, private corporates that are interested in collaborating with startups for the above challenges
- Stakeholders related to JICA's projects in agriculture sector (cooperatives, etc.)

<CAPACITY>

- 25 persons (In case the number of applications exceed the capacity, selection will be conducted on the viewpoint of participants' diversity)

<TIME TABLE>

※Please note that program contents may change without notice

■ Reception	8:30-9:00
■ Opening and ice break	9:00-9:10
■ Input of the Challenge	9:10-9:40
■ Explanation of ideation methods	9:40-10:00
■ Ideation (Diverge)	10:00-10:50
■ Coffee Break	10:50-11:05
■ Value Proposition Canvas (Converge)	11:05-12:05
■ Javelin Board (Hypothesis Verification)	12:05-12:55
■ Networking Lunch	12:55-13:55
■ Presentation	13:55-14:55
■ Closing	14:55-15:00

(3) Implementation Result

1) Applicants

There were 36 applicants, and 20 was selected mainly screened on whether a solution incorporating ICT technology was considered in the application form.

2) Grouping

5 groups were formed. Participants with similar interest was placed into the same group while considering diversity. Challenge providers were also placed in each groups to give feedback and answer questions from the participants.

3) Evaluation

Presentation was conducted in 2 groups, and the ideas were evaluated by the following criteria.

Table 5-18 Selection Criteria (Rwanda)

Criteria	Rating	Description
Validity	30	Does the solution match the needs of agriculture sector or needs of coffee project?
		Is priority of the solution within agriculture sector or within coffee project high?
Competitive Advantage	30	Have innovative and unique solution(s) on the challenge(s) by using ICT
Impact	20	Argue well how the proposed solution(s) serves to contribute to addressing the challenge(s) and needs and wants of the customer
Viability	10	Have the potential market (customer) to sell
Organization	10	Can we expect a strong team to implement the project?

Source: JICA Survey Team

4) Presented Ideas

A total of 17 ideas were presented. Ideas with high evaluation are as follows. Many startups worked on their current solutions/services in the workshop, while there was a startup that tried to develop a new idea based on the challenges proposed in the coffee value chain.

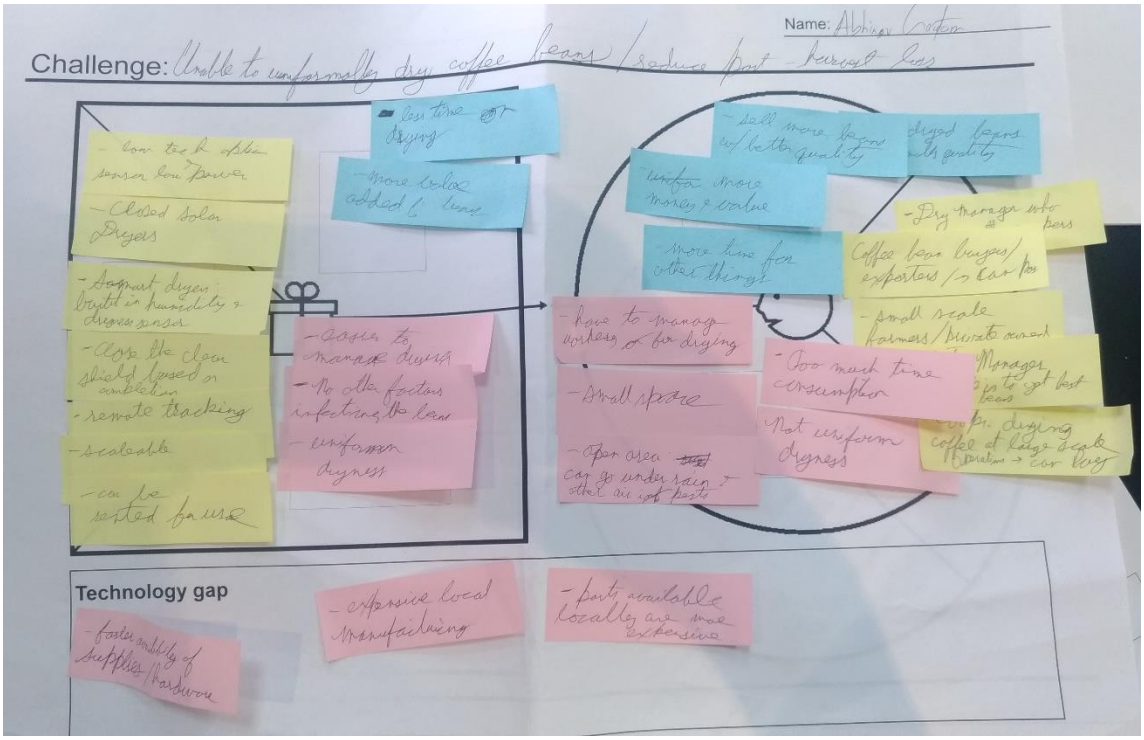
Table 5-19 Presented Ideas (Rwanda)

	Challenge	Proposed Idea
1.	How can we improve knowledge and skills of farmers and improve productivity?	-【Rwaponics】Aquaponic solution targeting hotels in cities, etc.
2.	How can we improve access of farmers to necessary supplies and financial services?	-【FarmPal】Digital platform matching farmers and investors (application). Provide technical information, necessary supplies and equipment to farmers to improve productivity. -【Spiderbit】E-commerce platform of agriculture

	Challenge	Proposed Idea
		produce, matching farmers and buyers. Also match suppliers of fertilizers and seeds to farmers and provide delivery service
3.	How can we decrease post-harvest loss?	-【FreshBox】Solar power dryer to dry coffee beans more efficiently
4.	How can we add value to agricultural products?	-【INTER CONNECT POINT】Develops IoT sensor that monitors humidity, temperature, CO2, hydrogen and oxygen and AI image analytics camera to manage the quality of tea processing in tea factories.

Source: JICA Survey Team

Example of a Value Proposition Canvas (FreshBox)



Of the five startups that received high markets, four startups, namely Rwaponics, Spiderbit, INTER CONNECT POINT, and FarmPal, were selected by the judges of 250 Startups to be incorporated into the fast-track selection of the 250 Startups program. The information on the four companies will be shared with the 250 Startups Program for further processes.

Interest was shown by the CUP members on the idea of FreshBox. Next steps on site visit by Freshbox to the coffee farms and drying facilities were discussed with CUP members, however, after discussion with Freshbox after the event, it was confirmed that not enough resources can be allocated for this project idea as they need to focus on their current business. Also, CUP members showed interest in the potential application of INTER CONNECT POINT's AI image recognition technology to measuring the sweetness of coffee beans. The acceleration of the idea including PoC is expected to be supported by the 250 Startups Program. Therefore, there was no company to proceed to the PoC workshop in July.

The following result of the event will be announced to the participants.

- Companies awarded chance to enroll in the fast-track selection process for 250 Startups Program: Rwaponics, FarmPal, Spiderbit, INTER CONNECT POINT
- Selected participants for the PoC planning workshop in July: None

5) Questionnaire Result

The participants' satisfaction was generally high. Out of 13 companies that submitted the questionnaire, 10 (77%) responded "very satisfied" and 3 responded "moderate satisfied" (23%). In particular, there were many positive comments that they gained a lot of insights and that it was a great opportunity to network with entrepreneurs and other stakeholders. Out of 10 members from JICA, 250 Startups, private companies (observers), RISA, and cooperatives, 6 (60%) responded "very satisfied", 3 (30%) responded "moderate satisfied", and 1 (10%) “slightly satisfied”. The participant that responded “slightly satisfied” was due to the lack of translation from English to Kinyarwanda. There were positive comments that they were able to know many ideas and that they gained a lot of insights as well. As for the question, “Do you think this Open Innovation Challenge contributes to making social impact?” and “Do you think this Open Innovation Challenge is useful for your business or for you to develop your business?”, all participants (100%) responded yes.

5.6 Outline of Implementation of Open Innovation in Japan

5.6.1 Open Innovation in Tokyo

(1) Implementation Policy

- The aim of the event was set to 1) improving awareness of the challenges and to create good quality ideas in order to increase new business development by private companies in Africa, and to 2) increasing stakeholders interested in business in Africa (community development).
- As it was assumed that there will be many participants from private companies and that it would be difficult to follow-up ideas that came out from group work, the ideation workshop was designed in such a way that group discussion will be conducted based on individual work.
- Taking into account the difference in knowledge of the participants, input from macro information, specific challenges to actual business experience in Africa will be conducted so that challenges and business opportunities can be well understood.
- With an aim of developing community interested in African business, networking will be conducted.
- As it is assumed that there will be many participants from corporates, the event will be designed to be completed in half a day (up to five hours).

(2) Open Innovation Outline and Preparation

A website for PR and registration was established. The excerpt of the page is as follows.

Africa Open Innovation Challenge in Tokyo powered by JICA

ABOUT

"Africa Open Innovation Challenge" powered by JICA invites talented entrepreneurs, developers, etc that can change business-as-usual and bring more efficient and effective solution to the challenges present in Africa.

In this event, an overview of the social challenges in Kenya, Rwanda, Uganda and Nigeria (details are explained below) will be presented, followed by an ideation session utilizing ideation frameworks to deep dive into the challenge and ideate innovative solutions.

Great ideas with potential impact will have a chance for a Proof of Concept project funded by JICA followed by possible scale-up and support for matching with local stakeholders.

BENEFITS FOR PARTICIPANTS

1 Chance to know the challenges, needs and opportunities in the agriculture sector in Kenya, Uganda, Rwanda and the water sector in Nigeria
2 Great ideas get a chance for support by JICA
3 Possible support for matching with local stakeholders after the event (※opportunity to participate in the upcoming event in July in the four countries)
4 Great ideas get a chance for presentation in TICAD VII in August

THE CHALLENGE

＜Kenya: Agriculture＞

1 How can we spread out horticulture crops among small-scale farmers?
2 How can we stimulate SME dealers to increase the supply of agric-input materials (seed, fertilizer, pesticides, etc.) and the purchase of harvest crops of small-scale farmers?
3 How can we create domestic supply chain for the agro-processing industry and to expand the value-added agriculture?

＜Uganda: Agriculture＞

4 How can we accelerate the bi-directional communication among farmers and extension workers in order to improve the productivity and revenue of farmers in the rural area?
5 How can we increase the supply and the variety of agric-input materials (seed, fertilizer, pesticides, etc.) in order to get more planting options of farmers in the rural area?
6 How can we enforce the function of farmers' cooperatives (internal financing, group purchasing/selling, etc.) in order to expand the trade/transaction of agric-materials and harvest crops?

<Rwanda: Agriculture>

7 How can we improve knowledge and skills of farmers and improve productivity?
8 How can we improve access of farmers to necessary supplies and financial services?
9 How can we decrease post-harvest loss?
10 How can we add value to agricultural products?

＜Nigeria: Water＞

1 How can FCTWB improve its metering and billing process?※
2 How can we improve the ease of payment for customers? ※
3 How can FCTWB improve its water supply service? Is there a new business model which FCTWB can adopt to increase revenue?

※If you are interested in these challenges, please contact the secretariat as explanation will be conducted separately from the event.

PROGRAM

<DATE>

June 11th (Tue), 2019 14:00-20:00

<VENUE>

SENQ Kasumigaseki

<TARGET PARTICIPANTS and ELIGIBILITY>

・ Companies and individuals interested in solving the above challenges utilizing digital technology

<TIME TABLE>

※Please note that program contents may change without notice

■ Reception	13:30-14:00
■ Opening and ice break	14:00-14:10
■ Overview of Africa	14:10-14:25
■ Introduction of social business in Africa	14:25-14:45
■ Input of the challenges in agriculture and water sector	14:45-15:35
■ Break	15:35-15:45
■ Ideation workshop	15:45-16:40
■ Break	16:40-16:45
■ Ideation workshop	15:45-16:40
■ Break	16:40-16:45
■ Ideation workshop	16:45-18:15
■ Presentation	18:15-18:45
■ Introduction of JICA's support schemes and closing	18:45-19:00
■ Networking	19:00-20:00

APPLICATION

Please apply from the following link. Please note that in case there are applicants over capacity, you may not be able to participate.

Application period: April 25th to May 20th
Announcement of result: May 28th
Capacity: 30

(3) Implementation Result

1) Application

Announcement of the event was conducted through mailing lists targeting startups, large companies and SMEs. Individual approach was made to startups doing business in the target sectors. As for dissemination of the information to those interested in international cooperation, request for cooperation was made to JICA.

2) Participants

There were 39 applicants to the capacity of 30. 10 applicants withdrew before the event, and there were 6 absences on the day resulting in 23 participants. As for startups, only 3 companies participated due mainly to Africa not being their priority area and due to schedule, and the participants were mainly composed of those from large corporates.

3) Workshop implementation method

- We planned to divide the groups according to the participants' area of interest (agriculture/water) before the ideation workshop, however, as 5 participants out of 7 who showed interest in the water sector was absent and it was assumed that grouping according to interest would be difficult, the grouping according to area of interest was not conducted.

- As separating diverging phase to develop as many ideas and converging phase to improve quality of the idea is important in reaching a good quality idea, the ideation workshop was conducted in two phases.

4) Proposed Ideas

The following ideas were presented.

Presented ideas
-Off-grid solar hydroponics farm combined with e-learning service on cultivation instruction and assembly method -Sensor that detects bugs that cause potato disease in coffee beans -Providing an enzyme bath service utilizing discarded rice straw -Agricultural products delivery truck sharing service -Improve sales of agricultural machinery and equipment by developing an animation or drama on agriculture success story -Provision of services towards farmers such as carry-car sharing service for agricultural produce and microfinance service in Wi-fi equipped kiosks

5) Photos

（Explanation of business outline by Ms. Fujimoto from Cancer Scan）

(Ideation Workshop)

(Presentation)

6) Questionnaire Result

The participants' satisfaction was generally high. Out of 18 participants that submitted the questionnaire, 11 (61%) responded "very satisfied" and 7 responded "moderate satisfied" (39%). In particular, there were comments such as “I was able to exchange ideas with people from various backgrounds”, “I was able to gain new hints”, “I was able to gain a lot of information on needs and challenges in Africa”, “I was able to build network”, etc.

As for the question, “do you think this Open Innovation Challenge is useful for your business or for you to develop your business?”, all participants except one participant from university responded yes. There were positive comments such as “I was able to gain good material to make a hypothesis because we have not been in Africa yet”, “it was a very good training because there was no habit of systematically thinking ideas", "I was able to build a foundation for new business development”, “I was able to exchange ideas with various people without prejudice which is useful for new business development”, etc.

As for length of the event, 9 (50%) responded “long”, 8 (44%) responded “appropriate”, and 1 (6%) responded “short”. As for management of the event, while there were comments such as “the event was very efficient and productive. I gained a lot of inspiration”, “the balance of input and output was good, I felt the event was designed based on abundant experience”, “very satisfactory as there were many menu”, there were also comments such as “there was a sense of overpacking”, “the workshop and the challenge of the four countries were not linked well”, “the event should end a little earlier as some people need to leave early”.

7) Overall Comment

In general, the participants’ satisfaction was high and good outcomes were seen in terms of building foundation for new business development and community development. At the same time, the following lessons were obtained.

A) It is important to design the event after clarifying the priority, whether it is an event that seeks the quality of the ideation output, or an event whose main purpose is improving awareness and community development. It could be said that this event was meaningful in the sense that it was useful for future business development through gaining new information and hints and exchanging views with various people. On the other hand, when setting the creation of excellent business ideas as the main purpose, it is desirable to present issues more specifically, and to arrange resource persons in each table and carry out the workshop. While the number of companies interested in the African market is limited in Japan, the number of participants will decrease if the target countries and issues are narrowed down; therefore, it is important to clarify the objective and priority of the event and then set the theme and target.
B) Though it was clearly stated in the application guideline that this workshop is to develop business idea in agriculture and water sector and the applicants selected the sector (agriculture or water) of interest in the application form, some participants developed ideas in sectors other than the target sectors, and in some cases, the challenges posed and the developed ideas were not linked. This may be due to the fact that the participants joined the event to collect information on the challenges of the target sectors as a company, but as the ideation workshop emphasized to ideate based on individual's vision, the participants worked on the ideation based on individual's vision. Such issue can be averted through more clearly stating the purpose and objective in the facilitation.

5.6.2 Open Innovation in Fukuoka

(1) Implementation Policy

The open innovation in Fukuoka aims for matching between the technology of National Institute of Technology (KOSEN) and social issue in Africa, in contrast with on in Tokyo focusing on enterprises.

(2) Outline

In KOSEN Open Innovation Challenge powered by JICA, JICA provides the field of open innovation and students of KSOEN, who have abundant experiences in development of robotics and etc, tackles on social issues in Africa with their technology and imagination.

This time, students of KOSEN propose the solutions for agriculture and water issues and technology gap identified in the open innovation in Kenya, Uganda, Nigeria and Rwanda in May 2019, and the selected solutions can be supported for prototyping.

The whole process of this program is as follows:

Recruiting participants	Sharing of Challenge (issue)	Pre-study of solutions	Challenge Day	Brush up & prototyping	Demo Day In each country
April 26 -	May 17	May 20-24	May 25-26	May 27 –July 11	Mid of July
• Sharing of program outline of Open Innovation Challenge with KOSEN • Recruiting participants from 6 KOSENs	• Sharing of detail program of Open Innovation Challenge with KOSEN • Providing of Challenge (issues) theme and elated materials	• Pre-study by each participant on solutions for challenge (idea, plan, prototype)	• Based on the pre-studied idea, making group with various talents • Preparing of presentation by each team • Presentation, evaluation, and selection of great ideas	• Selected team brush up the idea with Project Team and make prototype product • Report to JICA after the completion of prototyping	• Demo Day in the 2nd edition of Open Innovation in each country. • Possible matching with startups as a partner to develop the business using prototype product

Figure 5-15 KOSEN Open Innovation Challenge Powered by JICA (2019)

Source: JICA Survey Team

The program of Challenge Day is described in the following table. In the 1st day, after the explanation on overview of Africa, input of challenge was conducted. Based on the result of individual work, the 9 great ideas were selected and the teams were made around these idea. These 9 teams started to make presentation (Nagaoka College was 1 team as they were remote participation). In the 2nd day, the teams continued to prepare for presentation and the presentation evaluation was conducted. Finally, the great ideas to proceed to prototyping was selected.

Table 5-20 Challenge Day Program, 2019

May 25 (Saturday) Challenge Day

Time	Contents	Venue
12:45-13:00	Reception	Lecture room 1
13:00-13:05	Opening	
13:05-13:30	Overview of Africa	
13:30-14:00	Japanese Entrepreneur in Africa	
14:00-14:30	Explanation on challenge & output	
14:30-14:50	Break	-
14:50-15:00	Explanation on teaming	Lecture room 2
15:00-15:10	Individual work	
15:10-15:30	Presentation of individual work	
15:30-15:45	Voting & teaming	
15:45-18:30	Group work	
16:45-17:45	Progress check & feedback	
18:30	Closing	

May 26 (Sunday) Presentation Evaluation

Time	Contents	Venue
08:30-12:00	Preparation of presentation	Lecture room 2
12:00-12:45	Lunch	
12:45-13:00	Reception	Lecture room 1
13:00-13:05	Opening	
13:05-13:20	Introduction	
13:20-15:30	Presentation (presentation 5min + Q&A 3-5min, 10 teams in total)	
15:30-15:45	Break	
15:45-16:00	Presenting of evaluation result	
16:00-16:15	Feedback from evaluators	
16:15	Closing	

Source: JICA Survey Team

The 4 challenges are as follows:

Challenge 1: Kenya /Ecodudu (startup) Collaboration with Kenya Start-up, which aims to improve agricultural production and create a recycling-oriented society through the use of Black Soldier Fly (BSF) as fertilizer and feed! Ideas to automate the production process!
Challenge 2: Uganda /Patasente (startup) Timely and easy payment to farmers! Ideas to monitor the volume of shipments from farmers to cooperative associations in real time and promote cashless transactions!
Challenge 3: Nigeria /JAFFA (startup) Install inexpensive water meters that can be used without manual meter reading, and ask for ideas that can be operated without maintenance!
Challenge 4: Rwanda /Project for Strengthening Coffee Value Chain in Rwanda (JICA Project) We want a solution that can measure the sugar content of coffee cheaply!

The judge and criteria are as follows:

- Mr. KATO Ryuichi, Director General, Africa Department, Japan International Cooperation Agency (JICA)

- Dr. TAKIMOTO Takashi, Dept. Creative Engineering, Machine Systems Engineering Crs., National Institute of Technology, Kitakyushu College
- Mr. SAKURAI Osamu, Manager of Deloitte Touche Tohmatsu LLC, and Team Leader of this Survey

Table 5-21 Challenge Day, Selection Criteria, 2019

Criteria	Scoring	Note
Validity	5	The viewpoint of solution is valid to challenge?
Feasibility	10	The idea is feasible? The prototyping plan is well scheduled?
Uniqueness	10	Unique idea? Think outside the box?
Presentation	5	Presentation is understandable? The passion of presenter?

Source: JICA Survey Team

(3) Implementation Result

A total of 43 students participated (of which, Nagaoka College participated in the web conference system). In addition, one teacher from each technical college participated.

Table 5-22 Challenge Day, the Number of Participants, 2019

Name of National Institute of Technology	# of participating students
Kitakyushu College	21
Sasebo College	5
Ariake College	4
Ube College	4
Miyakonojo College	5
Nagaoka College	4
Total	**43**

Source: JICA Survey Team

Three prototyping teams were selected as a result of the review. Prototypes will be produced by each team by July, and demonstrations will be held on the occasion of the trip in July.

Table 5-23 Challenge Day, Examination Result, 2019

Order of presentation	Team name	Challenge No.	Outline of Proposal	Score (90 points)	Selected for Prototype
1	Team RIREKISHO	Challenge 4 (Rwanda)	The color of the generated rainbow is analyzed using a smartphone application to measure the sugar content.	66	
2	Team POTESALA	Challenge 4 (Rwanda)	Applications and devices for measuring sugar content based on the color of coffee using the smartphone camera function	73	○
3	Team Sommelier	Challenge 4 (Rwanda)	SNS where farmers can learn when to harvest coffee and communicate with each other	64	
4	Team 2st Grade	Challenge 4 (Rwanda)	A photo-saccharometer that measures refractive index with a smartphone using laser light and an aquarium.	67	
5	Kapot	Challenge 3 (Nigeria)	Kapo Raku, which is mounted on an existing mechanical meter and photographed with a camera and transmitted to the master machine	68	
6	Unicorn Gundam	Challenge 3 (Nigeria)	Self-generated water meters (independent power sources using hydroelectric power, automatic transmission of measurement data)	76	○
7	Strappers	Challenge 2 (Uganda)	Cashless settlement using a strap-type infrared transmission device	61	
8	Team KAOMISHIRI	Challenge 1 (Kenya)	Device that simultaneously pulverizes the feeder and segregates the larvae with a single power (motor)	63	
9	Abu Love	Challenge 1 (Kenya)	Game-like apps (moisture control, feeding, segregation using density differences)	62	
10	Nagaoka College	Challenge 1 (Kenya)	Dancing machines that automatically sort obsolete feeds from larvae	75	○

Presentation by Team POTESALA

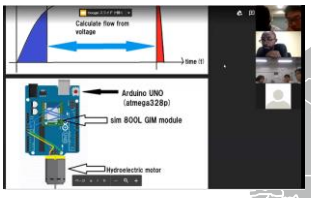
Questions and answers by judges

Group photos after the presentation

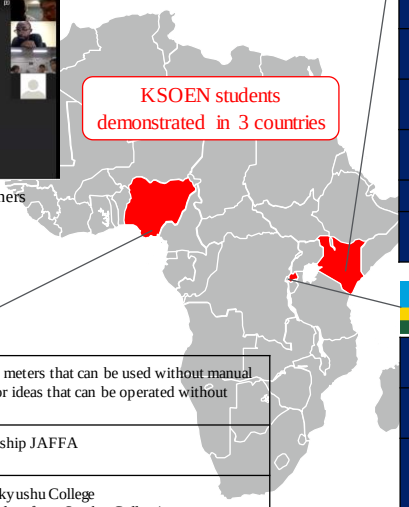
Source: JICA Survey Team

(4) Prototype Production and On-Site Demonstration

Three teams selected by the Challenge Day Review Board on May 26 worked on prototyping for about a month while holding meetings with local collaborating companies and projects. Team representatives (teachers and students) took prototypes to the site and demonstrated them with local partners. In the demonstrations, matching with local companies, Japanese companies, and local educational institutions was carried out in order to improve, provide, and disseminate prototypes in the future.



Web meeting with local partners



Kenya

Challenge	Collaboration with Kenya Start-up, which aims to improve agricultural production and create a recycling-oriented society through the use of American Mizuubu as fertilizer and feed! Ideas to automate the production process!
On-site collaboration	Start-up of Local Partnership Ecodudu
Technical college	Nagaoka College of Technology (one teacher and five students)
Prototype	Dancing machines that automatically sort obsolete feeds from larvae
Demo dates	Monday, July 15 and Tuesday, July 16
Participation	JICA experts at the Jomo Kenyatta University of Agriculture and Technology, AFRICA-ai-JAPAN Project

Nigeria

Challenge	Install inexpensive water meters that can be used without manual meter reading, and ask for ideas that can be operated without maintenance!
On-site collaboration	Start-up of Local Partnership JAFFA
Technical college	Sasebo College and Kitakyushu College (One teacher and one student from Sasebo College)
Prototype	Self-generated water meters (independent power sources using hydroelectric power, automatic transmission of measurement data)
Demo dates	July 29 (Monday) for FCTWB (Abuja Water Supply Authority) July 30 (Tuesday): For local companies
Participation	FCTWB, companies participating in the first Local Open Innovation Event, local water companies, etc.

Rwanda

Challenge	We want a solution that can measure the sugar content of coffee cheaply!
On-site collaboration	JICA Project for Strengthening Coffee Value Chain
Technical college	Kitakyushu Technical College and Miyagi Technical College (One teacher and one student from Kitakyushu Technical College)
Prototype	Applications and equipment to measure sugar content using smartphone camera functions based on the color of coffee (machine learning using actual image data and sugar content data of coffee at harvest in advance)
Demo dates	Tuesday, July 23
Participation	Local start-up companies, Tumba College of Technology, Carnegie Mellon University, JICA experts and JOCV members for the Project on Strengthening Coffee Value Chain

Figure 5-16 Overview of Demonstrations 2019

Source: JICA Survey Team

Demonstration in Kenya by Nagaoka College (July, 15th- July, 16th,2019)


Demonstration in Rwanda by Kitakyushu College (July,23rd, 2019)



Demonstration in Nigeria by Sasebo College (July, 29th-July 30th, 2019)

(5) Prototype Improvement

Based on the feedback obtained from the field demonstration, it led to improve the prototype in Japan. Originally, the field demonstration was scheduled to be held again in the spring of 2020 (Kenya and Rwanda), but due to the spread of the COVID-19, the trip was temporarily postponed. Therefore, we were not able to do so during the period of this survey. For the demonstration, we transported the prototype to the local partner and ordered coffee seeds from the local market. The table below shows the outline of the prototype improvement until the final report meeting on December 21, 2020.

Table 5-24 Overview of Prototype Improvement

Country Covered	Challenge	Team	Overview of upgrading prototypes
Kenya 	Collaboration with Kenya Start-up, which aims to improve agricultural production and create a recycling-oriented society through the use of American Mizuubu as fertilizer and feed! Ideas to automate the production process!	Nagaoka College	• In cooperation with the Nagaoka Industrial Revitalization Association NAZE, an NPO, prototype improvement was started in October 2019. • The first upgraded version was assembled on December 27, 2019, and a workshop with NAZE was conducted for further upgrade on January 10, 2020. As a result of the workshop, the modification on slider from tray to inlet was implemented. • After the travel to Kenya was finally cancelled, the upgraded BSF separation machine was delivered to Ecodudu, the local partner in Kenya, in October and November 2020. • The machine was assembled by Ecodudu in December 2020, and the demonstration was conducted by using BSF and residues. The demonstration clarified that the prototyped machine enabled to reduce processing time from 10 minutes per tray to a few minutes. • While the function of prototype was verified through the demonstration, the remaining items to expand the production capacity are i) electrification of separation process, and ii) scaling-up of machine. (As for i), the modification and verification of electrification was planned in the travel to Kenya in March 2020, by accompanying the technical staff from Nagaoka College, but the travel was finally cancelled.)
Rwanda 	We want a solution that can measure the sugar content of coffee cheaply! (After the demonstration in 2019, developed a "Potato Odor Sensor)	Kitakyushu Technical College /Miyagi Technical College	• Prototype development of sugar gauges is discontinued because it is difficult to collect additional data due to seasonal factors. On the other hand, a new team was formed within Kitakyushu College of Technology to develop a "Potato Odor Sensor," which had been identified as a problem in the field, and a prototype idea was created. • The team produced an experimental device combining various gas sensors and micro computers. • The experiment was conducted under various resistance values of gas sensors, by using "Potato Odor" coffee bean samples sent from coffee agronomist introduced by JICA Project Team. • As a result of the experiment, there were no significant differences though sensors showed higher values on "Potato Odor" coffee beans comparing to normal beans. • Based on this result, the team had discussion with experts on smell sensor, Dr. Sakurai from Tokyo Agriculture University and Mr. Yokota from MSS Forum of National Institute for Materials Science, and confirmed the limitation of gas sensor and the possibility of bio–sensor.
Nigeria 	Install inexpensive water meters that can be used without manual meter reading, and ask for ideas that can be operated without maintenance!	Sasebo College /Kitakyushu College	• The college decided to aim for implementation by February 2021 as a master's research of a student who had traveled to Nigeria. • The cooperation of section chiefs was obtained, and progress was made in the development of an intra-university system for the promotion of research and development. A system was established to obtain water sector knowledge and implementation advice from the private company in Fukuoka. • The performance demonstration was conducted in Japan by producing upgraded prototype responding to pre-paid method by reflecting the feedback in the demonstration in Nigeria.

Source: JICA Survey Team

(6) Final Report (December, 21st, 2020)

On December 21, 2020, the final report meeting of the FY2019 team was held along with the FY2020 team progress report meeting, mainly for JICA officials. The outline of the event is as follows. A total of about 158 participants attended, and presentations were made by three teams participating in FY2019 and seven teams participating in FY2020. 2019 teams will finish their activities after this final debriefing, but some teams will continue their activities for social implementation in other projects.

Date and Time: December 21, 2020, 16:30-18:40
Place: Online (Microsoft Teams meeting)
Participants: JICA officials, media representatives, and people from technical colleges (about 158 people)
Program:
16:30-16:35 Opening Remarks by Mr. Kato, Senior Advisor, JICA
16:35-16:40 Briefing on JICA-KOSEN Open Innovation Challenge
[Part 1: Final report by JICA-KOSEN OI 2019 participating teams]
16:40-16:50 Presentation by Sasebo College (Nigeria: Call for ideas for low-cost installation and maintenance-free operation of water meters that can track usage without manual meter reading!)
16:50-17:00 Presentation by Kitakyushu College (Rwanda: Call for a solution to measure the sugar content

of coffee beans at low cost! and solution to prevent coffee bean potato odor)
17:00-17:10 Presentation by Nagaoka College (Kenya: Cooperation with Kenyan start-up that aims to improve agricultural production and recycling society by converting BSF into fertilizer and feed! (Call for ideas to automate the production process!)
[Part 2: Progress report by JICA-KOSEN OI 2020 participating teams]
17:10-17:20 Presentation by Nagaoka College Team 1 (Kenya/Japan: Call for ideas for sustainable food production and supply systems to realize a recycling-oriented society! (Productivity improvement of recycling system using BSF) *RI theme of Nagaoka College)
17:20-17:30 Presentation by Nagaoka College Team 2 (Kenya/Japan: Call for ideas for sustainable food production and supply systems to realize a recycling-based society! (Productivity improvement of recycling system by using BSF) *RI theme of Nagaoka College)
17:40-17:50 Presentation by Nagaoka College (Rwanda: Call for ideas to prevent the spread of COVID-19 through the power of manufacturing!)
17:50-18:00 Presentation by Kitakyushu College (Ghana: Call for ideas to improve productivity and quality of paving blocks using waste plastic!)
18:00-18:10 Presentation by Kitakyushu College (Mozambique: Promoting digitalization in rural areas! Call for ideas for radio wave maps that can be created and shared by everyone!)
18:10-18:20 Presentation by Nagaoka College (Tanzania: Improving rice trading price! Call for ideas for a simple stone-removal machine!)
18:20-18:25 General comment (Ms. Masuda, Director, Africa Division, JICA)
18:25-18:40 Question and answer session and comments

5.7 Planning and Preparation for TICAD Official Side Event

5.7.1 Overview of TICAD Official Side Event

As a part of TICAD7, the Survey Team planned and prepared for the official side event ”From Idea to Action: Harnessing the Potential of Science, Technology and Innovation (STI) in Africa Development”. The team leader of this survey made a presentation on the implementation result of open innovation at the Part II.

(1) Outline

- DATE/TIME: Thursday, August 29, 2019, 2pm – 4:20pm (JST)
- VENUE: PACIFICO Yokohama Exhibition Hall B02
- ORGANIZER: World Bank, UNDP, JICA
- SEATING CAPACITY: 300 people
- LANGUAGE: English, French and Japanese (with simultaneous interpretation)

(2) Program

- Part I: 14:00-14:50 "High Level Dialogue among leaders from African and Japanese public and private sector"

■ Panelists:

- Paula Ingabire, Minister, ICT and Innovation, Republic of Rwanda
- Amani Abou-Zeid, Commissioner for Infrastructure and Energy at the African Union Commission (AUC)
- Fernando Paulo, Executive Officer, General Manager, Ecosystem Services Department and Sustainability Department, Rakuten, Inc.)
- Hafez Ghanem, Vice President for Africa Region, World Bank
- Ahunna Eziakonwa, UNDP Assistant Administrator/ Director of the Regional Bureau for Africa
- Kazuhiko Koshikawa, Executive Senior Vice President, JICA

■ Discussion Summary：

In the first part, the roles required of governments and development agencies were discussed, and the need for co-creation by various actors, including companies and academic institutions, as well as human resource development and improvement of systems to support such co-creation was highlighted.

Rwanda's Minister of ICT and Innovation, Paula Ingabire, introduced her country's policies and support from development agencies, saying, "The government is working with world-class academic institutions abroad to accumulate technology, and we are also actively developing human resources for small and medium-sized enterprises (SMEs), which is supported by the World Bank and JICA." Ms. Ahunna Eziakonwa, UNDP Assistant Administrator/ Director of the Regional Bureau for Africa, also mentioned the importance of the government's role, saying, "Although STI is led by the private sector, the role of the government in policy and environment building will remain essential."

Mr. Fukuoka, Vice President of Kobe Institute of Computing, which has accepted 120 ABE Initiative trainees as international students, mentioned that among many international students especially from Rwanda, the graduates are very active in Rwanda.

From JICA, then Vice President Kazuhiko Koshikawa expressed his determination to establish the "STI for TICAD Open Innovation Platform," saying that JICA would act as a catalyst to work with various actors to solve social issues in Africa.

Part I Panel Discussion

Audience at the Conference

➢ Part II: 14:50-16:20 "Discussion among practitioners about the factors for success for the start-ups"

■ Panelists:

- Alex Ntale, CEO, Rwanda ICT Chamber
- Kohei Muto, CEO/Founder, Double Feather Partenrs
- Rebecca Enonchong, Board Chair, AfriLabs
- Yoshikazu Takasaki, CEO, Dreming
- Masayuki Kurihara, General Manager, Economic Cooperation Team, Regional Coordination & Administration Dept, Marubeni Corporation
- Clement Uwajeneza, Country Director Rwanda, Andela

■ Discussion Summary：

At the beginning of the second part of the event, Mr. Naonobu Fuwa, an expert on supporting the establishment of a startup ecosystem in Ethiopia, introduced the initiative. He said, "So far, we have conducted business contests, entrepreneur training, and made policy recommendations to the Ethiopian government. We would like to develop similar initiatives in other regions of Africa, and eventually promote activities to bring about innovation throughout Africa. After his presentation, Mr. Sakurai, the leader of this survey team gave an introduction of this survey (see below for details).

In the following panel discussion, each panelist discussed the secrets of successful entrepreneurship in Africa from the different standpoint such as startup companies and investment funds, with the audience participating in the discussion.

Japanese companies also raised the need for public-private partnership funds and platforms. During the discussion with the audience, the following questions were raised such as "In order to attract foreign investment, the financial and accounting information of the investee companies must be disclosed,"

"Although there is a problem of the outflow of excellent human resources, if it will benefit Africa in the future from a medium- to long-term perspective, it should be welcomed," and "Young Japanese entrepreneurs do not have local information or human resource networks. We need to connect African entrepreneurs with Japanese entrepreneurs."

5.7.2 Presentation on This Survey

In the Part II, Mr. Sakurai gave a presentation on the results of open innovation in this survey, saying, "Africa cannot achieve the SDGs with the same business style as before. Open innovation is the key to creating innovative ideas. I would like to continue to work with more young people from Institute of Technology (KOSEN) to solve the problems in Africa."

- Open innovation initiatives in the four targeted countries and in Japan are organized into three steps((1) identifying issues by involving stakeholders, (2) holding open innovation events, and (3) developing PoC plans), and the details of initiatives at each step were introduced (see Figure 5-17).

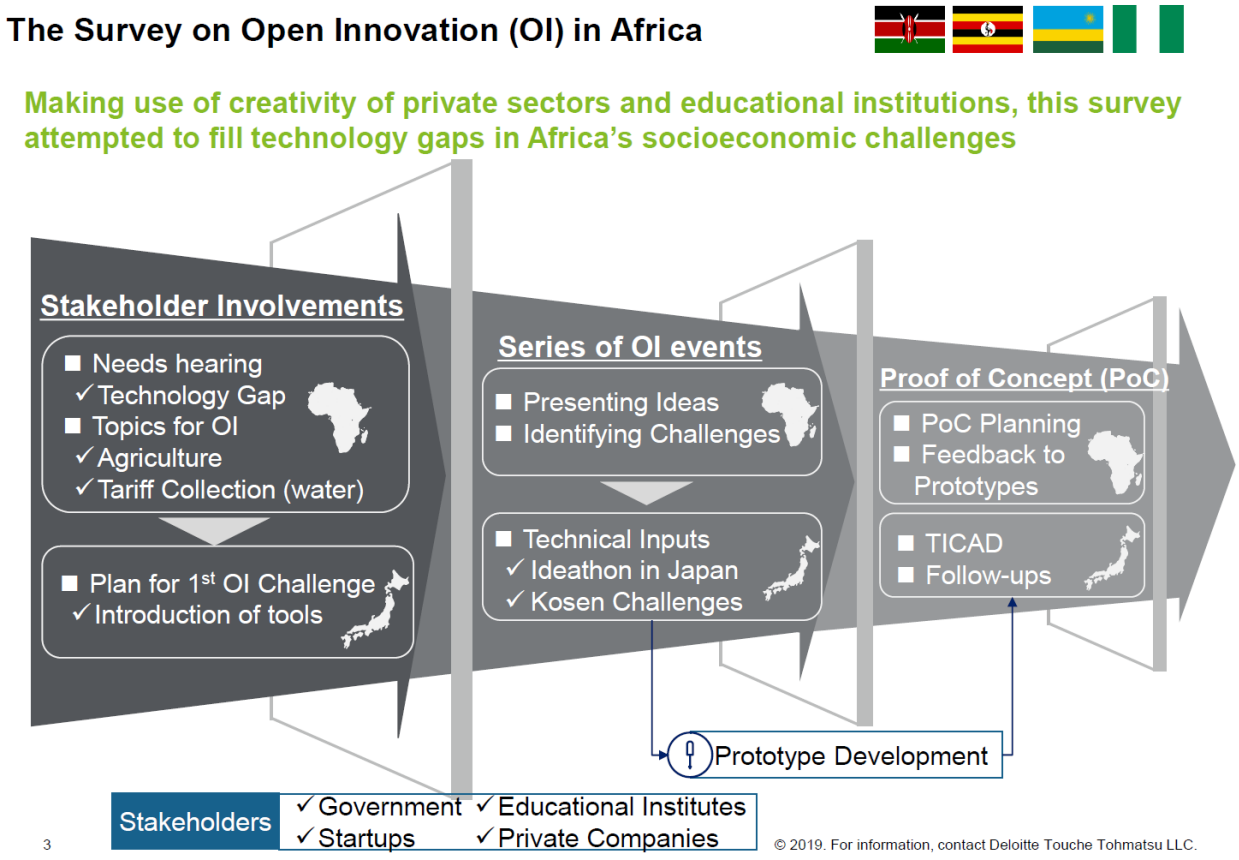


Figure 5-17 Presentation Papers of TICAD Event (Overview of This Survey)

Source: JICA Survey Team

- The overview of the KOSEN Open Innovation Challenge in Kenya, Nigeria and Rwanda were introduced. Associate Professor Mr. Takimoto and his student Ms. Noa Soyama of National College of Technology,

Kitakyushu College, who visited Rwanda to show the demonstration of their prototype, also made comments at the meeting.

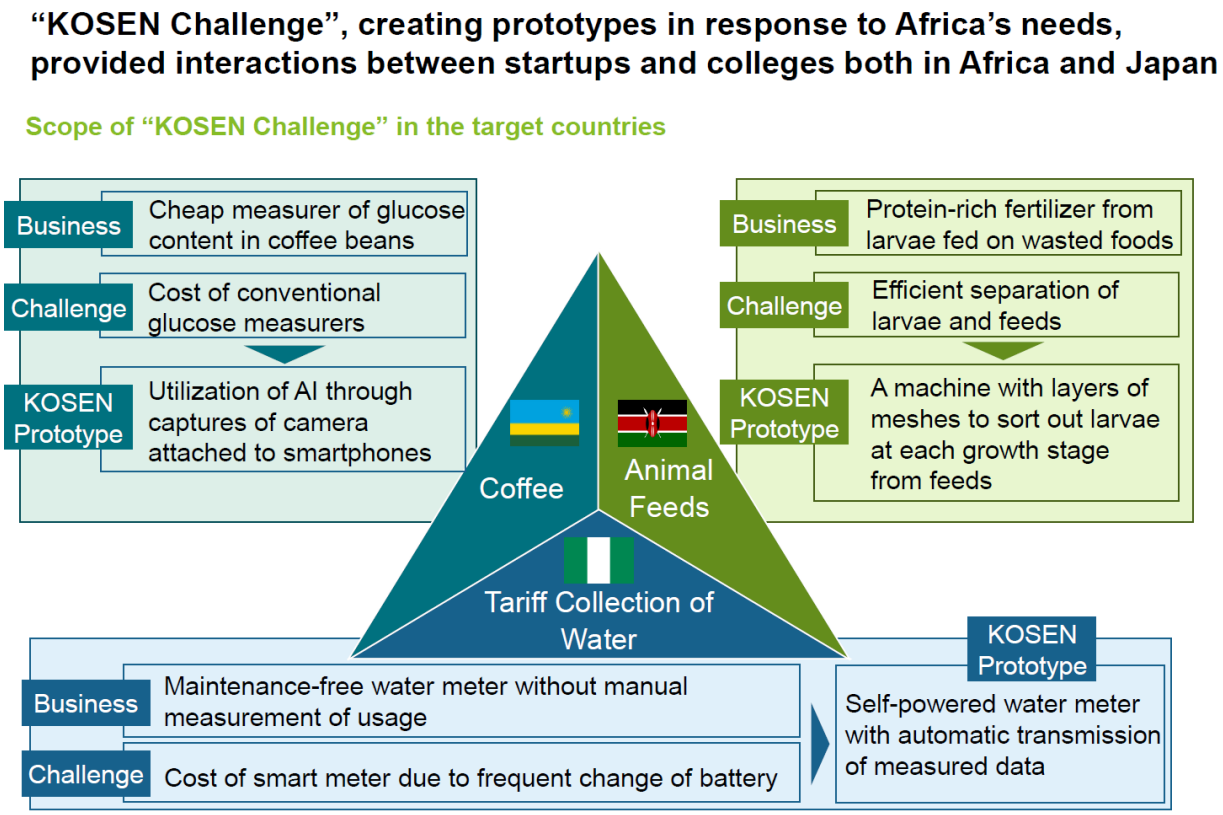


Figure 5-18 Presentation Papers of TICAD Event (KOSEN Open Innovation)

Source: JICA Survey Team

Chapter 6

Considerations for Open Innovation Implementation

Chapter 6 Considerations for Open Innovation Implementation

6.1 Reflection on the Open Innovation Conducted in This Survey

6.1.1 Comparison of Open Innovations Conducted in Each Country

The following table compares the OI locally held in the four countries described in details in Chapter 5 and summarizes the issues and lessons learned from the OI.

Table 6-1 Comparisons of Open Innovation Events between the Four Countries

Country for Local OI	Kenya	Nigeria	Uganda	Rwanda
Theme	Agriculture (Promotion of horticulture by small-scale farmers, etc.)	Resolving FCTWB Issues (Improvement of water meter reading, billing, and fee collection services)	Agriculture (Promotion of horticultural crop cultivation in line with market needs, expansion of market distribution, improvement of dissemination activities by agricultural extension workers, etc.)	Agriculture (Improving farmers' knowledge, access to funds, reducing post-harvest losses, and increasing added value)
Summary of Implementation	[1st] Ideathon mainly designed to generate ideas [2nd] PoC Planning Workshop	[1st] Ideathon for developing business ideas [2nd] Proposal of PoC from the enterprise	[1st] Ideathon mainly designed to generate ideas [2nd] PoC Planning Workshop	[1st] Creating ideas through group work and individually proposing solutions [2nd] Not implemented (because the selected startups were accepted by the 250 Startups program)
Major Outcome	Participants gave high marks to the fact that both sides were able to expand their knowledge through the exchange of opinions between the problem provider and the solution provider (a certain outcome for OI).	The project proposal that won first place was introduced to the local water utility company after a PoC supported by the JICA Nigeria office.	Participants gave high marks to the fact that both sides were able to expand their knowledge through the exchange of opinions between the problem provider and the solution provider (a certain outcome for OI).	As a result of the evaluation of the solution proposals, the top-ranked startups participated in the 250 Startups program and continued to brush up their business models.
Issues and Lessons	Although it contributed to improving awareness of the issues and building a community, it did not lead to concrete activity followed up (because it was difficult to set up a clear exit, the OI was held mainly for the purpose of idea generation and screening was not conducted).	The FCTWB, the proposal provider, user, and decision maker, presented specific issues and cooperated with this OI, and the JICA Nigeria Office made a commitment to support a PoC, so this OI was operated with a clear purpose as "call for proposals".	It contributed to improving awareness of issues and contributed to community building, but did not lead to concrete activity followed up.	Collaboration with the 250 Startups program, which JICA is supporting as a technical cooperation, became an exit strategy (and an incentive for participants).

Source: JICA Survey Team

As comparing the results of the four countries, in Nigeria, the idea generated by the OI led to the subsequent implementation of the PoC (albeit outside the scope of this survey) and then to the actual implementation, while there was no subsequent movement in Kenya and Uganda. This difference can be attributed to the fact that the FCTWB, which is the issue provider, user, and decision maker, presented specific needs and cooperated in Nigeria, and the JICA Nigeria office made a commitment to support the PoC. At the same time with the project in Nigeria, in Rwanda, JICA's “ICT Innovation Ecosystem Strengthening Project” was being implemented, and this survey collaborated with 250 Startups, an entrepreneur support program of the project, and provided continuous support including assistance for actual demonstration in that project. Thus, in stead of considering OI as a stand-alone project or event, it is important to plan OI in consideration of the environment surrounding and to regard OI as the commitment of stakeholders and the situation of existing projects which have potential for further collaboration.

In all four countries of Kenya, Uganda, Nigeria and Rwanda, the results of the OI participants' questionnaires (details are provided in Chapter 5) represent that the participants gave high marks to the fact that both sides were able to expand their knowledge through the exchange of opinions between the issue provider and the solution provider. According to the definition of OI set in this survey, "OI refers to a mechanism for dialogue and idea generation for involving various development stakeholders (governments of developing countries, private companies, NGOs, universities, local governments, the Japanese government, etc.) and solving social issues". Therefore, it can be said that the locally held OI achieved a certain degree of success. In addition, local stakeholders also felt that there are certain advantages to participating in OI.

6.1.2 Comparison of the Three Types of Open Innovation Implemented in This Survey

The three types of OI conducted in this survey (Africa Open Innovation Challenge (Local OI), KOSEN Open Innovation Challenge (KOSEN OI), and Africa Open Innovation Challenge in TOKYO (Tokyo OI)) were also compared, and the issues and lessons learned were summarized as shown in the table below.

Table 6-2 Comparison of the Three Types of Open Innovations

OI Implemented in This Survey	Africa Open Innovation Challenge (Local OI)	KOSEN Open Innovation Challenge (KOSEN OI)	Africa Open Innovation Challenge in TOKYO (Tokyo OI)
Purpose	• Create ideas to solve development issues by diverse local stakeholders	• Match technologies KOSEN with solutions of social problems in Africa • Manufacture solutions to solve local development issues by KOSEN	• Improve awareness of local issues • Create superior business ideas • Increase stakeholders interested in African business (community formation)
Target Participant	• Local companies (mainly Startups), local governments, universities, JICA	• KOSEN students in Japan	• Japanese companies
Method	Although it differs from country to country, the outline is as follows; • Ideathon that interacts with stakeholders who are familiar with the issues (Participants from the agricultural sector, etc.) and those who come up with solutions (Startups, etc.) (1 day) • Both PoC planning workshop and proposal Presentations (2 days)	• Problem-solving proposals for local issues and technology gaps by KOSEN students, and prototyping outstanding proposals with JICA support (About three months until the local demonstration including 2 days of the joint proposal preparation contest) • Demonstration of prototype on site	• Idea creation workshop where participants discuss ideas within a group based on individual work. (half day)
Major Outcome	• Participants gave high marks to both sides for expanding their knowledge through an exchange of opinions (Certain achievements as an OI) • In Nigeria, the proposal that won first place in the review was introduced to the local water utility company after a PoC supported by the JICA Nigeria Office	• It led to the establishment of "JICA - KOSEN Innovation Platform" involving new actors in African development. • The prototype has been demonstrated in a Kenyan startup to help improve productivity. MoU was signed between Nagaoka KOSEN and the local startup to continue collaboration	• It contributed to community formation to some extent • As a result of this event, a few Japanese companies met with African companies
Issues and Lessons	• Group work ideations are good for exchanging opinions among diverse stakeholders, but PoC requires individual company responses, so ingenuity is needed to balance the two. • It is difficult to set up a clear follow-up method after idea generation, so PoC implementation has not been realized. • It is necessary to set incentives for busy companies to participate.	• One of the success factors was the clear goal setting of simply competing on the ideas and quality of solutions, without considering subsequent business development. • At KOSEN, it is easy to collaborate across disciplines, and it enabled to flexibly consider solutions without being bound by their own specialties. • The novelty of solving social issues in Africa and the benefit of conducting on-site demonstrations attracted the KOSEN students. • On the other hand, since the students started with almost no knowledge or experience in Africa, it was necessary to provide detailed information about the issues and respond to their questions afterwards.	• It is important to design an event with clear priorities, whether it is an event that seeks quality output or an event with the main purpose of enlightenment and community building. • It is necessary to set incentives for busy companies to participate.

Source: JICA Survey Team

First of all, all of the OIs achieved a certain level of success seen from results. However, when comparing the size of the impact, it is reasonable to assume that the most noticeable OI was KOSEN OI, followed by the local OI, and finally the Tokyo OI. The reason for this difference seems to be related to the method of

each OI. The Colleges of Technology OI was not only an ideathon, but also was a three-month program including prototyping and local demonstrations. The products developed by the Colleges of Technology OI eventually contributed to improving productivity of the local startups. The first local OI was an ideathon, and the second local OI was the workshop for planning and proposing a specific PoC plan. As a result, concrete PoC proposals were generated, which led to the introduction of the IT system to the national water utilities corporation in Nigeria. One of the main reasons for this achievement in Nigeria was that JICA Nigeria office provided PoC support after the second OI, while the other JICA local offices did not provide PoC implementation support in the other three countries. As for Tokyo OI, Tokyo OI took the simplest method which is a half-day ideathon. Due to its method, the results were limited to improve awareness and community building. In short, the results varied depending on the approach (purpose and method) of the OI as clearly shown by these three types of OI.

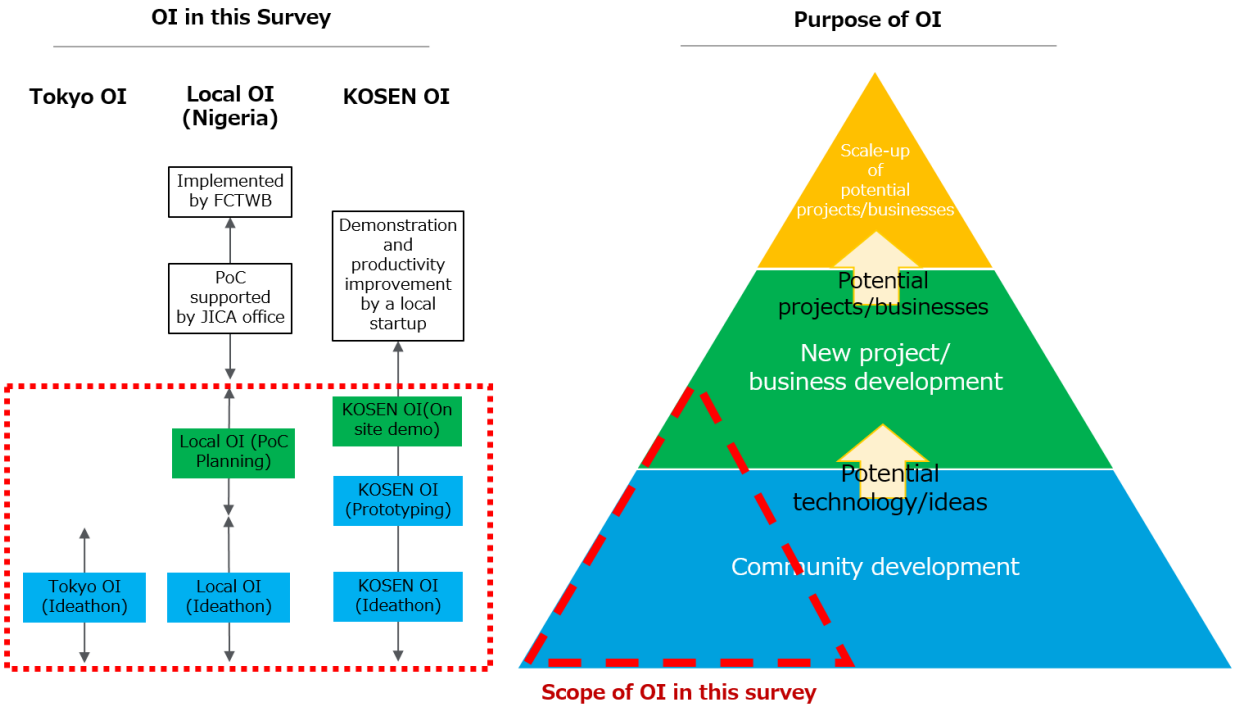


Figure 6-1 Purpose of Open Innovation and Range of Each OI in This Survey

Source: JICA Survey Team

Secondly, considering factors other than the approach, it seems that the success factor of KOSEN OI is their high level of manufacturing technology. However, since it cannot be said that "companies do not have the same manufacturing capabilities as KOSEN," technological capability is a necessary condition but not a sufficient condition. The main reason for the success was not the difference in manufacturing capabilities, but the difference in the ability to spend enough effort and time on it. In addition to the lessons learned from the local OI in four countries, which are the detailed explanation of specific issues and the commitment of the involved stakeholders, there are other factors such as the time that can be spent for OI and the incentives for participation. For example, KOSEN OI was a three-month program that included prototype

development. The KOSEN students were motivated to participate because the novelty of solving social issues in Africa and the privilege of conducting on-site demonstrations were considered as enough incentives for them to spend plenty of their time. In order to encourage Japanese companies to participate in the three-month program, other incentives such as prize money or a commitment to support the implementation of the PoC in JICA projects would be necessary. For companies, it is a difficult business decision whether they should spend time and effort, so it is very important to design incentives enough to motivate decision makers (owner and management of companies) to involve Japanese companies.

In addition, companies have “products to sell”, but KOSEN do not have such products, so the strength of KOSEN is that they were able to create ideas in a purely needs-driven manner. In the local OI, most of the participants from local startups tended to appeal their own products, services, and technologies, which are products they want to sell, and tended to be seeds-driven (solution-driven), which limited the creation of new ideas.

Finally, it is important to examine the reasons why Tokyo OI did not make it to deliver concrete results for the next step (as mentioned above, though it is impossible to seek concrete results from a half-day ideathon, it can meaningful input to think about the future direction). Based on the results of interviews with Japanese companies and other surveys conducted at the beginning of this survey, the number of Japanese companies with a strong interest in Africa was limited, and those with a strong interest often focused on specific countries. Therefore, in order to encourage as many Japanese companies as possible to participate in the Tokyo OI, a relatively broad theme of agriculture and water should be set, covering issues in four countries rather than one country in depth. Although this strategy was effective for calling participants, the explanation of issues was broad and shallow and may have been insufficient for deepening into the issues in order to consider concrete solutions. In addition, based on the lessons learned from the local OI conducted prior to the Tokyo OI, the Tokyo OI aimed to be as free as possible from the existing “products to sell” solution-driven approach. So, the Tokyo OI tried a different workshop method which started considering the big theme of “the future (vision) to be realized” rather than “products to sell” so as to freely think about solutions to Africa's problems. However, there were some unexpected cases where the participants generated solutions for achieving their own personal visions rather than the set issues of agriculture and water.

Companies with “products to sell” are more likely to implement PoC and commercialize their products, but they are also more likely to be limited in their ability to generate new ideas. On the other hand, if companies do not have a “product to sell,” such as KOSEN students, it is easier to create a new idea, but the hurdle for actual implementation is higher. Here again, it also indicates the importance of determining the final goal and exit strategy after OI and clarifying who and what the OI will target.

6.1.3 Comparison with Open Innovation by Other Donors and Private Companies

In addition to the comparison of the OI conducted in this survey, several OI conducted by other donors and private companies are also compared as an input for considering the direction of OI promotion by JICA

in the future. While the OI conducted in this survey were basically an ideathon, there were many cases where other donors and private companies conducted accelerator programs or business contests rather than ideathon alone as shown in the table below. Whereas there is the difference in methods between theirs and OI in this survey, it would be useful to consider the direction of OI by JICA. The table shows four examples; "Japan SDGs Innovation Challenge for UNDP Accelerator Labs" sponsored by the Japanese government (Cabinet Office), "WFP-X Moonshot Launchpad Programme" in which Mr. Sakata of this survey team participated as a judge, "IDEATHON#AfricavsVirus challenge" by the African Development Bank with the intention of focusing on the African region, and "Google for Startups Accelerator" in which WASSHA participated as an example of a private company.

Table 6-3 Examples of Open Innovations by Other Donors and Private Companies

Program	Japan SDGs Innovation Challenge for UNDP Accelerator Labs	WFP-X Moonshot Launchpad Programme	IDEATHON #Africavs Virus challenge	Google for Startups Accelerator (Japan)
Sponsor	• UNDP Accelerator Labs	• WFP	• African Development Bank	• Google
Purpose	• Business model development and verification for problem solving using Japanese companies' technology, know-how, and networks	• Solving urban food security and nutrition challenges with local entrepreneurs	• Generating ideas for solving health and economic issues triggered by COVID-19	• Technology support for startups with ideas to solve problems
Target Participant	• Japanese companies	• Local entrepreneurs	• Basically anyone can participate	• Japanese startups
Method	• Accelerator program • About 5 months	• Accelerator program • About 4 months	• Online Ideathon • 3 days	• Accelerator program • About 3 months
Overview	• UNDP and Japanese companies will work together to solve country-specific (five countries) challenges identified by A-Labs • **Opportunities and funds (up to 40,000UDS)** will be provided to companies to build problem-solving business models • **Provide advice from expert (180 people)** from lab teams in 78 countries	• Select 9 entrepreneurs from Tanzania's innovation ecosystem • Work with them to create 100 solutions in 100 days to solve Tanzania's urban food security and nutrition challenges using the moonshot approach • **Mentorship will be provided** for this purpose	• A 72-hour Ideathon to solve COVID-19-trigrred health and economic challenges in Africa • **Approximately 4,000 experts** provide advice during the Ideathon • **Technical assistance and grants of up to 20,000USD** is provided to the top 20 solutions generated. • More than 100 public and private companies are official partners	• An accelerator program for startups solving social issues • **Mentorship by Google staff** • **Training in machine learning, talent acquisition and development, and product development management** • Interaction with startups from different industries, VCs, engineering community, etc.
Remarks	• Sponsored by the Japanese Cabinet Office as well	• Including an intension of entrepreneurial development support • Mr. Sakata from the survey team participated as a judge	• Nearly 25,000 people participated in the Ideathon online with generating 750 solutions • African Development Bank's Jobs for Youth in Africa Initiative	• WASSHA, which operates in Tanzania, has also participated in the past

Source: Each OI's websites researched by JICA Survey Team

➢ Target

Similarly to each of the OI in this survey, each of the four OI also set the target participants according to the purpose. For example, WFP's WFP-X has an intension to support local entrepreneurs in addition to creating innovative ideas to solve problems, and therefore the target participants are local entrepreneurs. Also, the African Development Bank's Ideathon seems to be an event of being a 72-hour online ideathon (since it is conducted as part of the Jobs for Youth in Africa initiative, it is thought to have the intention of fostering entrepreneurship among young people), and therefore, in order to attract more participants, the event is open to anyone who is interested in solving the set problems.

- Duration

Except for the African Development Bank's ideathon, which has an event element, the other programs are accelerator programs, and their durations are about three to five months. The longer the duration of the program, the heavier the burden on the participating companies (because they have to spend less time on their core business), but it can be seen that each program is designed to provide incentives.

- Incentives for participation

Compared to the OI in this survey, the most significant difference is the provision of mentorship and monetary award to the participating companies: UNDP provides a grant of up to 40,000 USD, and the African Development Bank provides a grant of up to 20,000 USD. Meanwhile, the WFP and Google's OI do not offer monetary award. However, these initiatives have a strong entrepreneurial and startup support component, with incentives for mentorship and training. As for the monetary award, many donors actually offer prize money for collecting many solutions to development challenges. The table below shows examples of calls for solutions that were made between July and September 2020. The OI in this survey tried to provide other incentives without offering cash prizes, but it may be a reasonable idea to consider offering monetary awards by referring to the trends of other donors.

Table 6-4 Examples of Solutions for Issues by Donors

Program Name	Implementing Agency	Prize	Overview (from the Application Guidelines)
Intelligent Forecasting Competition to Model Future Contraceptive Use	USAID	25,000USD, 20,000USD	It aims to identify and test more accurate ways to predict future contraceptive use in health care delivery settings. USAID will award a $25,000 prize to an innovator who can develop a predictive model that uses USAID data and artificial intelligence to forecast contraceptive consumption over a three-month period. USAID will also provide a field implementation grant of up to $200,000 to customize and test a high-performance intelligent forecasting model in Cote d'Ivoire.
Mission Billion Challenge WURI West Africa Prize (WURI: West Africa Unique identification for Regional Integration and Inclusion)	World Bank	150,000USD (In Total)	It aims to create a digital financial service that facilitates the collection of taxes from informal sector workers. For example, the following services are envisioned; • Incorporate behavioral tools to continue payments to social insurance schemes from informal sector workers, encourage financial savings, and promote transparency and accountability • Payments can be made regardless of literacy or numeracy levels, even in the context of limited Internet penetration • A digital identity system that serves as a foundation for regional interoperability and is accessible across borders, network providers, and languages, regardless of where one is from or where one is currently located Winners of the Mission Billion Challenge will receive cash prizes totaling up to $150,000, participate in a high-level event at the World Bank, and receive mentorship and support from Google Developers Experts.
UNICEF Funding Opportunity for Blockchain Startups	UNICEF(UNICEF Innovation Fund)	Up to 100,000USD	The UNICEF Innovation Fund is seeking equity-free investments of up to $100,000 to provide early-stage seed funding and mentoring to for-profit technology startups that have the potential to benefit humanity. We aim to fund the following solutions. • People can use cryptocurrencies for income generation, savings, and access to decentralized financial products • Increased transparency in supply chains, contract management, data tracking, etc. using the blockchain. • New decision-making methods using blockchain to determine project funding.
Africa Online Safety Fund	Google.org	10,000USD, 100,000USD	The Africa Online Safety Fund will support innovative existing and new solutions to address the online safety of women and children through two categories of funding. • Catalytic projects are $10,000 grants for small, targeted, local and culture-specific interventions. • Transformative projects are $100,000 grants for large-scale interventions that reach multiple regions
Labeled Datasets for Agriculture in Sub-Saharan Africa	Lacuna Fund (Collaborative Fund by Rockefeller Foundation, Google.org, and IDRC)	500,000USD	It is looking for data scientists who can reference Earth Observation (EO) data and label agricultural datasets related to crops and other aspects of animal agriculture systems for machine learning in Sub-Saharan Africa. Grants of up to $500,000 are available for datasets that address unique challenges (e.g. mapping smallholder farmers in Africa with open source, high quality data that can be used to build real-world applications).

Source: Information of each websites researched by JICA Survey Team

➢ Supprt for participants

One of the incentives for participation in any OI is the provision of technical assistance and mentorship by experts. For example, in the case of UNDP, Japanese companies with limited knowledge of the challenges and realities of developing countries are provided with advice by experts who know the challenges and realities of developing countries. One of the strengths of the UNDP Accelerator Labs is that they have many experts who are familiar with the field, as they have labs in 78 countries. In addition, they have a wide range of experts such as AI, machine learning, and ethnography. Similarly, in terms of leveraging its own strengths, Google provides training in machine learning and product development. Since Google is one of the world-famous companies, many people would like to receive mentorship and training from Google staffs. In addition, WFP's WFP-X supports the embodiment of the moonshot approach of creating 100 ideas in 100 days, providing a novel learning opportunity for the participants. It seems that each program is designed with a specific purpose in consideration of their target participants; to support participants who are not familiar with the field in developing countries, to support participants who want to learn about technology and product development, and to support participants who want to learn about innovative business approaches.

Figure 6-2 Characteristics of UNDP Accelerator Network

Source: UNDP

Considering the previous sections “6.1.1 Comparison of open innovations conducted in each country” and “6.1.2 Comparison of the three types of open innovation implemented in this survey”, it can be said that the key point is how to secure the important factors such as the detailed explanation of specific issues, commitment of involved stakeholders, restricted time period for OI, and incentives for participation. In the OI design stage, it is important to determine where to set the objectives within the constraints of each of these elements. Based on the above, the direction of OI promotion by JICA will be described in more detail in the following sections.

6.2 Direction of JICA's Open Innovation Promotion (overall image)

As shown in the figure below, there are two possible directions for JICA's open innovation: the “ODA project formation type”, which aims to eventually formulate an ODA project, and the “Private business formation type”, which aims to form a private-sector project that can be initiated by private entities such as a company and NGO. For each of these two types, there are four stages of activities and relevant support: "Search for STI-applicable needs and OI themes," "Search and matching for candidate solution providers", "Business development support," and "Scale-up support.

In the “ODA project formation type”, JICA will formulate projects (e.g., technical cooperation project) suitable for JICA to act as the project leader, based on the local needs from the local offices as well as commitment from local stakeholders. On the other hand, in the “Private business formation type”, JICA's support aims at attracting and encouraging private sector entities to implement business that will be able to promote development and social impact.

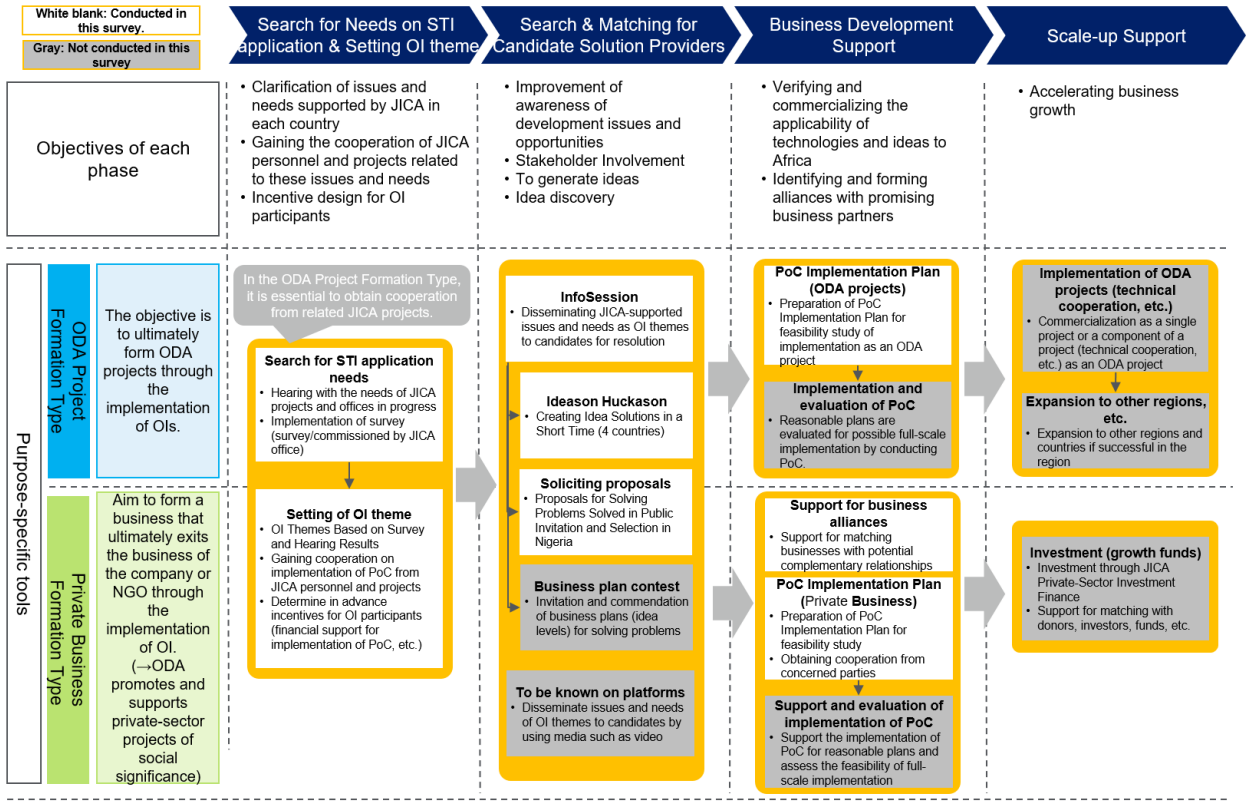


Figure 6-3 Overview of Open Innovation Promotion by JICA

Source: JICA Survey Team

6.3 OI Implementation Method by JICA

6.3.1 Search for STI-applicable Needs and Setting OI Themes

In general, it is important to set high-resolution themes in order to obtain good output from OI[28]. In order to set high-resolution themes, it is the best to collect voices from JICA experts, counterparts, JICA staffs and JOCVs on areas where STI application is needed. In addition to the method of conducting interviews through surveys, for example, soliciting areas which STI application is needed from JICA related personnel once or twice a year and evaluating relevance of the issues as OI themes may also be considered.

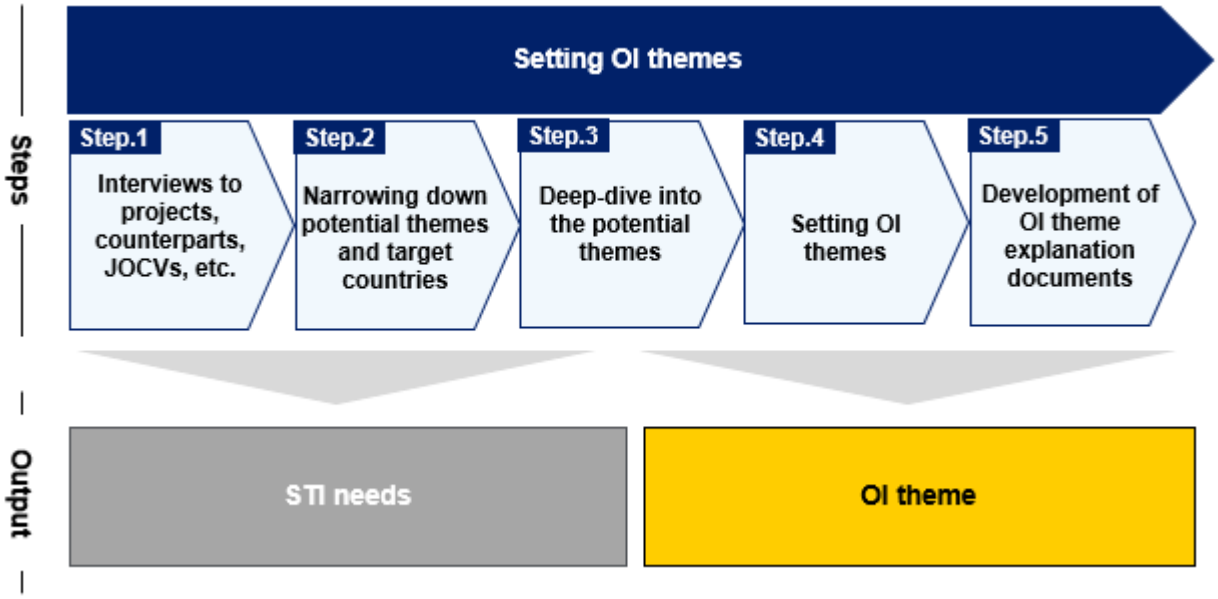


Figure 6-4 Setting OI Themes

Source: JICA Survey Team

The points to consider when evaluating the appropriateness as an OI theme are as follows:

(1) Is there a person concerned (JICA person or local government person, etc.) who is familiar with the local challenges?

(2) Is there a certain number of players (mainly private companies) who can provide solutions, and is there a variety of solutions?

(3) In the case of ODA formation type, can integration into ongoing projects or formation of new projects be expected?

(4) In the case of private business formation type, does the market exist?

[28] Some OI methods such as sourcing and scouting sets broad themes and looks for startups or technologies within the broad theme, so it is not necessary to set themes with high-resolution in all cases.

6.3.2 Search for Potential Solutions

(1) Selection of OI Methods

There are various OI methods, and it is important to select an adequate method in response to the objective. The following are some of the methods applicable in the development context.

① Ideathon・Hackathon

Hackathon is a coined word that combine “hack” and “marathon”; it is an event in which diverse persons such as IT engineers, designers, product managers are brought together to jointly develop new services, systems and apps in a short period of time.

Ideathon is a coined word combining “idea” and “marathon”, and originally it was a session implemented before the hackathon to develop an idea on the product to develop through the hackathon. It can be implemented by itself alone, where various participants come together to develop a new idea in a short period of time under a specific theme. Since it may take some time from idea creation to commercialization, ideathons are often carried out with the aim of community development for people with the same interest and creating a foundation for new idea development. Ideathon platforms are more likely to be carried out as one-off events rather than regular events.

② Business Contest

Business contests publicly recruit new business plans and ideas and awards excellent plans. For the awarded ideas, support menu from prize money to technical support by supporter companies are provided. “Business Idea Contest for 4 Billion People” by IC Net Ltd in partnership with JTB, RICOH, DyDo, HITACHI, etc awards business ideas contributing to improving the social challenges in developing countries. Business ideas with highest evaluation will have the chance for a sponsored feasibility study as well as support for commercialization. Business contests are often conducted with the aim of finding good ideas and stakeholders with high potential for collaboration. Also, there can be an aspect of community developments among people with similar interest.

③ Pitch Event

Pitch event is an event where startups present their technologies and services to investors and potential business partners in a few minutes, in order to obtain opportunities for financing and business alliances. Pitch event is widely utilized as an opportunity for investors to discover companies with potential for growth, and for business companies as a place to discover seeds of innovation, combine them with their own assets, and consider new businesses. It is often implemented by themes such as fintech, agritech, healthcare, etc. In some cases, it is conducted as one-off event, in other cases, it is held regularly as a platform.

④ Sourcing, Scouting

Startups with novel technologies and business models are searched in response to specific areas of interests in order to create new businesses through collaboration with startups. Collaboration hypotheses are developed, which can lead to PoC and commercialization. OI consultants who have a wide network with startups are often utilized.

⑤ Accelerator Program

Accelerator programs accelerate the growth of startups within a duration of a few months through support such as mentoring, funding and provision of networks. Initially launched by Y Combinator, an accelerator in the U.S., in 2005, launch of corporate accelerator programs to accelerate innovation through alliance between large corporates and startups have become active. Usually, after setting up the theme, application will be accepted and screened, periodic mentoring and KPI management will be conducted, and provision of funds and resources will be carried out in the program.

Method	Form		Objective					Engagement level
	Event/ One-shot	Platform/ Program	Idea Creation	Community Development	Identification of stakeholders with potential collaboration	New business development and alliance	Business acceleration	
Ideathon･Hackathon	●	-	●	▲	-	-	-	Light
Business Contest	●	▲	-	▲	●	-	-	
Pitch Event	▲	●	-	▲	●	●	-	
Sourcing･Scouting	●	-	-	-	●	●	-	
Accelerator Program	●	▲	-	-	●	●	●	Heavy

Figure 6-5 Open Innovation Methods

Source: JICA Survey Team

(2) Idea Screening and Project Formulation

The idea screening method (evaluation criteria) differs depending on the form in which the idea is to be materialized. This section summarizes the idea screening methods of the first OI conducted in the four countries in this survey, comparing them with similar evaluation criteria in existing JICA schemes

- Comparison with existing JICA evaluation criteria

Similar evaluation criteria already held by JICA include the SME and SDGs Business Support Scheme and the screening criteria for participation in the "250 Startups" incubation program in the Rwanda ICT Innovation Ecosystem Strengthening Project.

Table 6-5 Criteria for the SDGs Business Supporting Survey

（SME Partnership Promotion Survey）

Screening Criteria		Point for Evaluation
1. Experience and ability as a company for overseas expansion (10 Points)	1-1	Does the company have a track record of selling its products and technologies in Japan and overseas? (5 Points)
	1-2	Is the motivation for overseas expansion and the positioning of overseas business in the management strategy of the SME clear? In addition, is there a clear reason and rationale for the selection of countries, regions, and cities that are under consideration for overseas business development? (5 Points)
2. Status of relevance with development issues and plans for ODA projects (40 Points)	2-1	Is the targeted development issue a priority in Japan's development cooperation policy for the target country? (10 Points)
	2-2	Are the necessary understanding and analysis carried out regarding the current status of the proposed development issues and the products/technologies to be utilized? (10 Points)
	2-3	Is there a high probability that the use of the proposed product/technology will contribute to solving the development problem? (10 Points)
	2-4	Are there any specific plans for ODA projects after the implementation of this survey, or is the possibility of collaboration being considered? (10 Points)
3. Validity of the research plan and implementation system, etc. (25 Points)	3-1	Is the basic policy for conducting the survey clear and appropriate? (5 Points)
	3-2	Is the survey content (survey implementation method, process, personnel plan, etc.) set appropriately to achieve the objectives of the survey? In addition, are the assumed counterparts appropriate? (10 Points)
	3-3	Does the proposing company have an appropriate plan to utilize external human resources after selecting those that it can implement by itself and those that are difficult to implement? (10 Points)
4. Business development plan after the survey (10 Points)	4-1	Does the proposing company have a concrete and feasible business development strategy and plan after the implementation of this survey? (10 Points)
5. Contribution to the local economy and regional revitalization (15 Points)	5-1	Is the proposing company currently contributing to the revitalization of the local economy and communities in Japan? (10 Points)
	5-2	Is the implementation of the ODA projects and overseas development surveyed expected to promote the revitalization of the local economy and regions in Japan? (5 Points)

Source: JICA

The screening criteria for the SDGs Business Support Survey (SME Partnership Promotion Survey) focuses on “2. match with development issues and plan for ODA projects”. Half of the 40 points are given for the appropriate analysis of the problem and the suitability of the proposed product or technology to

solve the problem, and the other half points are given for the relevance with the ODA project. In addition to the survey content, the ability of the proposing company to conduct the survey, including its ability, survey method and system, is also an important factor to be considered.

Table 6-6 Criteria for the Enhancement Project of Rwanda's ICT Innovation Ecosystem

Screening Criteria		Allocation of Points		
		Screening Application	Interview	Final Presentation
1	Articulate a clear understanding of challenge(s)	25	20	15
2	Have innovative, well-designed solution(s) on the challenge(s) by using ICT	30	25	20
3	Argue well how the proposed solution(s) serves to contribute to addressing the challenge(s)	20	25	30
4	Have the potential market to sell. The proposals based on the discussion with the potential clients are preferable.	10	15	20
5	Combine bold vision with an appreciation of cost effectiveness and sustainability	15	15	15

Source: Rwanda's ICT Innovation Ecosystem Strengthening Project

The criteria for participating in "250 Startups" is to participate in the incubation program for 6 months, and to determine the likelihood of commercialization at the end of the program. Startups that pass the application screening will be interviewed and will be given a certain period of training to polish up their business plan, followed by the final presentation screening. Therefore, the screening of applications focuses on the understanding of the problem and the originality of the idea. In the meantime, the final presentation focuses on the appropriateness of the solution to the problem and the analysis of the target market and customers, reflecting how the business plan has been polished up through the training. Since the program targets seed-phase startups with weak organizational structure, there are no screening criteria for organizational structure, but there are application requirements such as "having a working prototype.

- Comparison of the evaluation criteria used in the first field OI of this survey (Nigeria and Rwanda)

As mentioned above, it is important to set up evaluation criteria that are in line with the purpose, so this survey attempted to create evaluation criteria according to the situation of each country. As an example, the evaluation criteria for the first OI ideathon in Nigeria and Rwanda are compared.

In both cases, while applications screening can be conducted beforehand, all ideas should be reviewed within a limited time of one day at the end of ideathon. Therefore, instead of a comprehensive screening process like the SDGs Business Supporting Survey, the criteria focused on the substance of the business idea and set common indicators such as Validity, Impact, Competitive advantage, and Organization, like "250 Startups".

In addition, within the scope of the common criteria, slightly different evaluation criteria for each country were set in accordance with the background and purpose of each country, as follows.

Table 6-7 Criteria the First Open Innovation (Nigeria and Rwanda)

	Criteria	Nigeria	Rwanda
1	Validity	Does the solution match the needs of FCTWB or needs of water sector? (20) Priority of the solution within FCTWB or within water sector (20)	Does the solution match the needs of agriculture sector or needs of coffee project? Is priority of the solution within agriculture sector or within coffee project high? (30)
2	Impact	Impact of the solution towards functional improvement of FCTWB or towards water supply (30)	Argue well how the proposed solution(s) serves to contribute to addressing the challenge(s) and needs and wants of the customer (20)
3	Competitive advantage	Is the idea unique? Is the advantage of the solution amongst other existing solutions clear? (15)	Have innovative and unique solution(s) on the challenge(s) by using ICT (30)
4	Organization	Can we expect a strong team to implement the project? (15)	Can we expect a strong team to implement the project? (10)

Source: JICA Survey Team

The key points of the screening criteria in each country are as follows.

- Nigeria

In the Nigeria ideathon, very specific information was provided about the challenges, the users of the proposed solutions, and the budget providers (sponsors) of the PoC. Considering that the intentions of the FCTWB, which is both the proposal provider and the user, should be widely incorporated in the judging, adjustments were made so that the judging results of the FCTWB side and the Japanese side would be equally reflected. In addition to the judges from JICA and FCTWB, the judging panel was composed of personnel with a thorough understanding of technology and business who are running the acceleration program at the Nigerian IT Development Agency (NITDA). On the other hand, it would have been difficult to judge the implementation structure of each participating company in a one-day ideathon, so there was room for consideration in setting a slightly lower score for the judging organizational structure.

- Rwanda

There were two exit strategies for the event: participation in the “250 Startups” program and the possibility of collaboration with the Project for Strengthening Coffee Value Chain in Rwanda (CUP). For this reason, the judging panel included two judges from “250 Startups” and two judges from CUP, as well as representatives from the JICA Rwanda office in charge of private sector collaboration, ICT, and agriculture, since these are all JICA projects. In addition, to evaluate the business aspect of the project, a VC (Sobek Capital) was also invited to join the panel of judges to ensure a multifaceted evaluation. The difficult points when preparing the application guidelines and setting the screening criteria were whether or not to set the condition of having a working prototype, which is a condition for applying to “250 Startups”, and whether or not to include organizational structure as a screening criteria in light of the lessons learned in Nigeria.

If “250 Startups” is considered as an exit, having a working prototype should be a condition in the application guidelines, on the other hand, in order to realize the OI involving various stakeholders, which is the purpose of this survey, there is also the idea that participants should not be limited to startups that stick to products and services that have already been developed. Furthermore, considering the possibility of collaboration with CUP, even if there is no working prototype as of May, it would be acceptable if a working prototype could be created before the second OI in July (the initial plan was to create a PoC plan at the second OI though it was not implemented). For this reason, although the requirement of having a working prototype was not set as a condition for application, the survey team intentionally selected about half (10/19) of the startups that had working prototypes during the application screening process.

- Key Points of the Screening

It is ideal that the judging panel consists of stakeholders from various fields, such as experts on the subject matter (providers of theme), users, sponsors, technology, business, and so on. However, depending on the purpose of the OI and the exit strategy for the follow-up, the idea with the highest total score may not necessarily be the most suitable for subsequent realization. While conducting the scoring, the judges should discuss and select the ideas that should be followed up. For example, in Rwanda, while referring to the results of the total score by all the judges, the intentions of “250 Startups” and CUP were given top priority in deciding which startups to follow up on.

(3) Method of Setting Screening Criteria

One of the lessons learned from the first OI in this survey is the importance of setting clear objectives and exit strategy. As seen from the example of Nigeria, if the purpose and exit are clear, the problem, users of solutions, and sponsors are clear, and naturally the criteria and who should be the judges can be clearly set. On the other hand, if multiple exits are set up, as in Rwanda, it may seem that the possibility of realizing the idea will increase due to the large number of options. However, it is difficult to determine where to set the standard for screening criteria and application requirement. The intension of this survey envisages a wide range of possible exits strategies for OI such as to be implemented by JICA including JICA projects as well as private sector collaboration, by other donor funds, by private sector business, and use of VC funds, etc. It is necessary to clarify the exit strategy or, if multiple exits are envisaged, it is necessary to clarify the priority of these options.

Although the situation in each country was different, the first OI was conducted with the aim of creating new ideas as well as ideas that would lead to follow-ups (i.e. ideas with feasibility). From the perspective of promoting idea generation, it is important to take the approach of "improving and utilizing other people's ideas rather than denying each other's ideas" in group work, but this may result in the output that are not good enough. On the other hand, from the perspective of creating ideas that can be followed up, it is important to discuss ideas with a certain degree of severity. All the stakeholders should have common understanding about the expected value of the output of group work in an ideathon where people are meeting for the first time. (In the event in Rwanda where we prepared the exit of “250Startups”, the judges from “250 Startups” and the VC asked tough questions about the feasibility of the participants' ideas, and some participants were positive that it was good, while others said it was unexpected.) In designing such

an event, it is necessary to clarify the purpose from the event design stage, whether to evaluate ideas that are not bound by existing frameworks, or to evaluate ideas that have a high possibility of materialization that can be followed up.

Based on the above, in order to consider the screening perspective when JICA implements OI, the following comparison was made between SDGs business supporting scheme and "250 Startup" (an example of local entrepreneurial support), which have been compared so far, plus normal, regular procurement.

Table 6-8 Focused Points in Evaluating in Each Schemes

	General Procurement	JICA's SDGs Business Support	250Startups (Local Startup Support)	Open Innovation	Open Innovation (in case of local OI)
Purpose	• Procure products and services needed by JICA based on clear specifications	• Encourage Japanese companies to expand their business in developing countries	• Support the development of local entrepreneurs and startups	• Utilize digital technology • Engage diverse stakeholders in development and dialogue/idea generation to solve social issues	• Utilize digital technology • Engage diverse stakeholders in development and dialogue/idea generation to solve social issues
Expected Outcome	• Obtain products and services that meet specifications at the lowest possible cost	• Japanese companies will be able to develop their business through this scheme • The business will contribute to the SDGs	• Entrepreneurs and startups' capabilities will be developed • Their business will grow	• The generated ideas will be used to solve problems (as ODA **or** private business by the support by JICA **or** other donors **or** private funds).	• Lead to a PoC to verify the possibility of using the generated ideas in JICA projects (technical cooperation projects, etc.)
Prioritized Evaluation Criteria	• Must meet specifications • Cost	• Business feasibility • Ability to conduct research	• The potential of entrepreneurs and startups	• Varies depending on expected outcomes	• Compatibility with the collaborative project (objectives, environment, price, operability, infrastructure, etc.)
Implementer and Sponsor	• Both the Implementing body and sponsor are JICA • The criteria are clear	• The Implementing body is a Japanese company • The sponsor is JICA • The criteria are clear	• The Implementing body is local entrepreneurs and startups • The sponsor is JICA • The criteria are clear	• Difficult to set standards due to unclear entities and sponsors (various stakeholders) • Criteria should be different according to the entities and sponsors.	• In the case of local OI of this study, the implementing bodies were basically local startups • The sponsor is JICA

- Open innovation in this survey refers to a system of dialogue and idea generation to solve social issues through involving various stakeholders in development (governments of developing countries, private companies, NGOs, universities, local governments, Japanese government, etc.) (from the specifications of this survey).
- The purpose of this survey is to investigate the applicability of digital technology in Africa, and to examine ways to solve development issues in Africa by incorporating technologies and ideas from private companies, governments, various organizations, and academic institutions in Japan and Africa through open innovation. (from the specifications of this survey).

Source: JICA Survey Team

If the solution to the problem is very clear at the level where a specification can be written, the normal procurement method can be taken. For business support of Japanese companies, there is the SDGs Business Support Scheme. If the purpose of the project is to support local entrepreneurs, it is not necessarily the best way to use the OI method. In sum, it is necessary for the judges to have a common understanding for what purposes OI is being conducted and what is the difference between OI and the abovementioned alternatives.

As seen from the above table, since the objectives of OI are broad, there is a wide range of expected outcomes. Therefore, it is difficult to narrow down the perspectives to focus on in the screening process. This is also a problem with the definition of the term "OI" (OI in this survey refers to a system of dialogue and idea generation and solving social issues for involving various stakeholders in development

(governments of developing countries, private companies, NGOs, universities, local governments, Japanese government, etc.). For this reason, the expected outcomes of the OI should be clarified after clarifying the implementing bodies and sponsors. For example, as shown in the rightmost column of the table above, in the local OI of this survey, the outcome was considered to lead to a PoC for materializing the generated ideas in JICA projects, taking into account the perspective of increasing the motivation of local companies to participate, and the screening criteria were set based on it.

As will be discussed later, the points of view to be considered in the screening process change depending on the type of exit envisioned after the idea is generated in the OI. For example, if the PoC is to be implemented within an existing JICA technical cooperation project, the most important point should be the compatibility with the project objectives (including sustainability, price, operability, infrastructure environment, etc., from the perspective of the C/P organization and users), rather than the support for Japanese companies or the novelty of the technology and solution. The use of technology is only a tool, and the most important point is whether it can really contribute to achieving the objectives of the technical cooperation project. Also, considering the implementation schedule of the collaborative project, it becomes clear whether or not it should be a prerequisite that the product or service has already been developed to a level that allows for speedy implementation.

If the OI is not designed to collaborate with ODA projects, other objectives may be set, such as supporting Japanese companies to enter the African market, supporting local entrepreneurs or utilizing novel technologies. Since JICA is a development assistance agency, not a profit-seeking private company or a technology-seeking academic research institution, the most priority should be put on the development impact and benefit to the local people.

6.3.3 Business Development Support

(1) Methods of Business Development Support

How can JICA support the materialization of promising ideas generated by the OI? First of all, in order to implement a PoC, a detailed plan is required including the content of the implementation, evaluation method of the implementation results, implementation period, and necessary costs, so on. The PoC plan can be created as an event following the ideathon (the initial plan in this survey), created and submitted by each company on its own (a method similar to a business competition), or created by co-working with JICA (a method similar to an accelerator).However, two issues can be raised: one is who and how to support this process (even if each company prepares it on its own, it is necessary to provide information from the JICA project it is collaborating with). Another issue is the additional workload on the project side in collaborating with the JICA project during PoC implementation.

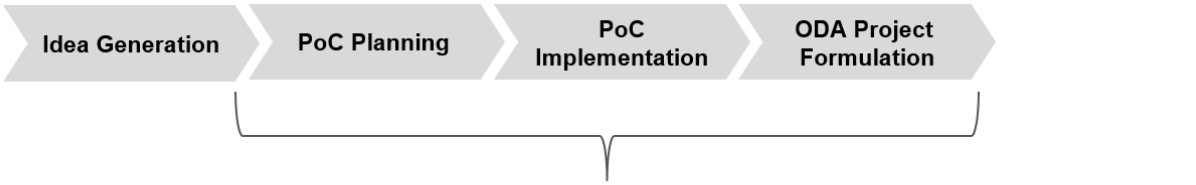


Figure 6-6 Methods of Business Development

Source: JICA Survey Team

Taking these issues into consideration, the measures to support the commercialization of the generated ideas are organized as shown in Figure 6-1, according to the categories of "ODA project formulation type" and "private sector project formulation type" (although the private sector collaboration scheme can be considered as an ODA project, it is organized as a private sector project formulation type in consideration of the difference from technical cooperation and the purpose of the scheme). The details of each type are described in the following section.

Table 6-9 Measures to Support the Commercialization of Generated Ideas

Type	Scheme	Merit	Measure	Points to be considered for implementation
ODA project formulation type	· Aim to commercialize as a component of existing technical cooperation projects	· The implementation scheme is already in place, and coordination costs for implementation are lower than a new project	· Only introduce companies to project stakeholders (not exactly an ODA project, but just a collaboration)	· Introduce the company to the C/P and project stakeholders to explore the possibility of introducing the solution · The workload on JICA and the project experts is relatively light, but the benefits to the company are limited, and the possibility of commercialization depends on the company's effort
			· Modify the PDM to formally include it in project activities	· In some cases, additional workload may be required for the project experts in order to involve stakeholders to agree on PDM changes. · There is a clear advantage for companies to ensure that their solutions are used in the project.
			· Implemented under a different scheme and budget from the on-going project.	· Save time and effort for PDM change, but may require a certain additional work for project C/P and experts to coordinate with companies. · Speedy implementation is possible compared to PDM change
	· Aim to commercialize as a component of a new technical cooperation project	· High degree of freedom to design PDM based on the use of specific technologies and ideas	· Select issues and narrow down the technologies and ideas to be used for a project during its detailed planning survey to some extent, and include related activities in the PDM.	· Since it may take six months to a year from the detail planning survey to the start of the project (or the start of the actual activity), there is a risk that the targeted technology may be out of date · To avoid using an out-of-date technology, it is necessary not to stick to a specific technology but to consider wide range of technologies and ideas to utilize
Private business formulation type	· Aim to commercialize utilizing JICA's private sector collaboration scheme (SDGs business support) (only Japanese companies)	· It can be an exit strategy when there are no technical cooperation projects that can be collaborated with · The timing of implementation is predictable to some extent and the budget is secured	· Explain the private-public partnership scheme and advise on proposal preparation	· Little benefit for local companies · It is necessary to have the applicant companies understand the outline and limitations of the scheme (e.g., it is highly competitive and there is no guarantee to be selected, it takes time from application to implementation, it is for survey and not to generate profits, there are no labor costs, and payment is made after the completion, etc.).
	· Aim to commercialize utilizing JICA's overseas investment and loans	· Large-scale business development with funds	· Explain the scheme and requirements and advise on proposal preparation	· The number of companies that can apply is limited due to the highly qualified screening criteria and the time required for screening · Difficult to apply at the stage of commercialization of ideas created through open innovation, as was done in this study
	· Aim to commercialize utilizing donors, investors, funds, etc.	· Can be an exit strategy when JICA is unable to collaborate and support · There are many options for companies.	· Introduce companies to donors, investors, funds, etc.	· Based on the characteristics of donors, investors, funds, etc., it is important to involve parties that are compatible with JICA's open innovation from the idea generation stage.

Source: JICA Survey Team

(2) ODA Business Formation Type

In the case of supporting the commercialization of ideas generated through OI as part of ODA projects, collaboration with technical cooperation projects can be considered. Technical cooperation projects can be flexible, and it is easy to secure the cooperation of the partner country's C/P organization and a site for PoC implementation. It can be implemented over the medium to long term. The following are some points to keep in mind when collaborating with an existing project that is already underway and with a newly formed project.

- Collaboration with On-going Technical Cooperation Projects

While it seems that collaboration with on-going projects is easy, when adding new activities to the project, it is necessary to get an approval from the C/P organization and probably change the PDM, which may require additional coordination work of the project's implementation consultant and hence a change contract.

Regarding this point, if immediate action is the first priority, there is a way to only introduce the company that created the idea to the project stakeholders. After that, it is dependent on the company to take the initiative (the company negotiates with the project stakeholders on the implementation of PoC and introduction of the solution), so commercialization is not guaranteed. However, just having the opportunity can be a benefit to the company, and such information about the potential solution also can be valuable information to the project stakeholders.

The second option is to formally implement the PoC as a project activity; if it cannot be positioned as an activity set in the PDM, it may be necessary to revise the PDM together with the C/P organization, or in some cases, to consider additional man-month for the consultant implementing the additional work. Although this is a time-consuming process, it is highly beneficial to the company providing the solution, as it will provide actual support for commercialization. However, companies should understand in advance that it will take a certain time period to change the PDM.

Finally, there is a possibility of implementing the project under a different scheme and budget from the on-going projects. For example, a survey could be implemented as a new program by JICA or it could be implemented by utilizing another scheme like the JICA overseas business enhancement funds. If the PoC planning and implementation support is outsourced to a local incubator, the procurement process can be simplified depending on the cost, and allowing for speedy implementation. In this case, from the perspective of collaboration with on-going projects, there is no need to change the PDM, but it should be noted that it may still require additional workload for the implementation consultant in order to obtain cooperation and commitment from the project stakeholders.

- Collaboration with New Technical Cooperation Projects

In cases where on-going projects do not exist or are difficult to collaborate with, there is a method to include the idea generation process into a new project. Specifically, during the detailed planning survey, it is considered whether the new project goals can be achieved more effectively and efficiently by the use of technology. If the results of the survey are positive, the use of technology is included in the new project activity plan. However, considering rapid evolution in technology, there is a risk that the targeted

technology may become out of date because it may take almost a year from the detailed planning survey to the implementation of a new project. To avoid using an out-of-date technology, it is necessary not to stick to a specific technology but to consider wide range of technologies and ideas to utilize. (It is also possible to conduct OI as part of the detailed planning survey, but it would be vey difficult to do so within the short survey period.)

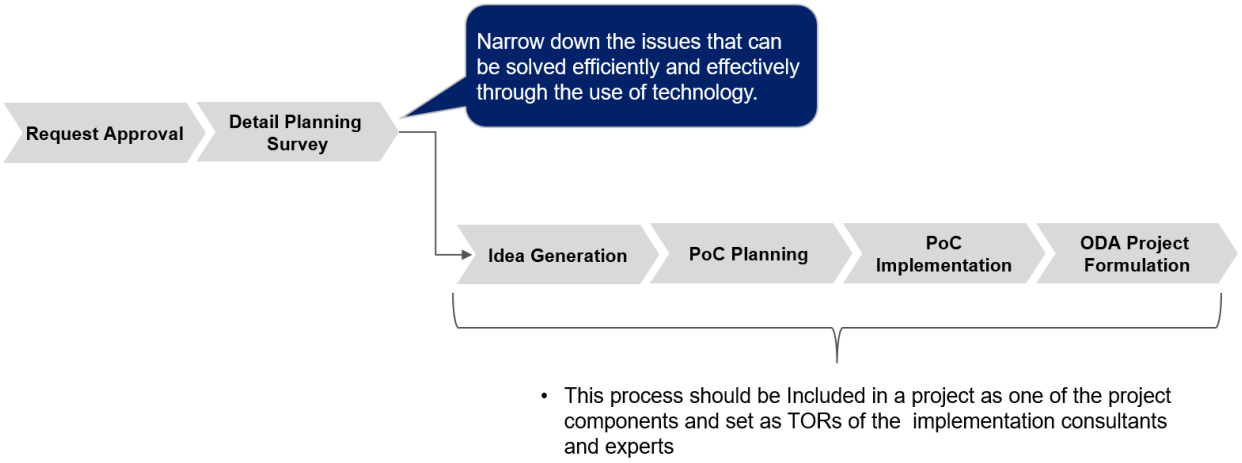


Figure 6-7 Co-operating with a New Project

Source: JICA Survey Team

(3) Private Business Formation Type

If ODA projects are not able to provide support for commercialization, JICA will support the promotion of commercialization as a private-sector business, targeting business ideas generated by OI that are unlikely to be linked to ODA projects but will contribute to solving development issues. Specific support methods include the use of JICA's private-sector partnership scheme and the utilization of resources outside of JICA.

➢ Utilization of JICA Private Sector Co-operation Scheme

In regard to the private sector business formation type, JICA's SDGs business support scheme is the first to be considered. Since this scheme is limited to Japanese companies, this survey assumed, by introducing ideas proposed by local companies to Japanese companies in response to local issues, Japanese companies wishing to collaborate with local companies might consider applying for this scheme. It would be an effective exit strategy for OI for Japanese companies to fill in the technology gaps that local companies lack and to collaborate with local companies to advance into Africa.

However, according to the results of the interviews with Japanese companies, because the companies already conducted their own research on startups in Africa, only a small number of Japanese companies claim that they would consider the possibility of collaboration if there are good local startups. Also some said, it is not necessary to collaborate with local startups as a way to expand business into Africa. Especially for large Japanese companies, there are obstacles such as not being able to get credit for new transactions with small companies in Japan, and even more so with African startups. In fact, some large Japanese

companies seek collaboration with companies started by Japanese nationals or major local companies. Furthermore, from the perspective of utilizing the SDGs business support scheme in collaboration with local companies, another problem raised was that the system is not attractive to local companies because they can hardly pay for research.

In addition, it leaves question whether the local ideathon method used in this survey is the best method for matching Japanese companies with local startups. First of all, there is a concern that it may result in disappointing the excessive expectations of the participating local companies. For example, Rwandan officials who had accepted many visits from Japanese companies with the expectation of investment and collaboration expressed a sense of "disappointment" with the Japanese companies (in fact, there were few cases where the visits led to concrete investment or collaboration). In addition, it is necessary to consider the risks involved in whether or not a good match can be made through a one-off event where it is difficult to obtain detailed background information on the participating companies.).

What can be said through this research is that there are many issues to be overcome in the exit strategy of "using the SDGs business support scheme to promote collaboration between local and Japanese companies, starting with local ideathons. However, although the general opinion is that collaboration with local startups is a high risk as mentioned above, some Japanese companies are interested in building relationships with local startups as one way to advance into Africa. For such companies, this scheme is very beneficial, as it allows them to collect information from local startups and conduct field research in a loose collaboration. Among the Japanese companies interviewed in this survey, not many had an accurate grasp and understanding of the scheme. Therefore, it is important for JICA to promote understanding of the scheme by continuing to provide explanations of the scheme and advice on proposal preparation (as it is currently doing)

- JICA overseas investment and loans

As for overseas investment and loans, there are some examples of Japanese startups using technology in Africa that have been eligible for JICA investment and loans, such as Digital Grid Corporation (at that time, renamed WASSHA Corporation), which received a loan of 300 million yen from JICA in 2016. However, because of the high screening criteria and the requirement for applicants that are expected to be a certain level of track record, it is difficult to apply for the stage of commercialization of ideas generated in the ideathon in this survey.

- Donors, investors, and funds

Besides the JICA scheme, there are other ways to explore the possibility of support from other donors, investors, local incubators, and venture capitalists. For example, in this survey, Rwanda involved RISA, a Rwandan government agency that is implementing a similar program with other donors, as well as venture capitalists, who also participated in the ideathon as judges. In this way, by having them participate in JICA's OI as observers or judges, it is possible to build a bridge to support providers other than JICA. In fact, in Rwanda, RISA was exploring the possibility of following up on ideas that JICA did not follow up on, in collaboration with other donors. However, since each position, such as donor or investor, has different

perspectives and objectives, it is important to involve those who match JICA's OI from the planning stage, taking into account the characteristics of those partners (if their objectives do not go along with JICA's objectives and screening criteria, the screening process might be negatively impacted). As described in "6.2.2.(3) How to set the screening criteria" above, it should be noted that it is not necessarily beneficial to provide many exit options

6.3.4 Implementation Procedures

The OI implementation process and the roles of relevant stakeholders are as follows.

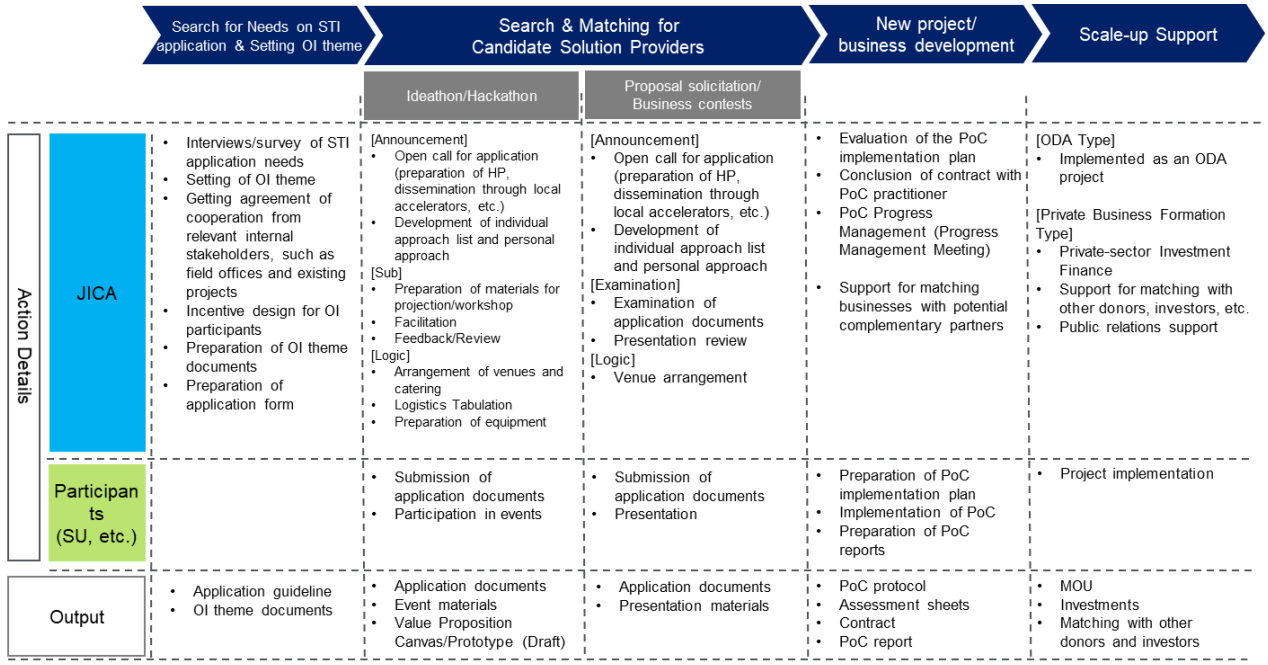


Figure 6-8 Implementation Procedures

Source: JICA Survey Team

6.4 Lessons Learned and Recommendations

6.4.1 Rationale of Introducing OI in JICA

While this section is returning to the purpose of this survey, the significance of introducing OI as JICA is reviewed. Then, this section summarizes lessons learned and recommendations. As stated in Chapter 1, the objectives of this survey are as follows;

This survey investigates the applicability of STI, especially disruptive digital technology, to Africa and how it can be utilized to solve development issues in Africa by incorporating technologies and ideas from Japanese and African private companies, governments, various organizations, and academic institutions through open innovation.

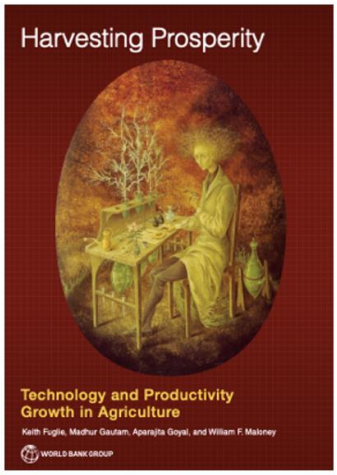
In line with the above survey objectives, the survey results are briefly summarized from the following three aspects.

- The applicability of digital technologies in Africa
- Significance of incorporating technologies and ideas through open innovation
- Consideration of how to implement open innovation

(1) The Applicability of Digital Technology in Africa

As discussed the background of this survey in Chapter 1, the significance of STI in international developments has grown, and STI is considered as important tools for achieving SDGs. For example, donors like the World Bank have issued reports and strategies on the use of digital technology for development. In addition, as described in Chapter 3, the number of tech startups in Africa has rapidly increased, and the groundwork for the use of digital technology in Africa is likely to be strengthened.

✓ The World Bank released a report insisting that agricultural innovation and technology is the key to poverty reduction in developing countries (2019)



Source: World Bank

✓ African Development Bank Released a report about the potential of digital technologies for the Fourth industrial revolution in Africa (2019)

Source: African Development Bank

✓ USAID (United States Agency for International Development) released its digital strategy (2020-2024)

Source: USAID

Figure 6-9 Reports and Examples of Strategy about Implementation of Digital Technology
Source : JICA Survey Team creating based on international organizations' websites

In fact, in this survey, many local stakeholders (governments of the surveyed countries, other donors, private companies, educational institutions, etc.) expressed positive opinions about the possibility of using digital technology in Africa (see Chapters 3 and 5). For example, as described in Chapter 5, the comments made at TICAD7 by Ms. Ahunna Eziakonwa, Assistant to the President and Director of the Bureau of African Affairs of the UNDP, show expectations toward the use of digital technology. In addition, the WFP's WFP-X Moonshot Launchpad Programme and the African Development Bank's IDEATHON#AfricavsVirus challenge, as described in "6.1.4 Comparison with Open Innovation by Other Donors and the Private Sector", are examples of open innovation in order to utilize digital technology. In this survey, we will also examine the impact of the WFP-X Moonshot Launchpad Programme in Nigeria.

In this survey, the local OI in Nigeria led to the introduction of the information system proposed by a local startup to the water utility company. The use and introduction of digital technology tends to be more important for local public institutions, and digital technology is considered to be a tool that JICA should take into consideration in the formation of future ODA projects.

(2) Significance of Incorporating Technologies and Ideas through Open Innovation

The general process of ODA project formulation so far has been to decide the outline of the project to be implemented through discussions between the partner government and the Japanese government including JICA. While preliminary studies using development consultants have been conducted, in recent years, with the emergence of new technologies and technology-enabled solutions, particularly digital technologies, the traditional process of project formulation with government officials and development consultants has limitations on the selection of the best solution through comparing and examining a wide range of the latest solutions. By incorporating OI, ideas from the private sector and academic research institutions, which have not had the opportunity to be involved in the project formulation process so far, can be utilized to adopt better solutions. It is significant to introduce OI as a new approach of ODA project formulation. Furthermore, as a result of this survey, the products developed by KOSEN OI contributed to the productivity improvement of the Kenyan startup, however, the products did not necessarily utilize the most advanced digital technology. There are many local issues in Africa that can be solved by general technology, by not cutting-edge digital technology. The case study of KOSEN OI shows that OI can be used in a wide range of ways, not limited to the application of disruptive digital technologies.

(3) Consideration of How to Implement Open Innovation

As mentioned above, the significance of JICA's adoption of OI is great, but the results of the multiple OI trials, mainly ideathons, in this survey revealed that there are various issues that need to be addressed in order to make OI successful. Although the issues have been mentioned in the previous sections, they are reviewed and summarized in the following sections, “6.4.3 Recommendations for OI Promotion Measures in JICA Projects,” and solutions to these issues are proposed.

6.4.2 Challenges in Promoting OI

The concept of OI was presented by former-Harvard University faculty member Chesbrough in 2003, primarily as a concept for large corporations to create innovation. Chesbrough called the process of R&D and commercialization only with its own resources as “closed innovation”, and the process of incorporating external resources and promoting product development and commercialization as “open innovation”. After that, as product cycle became shorter, OI was actively adopted by large Western companies as a process to accelerate innovation, and with evidence in overseas that companies that continuously work on OI are creating innovation in the mid to long term, Japanese companies have also become active in venture search activities mainly through acceleration programs after 2010.

On the other hand, it is not always the case that all companies working on OI have succeeded in creating innovation, and various issues in promoting OI have been confirmed. According to the 21st Century Policy Research Institute’s "Research on Japanese-style open innovation", 70% of companies cited issues such as a shortage of human resources to promote OI in a questionnaire, and there were also issues such as the

difficulty in project management of projects in collaboration with external organizations. Also, issues such as the adopted technology did not lead to commercialization were raised.

Under such circumstances, it can be summarized that the companies that show results through OI have seven common elements. The most important thing is "the passion and skill of the person in charge". The key to success is how enthusiastic the person in charge can promote while involving others. Next is "commitment by the top towards OI". It is important to disseminate the significance and strategy of working on OI internally, and to allocate necessary personnel and budget. As for another element, it is "culture". Since no one can know whether OI will bear results at the beginning, an internal culture that encourages challenges to create greater impact is important. In addition, "organizational structure" that enables quick decision-making, "network" with venture companies and external experts, "strategy" such as positioning OI in company-wide strategy and appropriate resource allocation to OI activities, "Systems" such as personnel evaluation and incentive design are also important factors. Not only for private companies, but these factors are also important to international cooperation organizations in promoting OI.

6.4.3 Recommendations for OI Promotion in JICA

(1) Challenges Faced in This Survey

Based on the above success factors, we will organize the challenges faced in this survey.

- Passion and skill of person in charge, commitment by the top towards OI

In this survey, there were differences in the degree of commitment to OI efforts by target countries and persons in charge. Possible causes include the lack of understanding of OI itself, not being an on-site initiative, and being busy with regular work and not having time to devote to additional work.

- Strategy

In this survey, as shown in the figure below, it was confirmed in advance that the focus of the OI for this survey would be improving awareness of development issues and opportunities, involving stakeholders, and forming communities with the main objective of creating ideas. Ideathons (4 countries and Tokyo), call for proposal on PoC plan (Nigeria), hackathon and PoC (KOSEN OI) were implemented.

However, during the survey, the mainstream argument shifted to, we should focus on PoC and new project/business development rather than improving awareness and creating ideas. (With such arguments, the subsequent survey focuses on PoC of technologies.)

One of the issues is that the survey had to set OI themes and hold a number of OI events in a short timeline, without sufficient discussion on strategies such as what and when to achieve through OI.

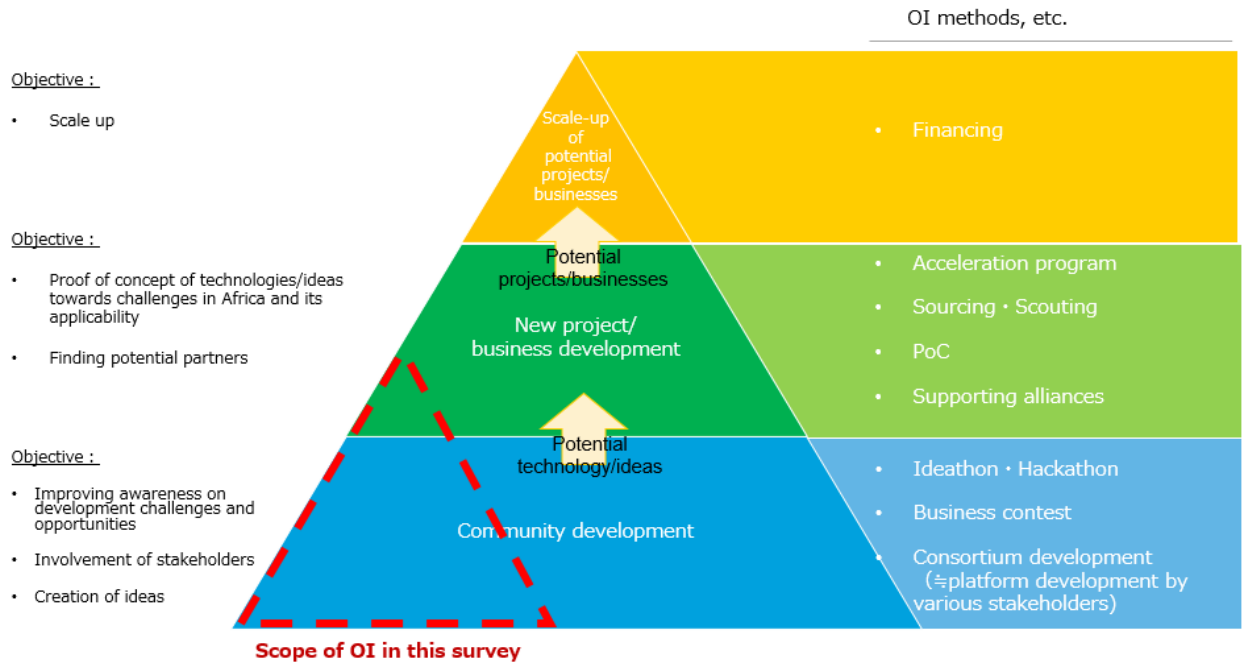


Figure 6-10 OI Objectives, Methods, and Scope of OI Implemented in This Survey

Source: JICA Survey Team

- System design

In this survey, we posed advantage to the participants such as the selected PoC project costs can be borne by JICA and that the government may introduce services if the PoC succeeds (Nigeria case), and a certain number of applications were received.

However, for Japanese companies, if specific support after the PoC is not presented, it could be better to apply for JICA's open application projects towards the private sector from the beginning. In addition, at present, no-bid contracts are not allowed except for special cases, but if the PoC is successful and is decided to be introduced into projects, etc. via tender, it could be a big disadvantage for the companies who conducted the PoC, as the result could be utilized by other competitors. Considering these issues, it is necessary to consider not only the burden of demonstration costs but also incentive design beyond that before promoting OI.

- Organization, network

Although it is not an issue faced in this survey, during the period of this survey, business contests, acceleration programs, demonstration projects, etc. were initiated by the STI / DX Office of the JICA Governance and Peacebuilding Department, the Economic Development Department, and other regional departments. It seems that OI initiatives have been launched in various departments without knowledge necessarily being shared. In order to accumulate best practices and knowledge on OI, build network with venture companies and external experts, and continuously work on OI, it seems that organizational structuring is necessary.

(2) Promotion of OI in JICA

Based on the above issues, we will organize the efforts required to promote OI in JICA.

Table 6-10 OI Promotion Measures in JICA

Overall goal	Realize leapfrog development of development issues
Objective	To co-create innovative new projects/businesses with different stakeholders by JICA taking the lead to incorporate technological seeds and solutions of private companies and academic institutions, etc. that will lead to solving challenges in developing countries through OI
Outputs	1) Strategy and guidelines for OI program are formulated 2) The importance of OI is recognized within JICA 3) The organizational structure necessary for promoting OI will be established. 4) The system necessary for promoting OI will be developed. 5) OI project is formed and implemented, promising technological seeds and solutions are demonstrated
Activities	Output 1: Strategy and guidelines for OI program are formulated ➢ Define what to achieve with OI ➢ Organize OI methods according to the purpose ➢ Organize KPIs on what to realize by when
	Output 2: The importance of OI is recognized within JICA ➢ Hold OI seminar for JICA staff ➢ Position OI in the medium-term plan and communicate the importance of promoting OI from the top management
	Output 3: The organizational structure necessary for promoting OI will be established ➢ Organize the department in charge of OI ➢ Organize the duties under the jurisdiction of the department in charge of OI and related departments.
	Output4: The system necessary for promoting OI will be developed ➢ Organize necessary system design based on the formulated strategy
	Output 5: OI project is formed and implemented, promising technological seeds and solutions are demonstrated ➢ OI projects are formed ➢ Projects are implemented (search for solutions, demonstration, formulation of projects/businesses)

Source: JICA Survey Team

In order to promote OI and co-create innovative new projects/businesses with other stakeholders, five initiatives (outputs) are required. The outline of each output is as follows.

- **Output 1: Strategy and guidelines for OI program are formulated**

It is important to define in advance what will be achieved through OI and its purpose, and to clarify the position of OI in higher-level strategies such as the medium-term plan. On that basis, it is important to

organize the approach in response to the purpose and set goals such as what will be achieved by when. If the purpose of what you want to achieve remains ambiguous, it is likely that the implementation of OI itself will often become the purpose. Whether JICA aims to expand the base of stakeholders who participate in solving problems in developing countries, or to form ODA projects that introduce innovative solutions, or to support private projects with innovative and social significance, the first of all, it is important to thoroughly consider and organize the purpose and KPI of the OI program in advance. After that, the implementation plan of the linked project should be considered in accordance with the purpose of the program and KPI. The following are the findings of the survey team regarding the direction of strategies and guidelines.

- What to achieve

  The reason for aid agencies to implement OI is to accelerate the achievement of SDGs. To formulate innovative new projects/businesses that can lead to the realization of leapfrog-like development, instead of business-as-usual, it is needed to involve ideas and innovative technologies of stakeholders who have not been considered as stakeholders in development cooperation traditionally.

  Regarding what kind of new projects/businesses should be formed through OI, the emphasis should be placed on those that could lead to new ODA projects, such as introduction or scale-up in technical cooperation projects, after the demonstration. In order to develop a business in a developing country where business risk is relatively high, it is highly likely that the burden of demonstration costs alone will not be a sufficient incentive for private companies, etc. Even if we ultimately aim for commercialization by private companies, OI should be prioritized in areas where JICA's support for local introduction and deployment could be expected even after the demonstration. For example, IDB lab of the Inter-American Development Bank has formed a business of 230 million yen with aquaculture startup, Umitron, in Peru and is working to improve the efficiency of aquaculture, and such cases can be a benchmark.

- Approach

  In order to construct innovative new businesses, it is important to improve awareness of development issues and opportunities of various actors and promote the creation of new innovative ideas. However, in light of the arguments raised in this survey, in order to foster the momentum of OI within JICA and continuously work on OI, it will be important to first focus on producing clear results. From this point of view, it is desirable to first focus on "new project/business development" in Figure 6-9 to promote OI.

  As a means of " new project/business development ", demonstration support programs (solution search, examination, adoption, demonstration, consideration of new project development) or new business formation by scouting or sourcing of startups in a specific areas utilizing OI consultants who have a wide network with domestic and overseas startups (creation of long list of startups, creation of short list, consideration of demonstrations and new project development) are options. Also, in

countries where the startup ecosystem is relatively developed, implementation of acceleration programs for local startups can also be an option.

- OI target countries and areas of focus

  In order to involve promising actors and form innovative projects that can serve as model cases, prioritized countries and areas should be carefully considered. Necessary budgets should be secured accordingly, and projects should be launched in each country and area. The following points can be mentioned as points for consideration.

  -Are the countries / regions with high market potential for future business prospects?
  -Are areas where the diversity of actors who can provide solutions is ensured?
  -Is there government flexibility in deregulation?
  -Is there a possibility that the project can be implemented with strong interests and motivations from the responsible country?

- KPI

  It is recommended to set feasible indicators through discussions with related departments and have common understanding of what to achieve through OI; such as implementing at least # demonstration projects this year and forming at least # new projects through OI for the next year's request survey.

- Output 2: The importance of OI is recognized within JICA

As mentioned above, in order to promote OI, it is important to disseminate the significance and purpose of OI within the organization. The following two points can be mentioned as specific activities.

- Hold OI seminars for JICA staff about twice a year by OI consultants who are also working on OI for private companies. The contents will introduce the significance of OI, OI methods, trends of OI in private companies and international organizations, success cases, success factors and issues, purpose and process of OI in JICA, etc.
- Send a message from the top to promote OI as an organization. Since it is difficult to materialize with just the command, a concrete methodology such as establishing a dedicated idea frame (budget frame) using the OI method in the internal open call for new business ideas currently being led by the JICA Planning Department could be an option.

- Output 3: The organizational structure necessary for promoting OI will be established

It is essential that JICA works on OI continuously, and it is expected for JICA to establish an organizational structure to continuously work on OI. As mentioned above, OI efforts have been initiated by various departments within JICA. In order to accumulate knowledge of OI, always obtain information on the latest innovation trends, build a network with venture companies and external experts, and

continuously work on OI, it is necessary to organize the department in charge of OI. Since it is a cross-regional / sectoral initiative, it seems to be a good idea to have the STI / DX Office or the Private Partnership Division under its jurisdiction.

- Output 4: The system necessary for promoting OI will be developed

In order to involve actors with promising solutions in OI, it is very important to clarify the advantages of participating in JICA's OI and to organize incentive design for participants. In the case of OI by a large company, the participating startups have clear participation advantages such as access to the customer base of the large company and brand power, and the mechanism is such that a win-win relationship is built with each other.

Especially when approaching social issues in developing countries, the obstacles for commercialization are not low in many cases, so in addition to considering the expected ODA project formulation in advance and supporting demonstration costs, the following systems should also be considered.

- Build a system that allows you to participate in private sector collaboration projects by fast track in cases where private sector collaboration projects are considered appropriate after the demonstration.
- Consider a mechanism that allows you to procure services under a no-bid contract if the demonstration succeeds
- Provide a regulatory sandbox in agreement with the government of the partner country

In addition to designing incentives for participants, it is necessary to consider commending human resources who are actively engaged in OI so that staff with a spirit of challenge inside can actively work on it.

- Output 5: OI project is formed and implemented, promising technological seeds and solutions are demonstrated

Based on the OI program strategy / guidelines formulated in Output 1, OI projects will be formed on either the theme axis (supervised by the theme department) or the country / region axis (supervised by the country / regional department), and activities and KPIs shall be organized under each project. In forming OI projects, including the formulation of OI strategies and guidelines, recruiting consultants for information organization and strategy/project formulation development could be an option.

(3) Lessons Learned from This Survey

In the last part of this report, this approaches five lessons learnt from this survey. Although the following lessons are very general ideas, the significance and importance of these lessons were re-affirmed in this

survey. Future OI implementation by JICA will be expected to bring different effects from those of conventional ODA. Therefore, the results of this survey and the lessons discussed in this section will support JICA to conduct more effective OI.

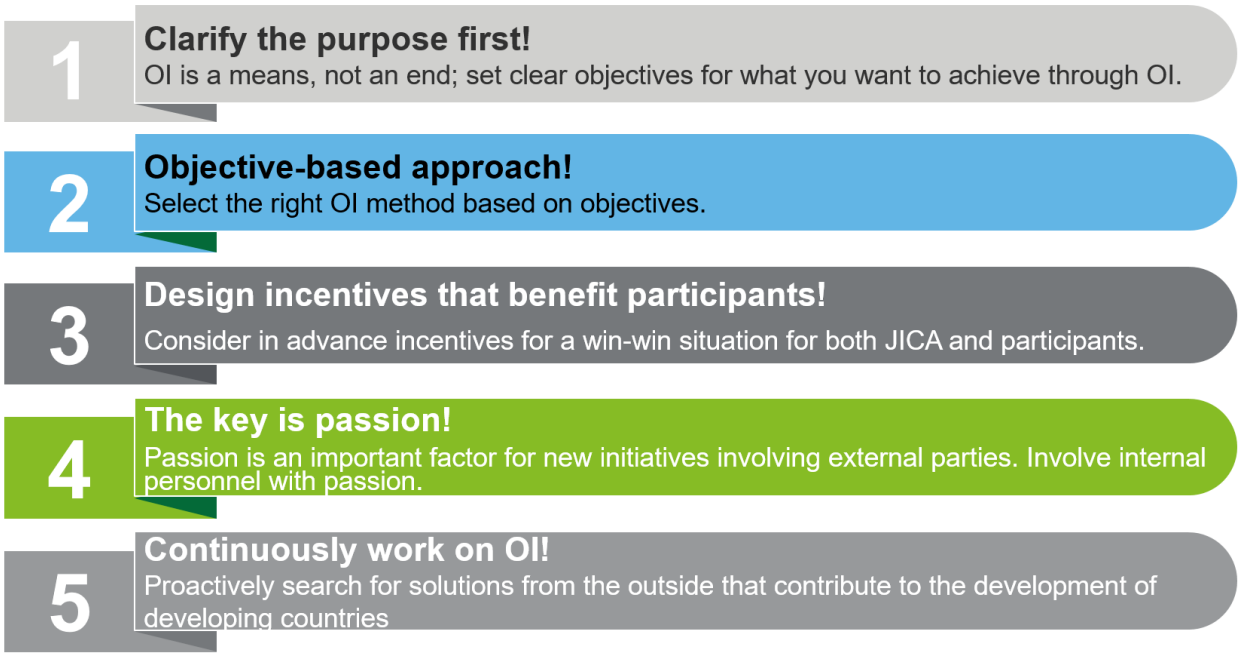


Figure 6-11 Lessons Learnt from This Survey

Source: JICA Survey Team