DATA COLLECTION SURVEY ON TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING IN THE REPUBLIC OF RWANDA

FINAL REPORT

February 2021

Japan International Cooperation Agency (JICA)

Koei Research & Consulting Inc.

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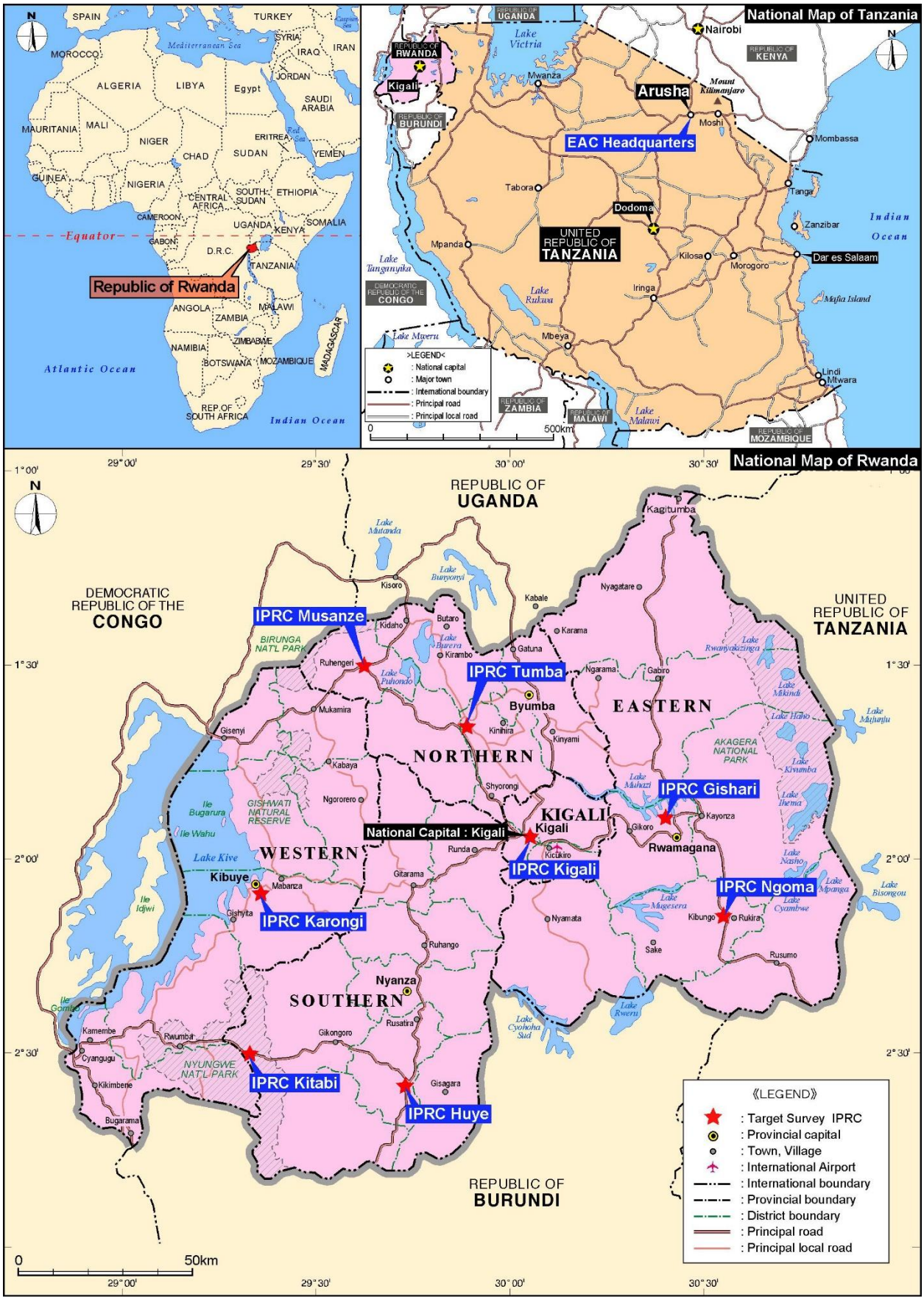

Survey Target Areas

Abbreviations

AFD	Agence Française de Développement
AfDB	African Development Bank
AIMS	The African Institute for Mathematical Sciences
AMIR	Association of Microfinance Institutions Rwanda
AR	Augmented Reality
AU	African Union
BDS	Business Development Services
BMZ	Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung
CBA	Competency Based Assessment
CBT	Competency Based Training
CMU	Carnegie Mellon University
CoE	Center of Excellences
COVID-19	Coronavirus Disease 2019
CSC	Chamber of Skilled Crafts
DE4A	The Digital Economy for Africa Initiative
DSSD	Digital Solutions for Sustainable Development
EAC	East African Community
EASTECO	East African Science and Technology Commission
EASTRIP	The East Africa Skills for Transformation and Regional Integration Project
Eco-Emploi	The Promotion of Economy and Employment Programme
ESSP	Education Sector Strategic Plan
EU	European Union
GIZ	GesellschaftfürInternationale Zusammenarbeit GmbH
IAP	Industrial Attachment Program
ICT	Information and Communication Technology
IPRC	Integrated Polytechnic Regional Center (Before February 2018) Integrated Polytechnic Regional College (After February 2018)
ILO	International Labour Organization
IT	Information Technology
IUCEA	Inter-University Council for East Africa
JICA	Japan International Cooperation Agency
KfW	Kreditanstalt für Wiederaufbau
KOICA	Korea International Cooperation Agency
KOSEN	National Institute of Technology
LMIS	Labour Market Information System
MFI	Microfinance Institution
MIFOTRA	Ministry of Public Service and Labor
MINECOFIN	Ministry of Finance and Economic Planning
MINEDUC	Ministry of Education
MINICOM	Ministry of Trade and Industry
MINICT	Ministry of ICT and Innovation
MOU	Memorandum of Understanding
NTQF	National TVET Qualifications Framework
OJT	On-the-Job Training
PPP	Public Private Partnership
PROMOST	Promoting Market-Oriented Skills Training Program
PSF	Private Sector Federation Rwanda
RDB	Rwanda Development Board
RDPU	Research, Development and Production Unit
RICEM	Rwanda Institute for Cooperatives, Entrepreneurship and Microfinance
RP	Rwanda Polytechnic
RTTI	Rwanda Technical and Vocational Education and Training Institute

RWF	Rwandan Franc
SBFIC	【G】Sparkassenstiftung für internationale Kooperation 【E】Savings Banks Foundation for International Cooperation
SDC	Swiss Agency for Development and Cooperation
SDGs	Sustainable Development Goals
SEAD	Strengthening Education for Agricultural Development
SSWG	Sub Sector Working Group
TAG	Technical Advisory Group
TAPF	Technical Assistance Pool Fund
TVET	Technical and Vocational Education and Training
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNEVOC	International Project on Technical and Vocational Education
UR	University of Rwanda
USAID	United States Agency for International Development
VR	Virtual Reality
WDA	Work Force Development Authority

Data Collection Survey on Technical and Vocational Education and Training in the Republic of Rwanda
Final Report

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Chapter 1. Background of the Survey

1.1. Background

The Republic of Rwanda (hereinafter "Rwanda") sets the development of human resources as one of the top priorities for economic development according to the "National Strategy for Transformation (NST1) 2017-2024" and has focused on enhancing technical and vocational education and training (TVET). "National Skills Development and Employment Promotion Strategy (NSDEPS) 2019-2024" set by the Rwanda Development Board (RDB). It also emphasizes the enhancement of TVET that meets the skills needs of the private sector. In addition, it set out a policy to proceed with investment in human capital in parallel with job creation through the expansion of the labor market.

TVET is also being promoted at the regional levels, such as the East African Community (EAC) and the African Union (AU). EAC launched the EAC TVET Center of Excellence (CoE) in 2012 to promote collaboration and improve the quality of TVET programs of partner states. Tumba College of Technology was certified as TVET CoE in Rwanda. Although no progress has been seen on this initiative since then, regional meetings will be held from 2020 onwards and concrete progress is expected. AU also calls the period from 2019 to 2028 the "Decade for Technology, Professional and Entrepreneurship Training and Youth Employment" and emphasizes the importance of skills development across Africa.

As mentioned above, while the importance of TVET is emphasized both inside and outside Rwanda, it has been pointed out that further improvement of TVET institutions is necessary for economic growth. NSDEPS analyzes that currently 60% of employment is concentrated in agriculture, retail and construction sectors, and claims that it is necessary to transform employment structure to service and manufacturing sectors. It is therefore expected that TVET institutions will play the role of developing highly skilled human resources through institutional reforms such as the promotion of ICT utilization and enhancement of innovation functions. Cooperation among TVET institutions in EAC partner states led by EAC Secretariat has just begun, and its implementation is urgently needed.

JICA had supported Rwanda's TVET sector up to the "Tumba College of Technology Enhancement Project Phase 2", which was completed in August 2018. In the project, JICA provided assistance related to the development of highly skilled human resources necessary for the transformation of the industrial structure required by Rwanda, through the construction of a school building for ICT department and incubation facilities and developing manuals on activities. As for regional cooperation, JICA has been collecting information through participation in related meetings held by EAC Secretariat.

1.2. Objectives

The objectives of this survey are to collect basic information and analyze possible measures for:

（1） Examining the direction of future JICA support to TVET in Rwanda, especially to promote the utilization of ICT and to strengthen innovation functions at TVET institutions for the development of highly skilled human resources.

（2） Considering possibilities of extending cooperation in TVET sector from Rwanda to the rest of EAC region, by confirming TVET program implementation structure of EAC Secretariat such as staffing and budget size, as well as the progress of strengthening collaboration among TVET programs of its partner states.

1.3. Survey Design

1.3.1. Survey Period

The survey period is from 31 March 2020 to 15 March 2021. The original plan was to conduct two field surveys, but due to the expanding impact of the new coronavirus, this was changed to a remote survey using survey assistants (from the end of July to the end of October 2020).

1.3.2. Target Areas and Organizations

The main areas and organizations surveyed are listed below. However, the National Institute of Statistics of Rwanda (NISR) and the Private Sector Federation (PSF) did not participate in the survey. The list of interviewees is shown in Appendix 1.

Rwanda

（1） Government institutions related to TVET
- (i) Ministry of Education (MINEDUC）
- (ii) Rwanda Polytechnic（RP）
- (iii) 8 Integrated Polytechnic Regional Colleges（IPRC）
- (iv) Workforce Development Authority（WDA）
- (v) Rwanda Development Board （RDB）
- (vi) Ministry of ICT and Innovation (MINICT)
- (vii) Rwanda Information Society Authority (RISA)
- (viii) National Institute of Statistics of Rwanda (NISR)

（2） Private sector
- (i) Private Sector Federation（PSF）
- (ii) Chambers of Private Sector Federation
- (iii) Companies which employ IPRC Tumba graduates and major private companies

Tanzania

EAC Secretariat（Arusha）

1.3.3. Survey Process

In the first work in Japan, the survey team reviewed and analyzed the existing data, and prepared the questionnaire and inception report. In the remotely directed field survey, the survey team collected the latest documents and statistical data, interviewed the parties concerned, and visited the facilities such as the IPRCs, and analyzed the current situation and extracted the issues. After that, the results of the remote field survey were compiled in the Interim Report. The survey team discussed the possibility of collaboration with Japanese academic institutions and private companies based on the results of the remote field survey and reflected the results in the Draft Final Report. Explaining and discussing the Draft and Final Report to the Rwandan government via teleconference, confirming any discrepancies with the facts, making corrections as appropriate, and summarizing the findings in the final report. Figure 1-1 shows the overall survey workflow.

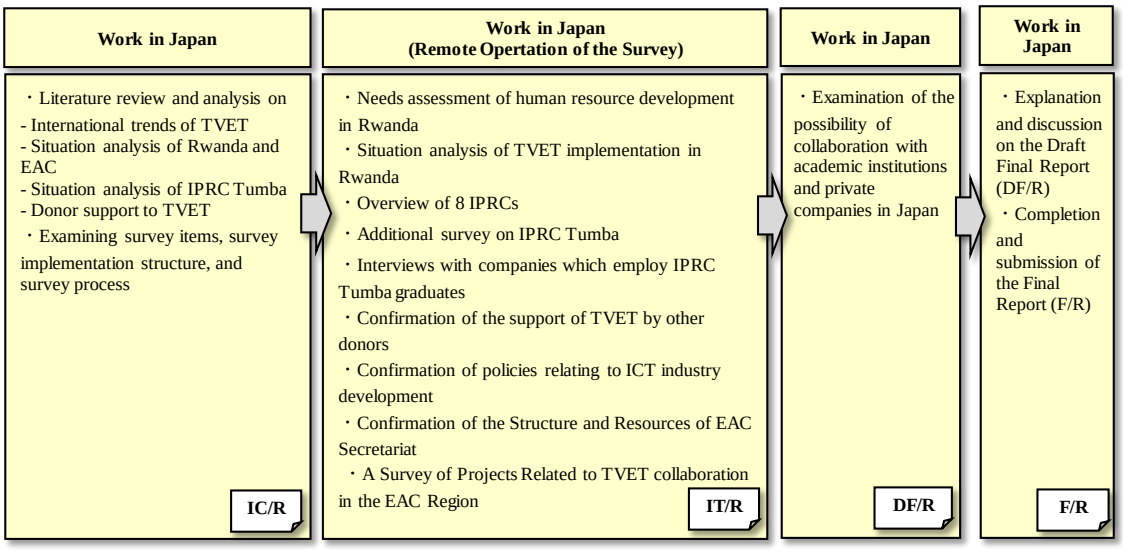

Figure 1-1　Overall Survey Workflow

1.3.4. Survey Methodology

This survey was conducted by literature review and remote interview using a questionnaire. The method and contents of each survey item in the overall survey flow are described below.

The first work in Japan

（1）　Review and analysis of existing materials

Prior to the fieldwork, a review and analysis of existing relevant materials were conducted.

（2）　Creating an Inception Report

The approaches, survey items, structure, and process of the survey were compiled as an inception report. The Inception Report (draft) was explained and discussed with JICA Rwanda office and was finalized after making the necessary revisions.

Remote field survey

（1） Identification of human resource development needs in Rwanda

Taking into account the country's industrial policy, industrial structure, key employment statistics, and industries with growth potential, future human resource development needs in Rwanda were identified. The companies to be interviewed were selected mainly from the ICT, tourism and manufacturing industries, which are expected to drive job creation by 2050 according to the National Skills Development and Employment Promotion Strategy (2019-2024), and the construction industry, which has a large working population according to the Labour Force Survey.

（2） Confirmation of TVET implementation in Rwanda

Interviews were conducted with the Ministry of Education, RP and WDA, focusing on matters related to the level of technical colleges within Rwanda's TVET.

（3） Overview of the eight Integrated Polytechnic Regional Colleges (IPRCs)

Interviews were conducted with eight IPRCs in Rwanda on the survey items such as organizational chart, department and curriculum.

（4） Additional surveys on IPRC Tumba

In addition to (3) above, additional research was conducted on the assumed advantages in IPRC Tumba compared to the other seven schools. The advantages were set as the good practices described in the "Final Report on the Project for Strengthening the Capacity of Tumba Technical College of Technology Phase-2", the hardware support in the same phase and the support of the Technical Advisory Group (TAG) introduced in Phase 1, and whether or not the budget and human resources recommended in the terminal evaluation were allocated to these to ensure the sustainability of the outputs.

（5） Interviews with companies which employ IPRC Tumba graduates

The contribution of IPRC Tumba's educational and practical contents to practical work, as well as employers' expectations of TVET's human resource development, were identified through interviews.

（6） Confirmation of the support of TVET by other development partners

The German Embassy, co-chair of the TVET Subsector Working Group (SSWG), and major development partners who are currently implementing TVET projects were interviewed about (1) efforts to promote the use of ICT for the development of highly skilled human resources and to strengthen the innovation function, and (2) Rwanda as a starting point for TVET sector cooperation in the EAC and its potential for the sector.

（7） Confirmation of Policies Relating to ICT Industry Development

To identify the kind of ICT workforce that IPRC needs to develop, the survey team interviewed three categories: policy level, RP/IPRC, and private sector, on the skills required in three areas: technical, business and human skills.

（8） Confirmation of the Implementation Structure and Resources of EAC Secretariat

To develop the TVET sector support in the EAC region starting from Rwanda, the capacity of the EAC Secretariat as the main actor in the collaboration was assessed in terms of implementation structure and budget.

（9） A Survey of Projects Related to TVET Collaboration in the EAC Region

information was collected from the EAC Secretariat's Social Sector Directorate General, regarding the TVET sector development in EAC region starting from Rwanda, Center of Excellence project which has a potential for regional collaboration, and “East Africa Skills for Transformation and Regional Integration Project” by World Bank (targeting EASTRIP, Kenya, Tanzania, and Ethiopia)

（10） Creation and discussion on Interim Report

The results of the remote field survey were compiled into the Interim Report, which was submitted and reported to JICA Rwanda office.

The second work in Japan

（1） Examination of the Possibility of Collaboration with Academic Institutions and Private Companies in Japan

Based on the results of the remote field survey, the survey team conducted interviews with Japanese academic institutions (technical colleges) and private companies that may collaborate with IPRC Tumba in December 2020. Potential collaborative activities and specific details of the collaboration were included in the Draft Final Reports.

（2） Creating Draft Final Report

Draft Final Report was prepared, incorporating the findings of the above (1), which was shared with JICA Rwanda Office and revised according to comments.

The third work in Japan

（1） Explanation and discussion on Drat Final Report

The contents of the Draft Final Report were explained to the Ministry of Education, RP and IPRC Tumba to ensure that there are no factual errors and made corrections as appropriate.

（2） Completion and submission of Final Report

The results of the survey were reported to JICA Human Development Department and JICA Rwanda Office, and Final Report was prepared and submitted to JICA Rwanda Office.

1.3.5. Survey Team Members

The team consisted of the following six members, and JICA Rwanda Office provided support during the fieldwork. Table 1-1 lists the team members and their positions. -

Table 1-1 Team Members and Areas of Responsibility

Position	Name	Organization
Team Leader / TVET Policy (1)	Utako Morita	Koei Research & Consulting Inc.
Deputy Team Leader / TVET Policy (2)	Ryuichi Nishiyama	Koei Research & Consulting Inc.
Private Sector Analysis	Tatsumi Aragaki	Koei Research & Consulting Inc.（Unico International Corp.)
ICT Utilization and Innovation Introduction Analysis	Tomonari Takeuchi	Koei Research & Consulting Inc.（Deloitte Touche Tohmatsu LLC)
TVET Situation Analysis / Donor and Area Coordination Analysis	Yuki Kobayashi	Koei Research & Consulting Inc.
Skill Demands and Labor Market Analysis	Yu Ito	Koei Research & Consulting Inc.

1.4. Data Collection Tools

Based on the purpose of the survey, the survey items were identified and classified into two categories: those that could be surveyed by literature review and those that required a questionnaire survey. A matrix of the survey items and the organizations to be surveyed was created, and after reviewing the draft questions, a questionnaire was created for each organization to be surveyed. The questionnaire is attached as Appendix 3.

Chapter 2. Socioeconomics of Rwanda

2.1. Economy

Since the outbreak of the genocide, Rwanda has seen negative economic growth, but has shown a solid recovery in agricultural production since the end of the genocide and GDP reached to pre-genocide levels by 1999 due to assistance and aid from development partner countries and the government's sound economic policies [MOFA, 2019]. Since 2000, the real economic growth rate has been maintained at around 7.7% on average, and the economic scale is expanding [World Bank, 2020]. In 2019, nominal GDP exceeded $ 10 billion for the first time. The Rwandan government has set a goal of becoming a medium-income country by 2020, a high-medium-income country by 2035, and a high-income country by 2050, and since 2017, the government is implementing the "First National Transformation Strategy (NST1)", an economic growth strategy that aims for an average annual economic growth rate of 9.1%.

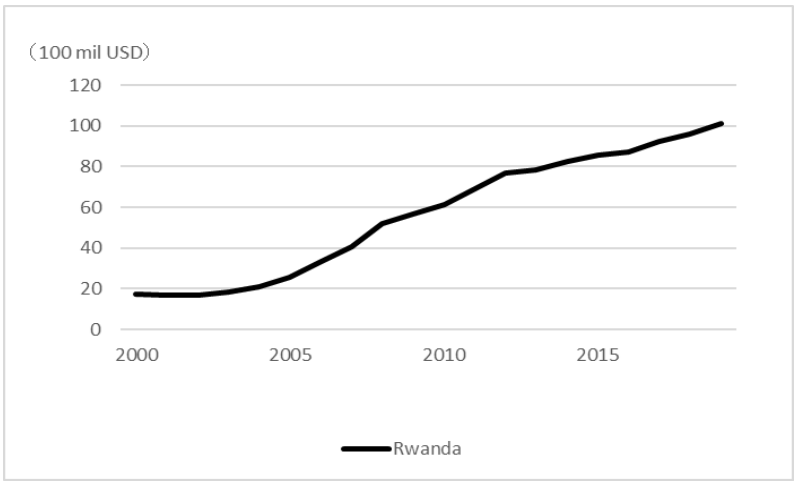

Figure 2-1 Transition of GDP

Source: Created from the World Bank website

GDP per capita, which becomes a measure of income level, has also increased steadily, reaching a level of over $ 800 in 2019. The total trade value in 2017 was 995 million dollars for exports and 1.92 billion dollars for imports, and although chronic excess imports are an issue, overall stable macroeconomic management is being carried out. [MOFA, 2019]

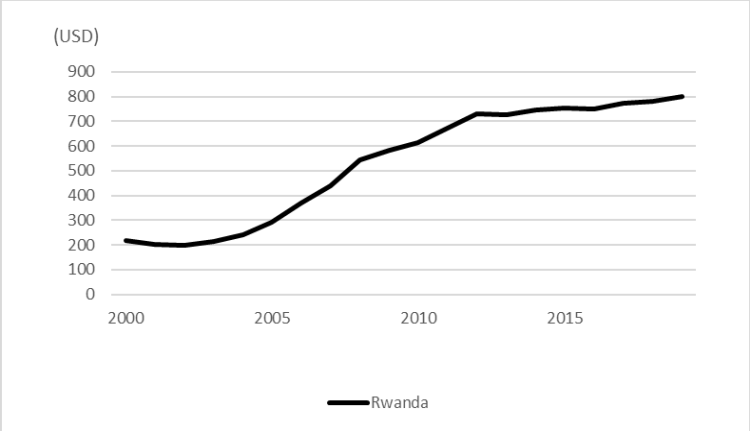

Figure 2-2 Changes in GDP Per Capita

Source : Created from World Bank website

2.2. Industrial Structure

This section describes the industrial structure of Rwanda, including structure, major policies, the ratio of each industrial sector and sub-sector to GDP, the characteristics of each sector, issues, and the status of implementation for industrial promotion.

2.2.1. Major Industrial Policies

The Rwanda government stated and advocated in the National Industrial Policy formulated in 2011 that 1) promotion of environment improvement for promotion of industrialization, 2) increase in production of products to be consumed in its own country, and 3) export competitiveness. As a concrete policy, the aim was to achieve exports of US $ 1.5 billion by 2020, which is double that of 2011, and to create 1.4 million new jobs in the non-agricultural sector.

In addition, the government promoted the expansion of production of higher value-added agricultural products, improve infrastructural environment for industrial promotion and reduction of the energy cost. However, despite the increase in income from the tourism and hotel industries and direct investment from foreign countries, the trade deficit problem in Rwanda is a concern, considering information such as UNCTAD statistics, National Industrial Policy, and various reports. It is thought that it remains as.

The country's GDP in 2010 was about US $ 5.5 billion, with the mining and industrial sector accounting for only 15% of GDP [Ministry of Trade and Industry, 2011]. Of these, agriculture, forestry and fisheries accounted for 24.3%, service industries including commercial trade, tourism, transportation and telecommunications accounted for 50%, and others account for about 10% [Statista, 2021]. Looking at the shares by sub-sector of the industry sector, the mining industry is 3%, 43% in the manufacturing industry, 2 % in the electricity / water management, and 52% in the construction industry respectively. Looking at these on a second quarter basis in FY2019, the mining industry accounts for 18%, the agriculture / forestry and fisheries accounts for about 24%, the service industry

including commerce, tourism, transportation and telecommunications accounts for 49%, and others accounts for about 9% [Worldbank]. When comparing these two years, the share of industrial production in GDP increased only 2 points, but when comparing output, the second quarter of 2019 was an increase of about 42% that of the year 2015.

And looking at the ratio of industrial production to GDP in FY2019 by sub-sector, mining was 2%, manufacturing was 6%, electricity and water was 2%, and construction was 7% respectively. The ratio to GDP has not changed so much, but when converted to output and compared on monetary basis, the mining industry is 1.4 times, the manufacturing industry as a whole, electricity and water supply are 1.5 times each, and the service industry is 1.3 times [NISR].

In addition, in Vision 2020 the Rwandan government advocated the following six pillars as guidelines for national development and actively promoting industrial development, human resource development, private-sector-led economic development and industrial policy.

- Good governance and a capable state
- Development of skilled human capital to drive a knowledge-based economy
- Vibrant private sector to drive economic growth
- Development of a world-class physical infrastructure
- Development of modernized and export-led farming
- Regional and markets integration

As specific targeted goals for the policy formulation, implementation of raising productivity and market-oriented agricultural development, increase the share of industry in GDP from 15% in 2010 to 26%, and create a knowledge-based economy are listed.

In the development of the industry sector, the government is advocating and promoting private-sector-led development, especially promotion of entrepreneurship by young entrepreneurs, expansion of foreign direct investment, promotion of IT industry, development of infrastructure in transportation, human resource development, financial services. The primary goal is to create 1.2 million non-agricultural jobs in the area of present agricultural sector, which is expected to result in half of the approximate population which is 13.5 million by 2020 [Rwanda]. Some of main goals and achievements of Vision 2020 are showing below;

Indicators	Targets	Achievement
GDP per capita	US$ 1,240.	US$ 689.69
Average GDP growth rate	11.5%	6.1%
Increased poverty reduction	20%	20%
More off-farm jobs creation	1,200,000 jobs	1,704,000 jobs
Urbanization (Percentage of urban residents in the population)	35% of total population	17.3% of total population
Growth rate of export	28%/year	15%/year

出典：An Evaluation of Rwanda Vision 2020's Achievements, Jönköping International Business School

The followings are considered as the reasons why the target value could not be achieved;

- The poverty rate is constant, and the poor are not decreasing
- Uneven distribution of wealth
- Uneven distribution of cultivated land due to the high population density
- Agricultural population occupying a high share
- The number of workplaces is small for the younger generation
- Technical level of workers is low, and their productivity is low

Vision 2050 has been newly formulated in Rwanda, and its framework is to promote improvement of living standards, secure a sustainable food supply, protect family, provide quality health and education, expand financial services, and expansion of services such as housing, energy, and infrastructure. Furthermore, the country is making its efforts to enter the top middle-income countries by 2035 and to become a high-income country by 2050. To achieve this goal, Rwanda is aiming to achieve an annual economic growth rate of over 10%, which is about twice the present growth rate.

The National Skill Development and Employment Promotion Strategy (2019-2024) also points out the need to promote the transformation of industry from agriculture to highly productive industry and service sectors [RDB, 2019]. Three pillars were set as the core of this policy, and they are 1) preparing education systems to raising students with skills that meet the needs of the labor market (skill development), 2) facilitating easing access to markets, finance and business advisory services, and 3) improving the flow of information between companies that need skilled human resources, and schools/students that provide human resources effectively connecting the two can be raised as matching

The industrial structure will be described later by sub-sector, but some international organizations have proposed that maintaining the annual growth rate of 12% in the industrial sub-sector can exceed its proportion in agriculture and service industries [AFDB, 2014].

As Rwandan government's efforts, RDB was established in 2009 to formulate and implement policies including company establishment process, investor development, exporter development, and various policies such as SME development, trade/export development, etc. The RDB mainly targets the following three pillars.

- Preparation of an environment for the promotion of industrialization in Rwanda
- Promotion of production for fostering import substitution industries
- Strengthening export competitiveness

In addition, in terms of human resource development, there is a need to establish active promotion system of admission to vocational training schools such as VTCs and IPRCs, and within the company there is a need to strengthen ability and reduction of energy costs, and as in institutional aspects there is a need to establish financial systems, fostering SMEs and exporters, and eliminate trade barriers [IGC (International Growth Center), 2018].

Moreover, agricultural product processing, ICT industry, tourism, textile industry, and processing of mineral resources are listed as short-term sector development efforts. And as medium-term development strategy, construction, pharmaceutical development, and chemical product manufacturing are listed, while as long-term development goals include construction materials, bioplastic products, and other high-tech products [IGC (International Growth Center), 2018].

The steady economic development of Rwanda and the growth of the mining and manufacturing industry subsector are clearly visible in the statistical data. For example, according to the National Institute of Statistics of Rwanda's economic data for the second quarter of 2019, the growth rate of GDP was 12.2% compared to the same period of the previous year [NISR].

The growth rate for each industrial sector is as follows.

- Agriculture（5% increase overall, contributed by food crops, livestock, and export crops）
- Industry（21% increase overall , contributed to by manufacturing, and particularly by construction）
- Services（12% increase overall, contributed to by trade、transport、Professional & Technical activities such as medical doctors, lawyers, and accountants, finance）

However, as shown in Figure 2-3 (described later), it is also a fact that the transformation of the industrial structure has not progressed well. Especially in the case of the industrial sector, there are several possible reasons, and they are 1) Slow speed to make a smooth shift from low value product production to internationally competitive high value product production within the same sector (e.g. in industry), 2) delay in building a value chain due to being a landlocked country and due to underdevelopment of transportation system, and 3) delay in building the global value chain necessary for the smooth implementation of international trade.

2.2.2. Industrial Structure

Agriculture, forestry, and fisheries account for about 25% of GDP [MOFA, 2019]. About 70% of all farmers are small-scale farmers who own less than 0.2 hectares of arable land [FAO, 2020]. The main commercial crops are coffee and tea (about 28% of export revenue). The government is undertaking policy to strengthen international competitiveness by improving quality. [MOFA, 2019] Other export crops include vegetables, cereals and flowers [Workman]. On the other hand, the country has the problem of high transportation costs due to being a landlocked country, and in order to overcome the

government is focusing on the development of special economic zones and the promotion of the ICT industry. [MOFA, 2019]

Industry (including the construction industry) accounts for about 18% of GDP, and the service industry accounts for about 49%. Although as mentioned above, the ratio of each industry to GDP has not changed significantly since 2010, it has been pointed out that it is necessary to promote the conversion of the industry to manufacturing and service industry.

In the World Bank's "Doing Business (Investment Environment Ranking) 2019," Rwanda ranks 29th out of 191 countries and regions in the world, and 2nd in Africa.

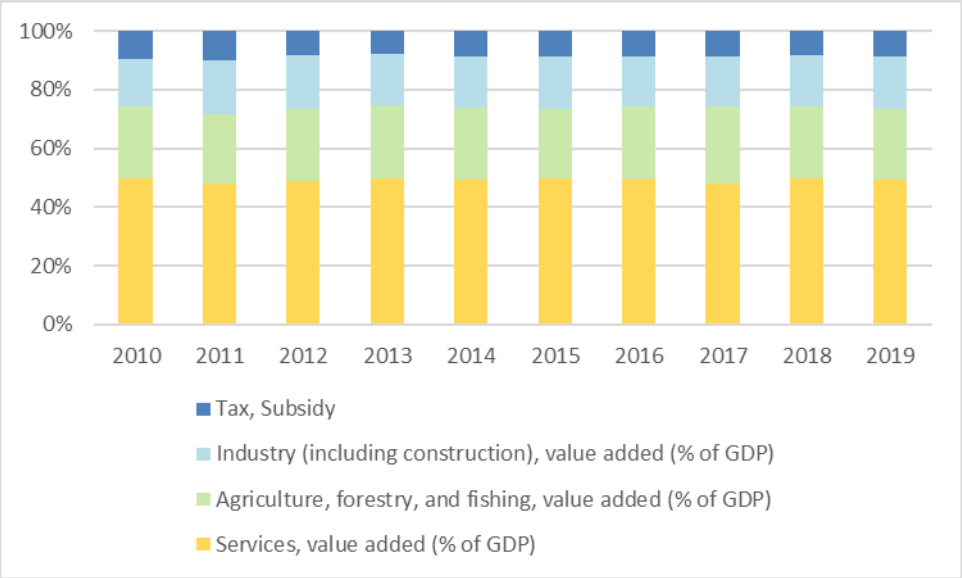

Figure 2-3 Percentage Share by Industry (value added) in GDP (%)

Source: Created by World Bank website

2.2.3. Characteristics of Each Industrial Sector and Sub-sector

This section describes the characteristics of each industrial sector and sub-sector in Rwanda. Statistical data used in this section are quoted from the data based on the results of the first quarter survey of 2020 and the statistics book issued by the National Institute of Statistics of Rwanda (NISR), unless otherwise specified.

(1) Agriculture, Forestry, and Fishery

The major crops can be classified into food crops and export crops, the former is comprising bananas, cassava, legumes, corn and potatoes, and the latter is from tea and coffee. In recent years, the cultivation of pyrethrum and flowers has also been reviewed as export items, and the cultivation is gradually expanding. Lumber and charcoal production are the main products in the forestry industry,

and the proportion of the agriculture, forestry and fisheries industry in GDP is 6% in 2020, which has been almost constant since 2010.

In the dairy products, the government's policy of owning one cow per household has increased the number of dairy cows owned, and the production of milk, cheese, yogurt, etc. is increasing, and the ratio of GDP to the agriculture, forestry and fisheries sector has also risen 1% in recent years.

（2） Industry and Mining

According to NISR statistical data of the first quarter 2020, the industry and mining sector accounts for 18% of total GDP, manufacturing is the largest with 9% of the sector, followed by construction with 7%, and the rest is mining. Electricity, water and water management account for 1% each. As characteristics of the industry and mining sector production as a whole is that the share in GDP has increased from 16% in 2010 to 18% in 2019. In the Vision 2020, the government is aiming the share to increase up to 26%.To reach the target, the government is advocating raising and maintaining the service and agriculture sectors an average annual growth rate of 12%, as well as increasing the number of non-agricultural workers to 1.4 million. Currently, the number of its workers is 170,000 people, which is only 4% of the total number of employees. On a gross basis, the total amount of production has almost tripled in 2019, but the growth rate is not necessarily high because the industry as a whole is also growing. The characteristics of each major sub-sector are described below.

(A) Manufacturing Subsector

Food Processing

Among manufacturing industry, the food processing industry accounts for the highest proportion of GDP at 2%. Mainly rice, wheat, millet, beans, meat processing such as pigs and chickens, dairy products, etc., and coffee and tea processed products as export items.

Beverage and Tabacco Subsector

Beverage and tobacco production accounts for 2% of the total manufacturing sector and the production of beer, soft drinks are particularly active.

Texitle and Clothing Subsector

Since 2012, due to an increase in imports of low-priced clothing from China, textile and clothing industry had been shrinking. However, the industry has regained 1% of the GDP in the entire manufacturing industry for the past few years by importing fabrics from India and Pakistan, adding value to dyeing and sewing, and selling them to the domestic market.

Others

The GDP ratio of other industry products such as chemical products, rubber, plastics, non-ferrous metals, iron products, machinery, and furniture is 1%, of which the impact on all economic activities is not so high.

(B) Construction Subsector

Construction subsector accounts for the second largest sector after the manufacturing industry, accounting for 7% of the total manufacturing sector. This ratio has risen further in recent years. This is due to the higher demand of office space, the construction of factories by domestic and foreign companies, the high demand for construction of hotels and individual houses, and for development of infrastructure.

(C) Electricity and Power Generation

According to USAID's POWER AFRICA FACT SHEET, the current electrification rate in Rwanda is 72% in urban areas such as Kigali and 12% in rural areas. [USAID, 2020] The government has declared that it will reach 100% domestic electrification by 2024, so the electricity and power generation subsector's share of GDP is still only 1%, but it is expected to rise in the future.

(3) Service Sector

The service industry, which has the highest share of GDP in the first quarter of 2020 at 48%, has already overtaken the share of agriculture in 2004 and is still on a continuous growth path. Looking at the growth rate of GDP, the service industry showed 19%, 7% in manufacturing and 4% of agriculture in 2014 [IZA, 2016]. The service sector in Rwanda is divided into two categories; commercial/transportation and other services. According to the NISR's statistical data, the former accounts for about 15% of the sector, and is further composed from wholesale and retail, transportation services and auto repair. In addition, the other service industry, which accounts for about 33% of the total industry, consists of real estate transactions, financial services, hotels/restaurants, ICT, government/administrative services, professional services such as medical care, lawyers, and accountants, and culture/education. The service sector achieved an average GDP growth rate of 8% between 2001 and 2014 [IZA, 2016]. GDP per capita in this subsector is also expanding rapidly and is expected to grow in the future [IZA, 2016]. The characteristics of each sub-sector of the service industry are described below.

(A) Commercial and transportation subsectors

Wholesale and Retail

In the service industry, the wholesale and retail sector account for 9% of the highest intra-sectoral GDP in the commercial and transportation sub-sectors. Retailing is a profession that women can easily

enter, and more than half of the total population in the country is engaged in this activity, and it is expected to increase in the future.

Transportation Service

The largest proportion of the transportation subsector is made up of drivers such as buses and motorcycle taxis, and their surrounding occupations such as conductors, maintenance staff, vendors at bus terminals etc. The ratio of GDP in 2019 the transportation service subsector has increased 1.5 times compared to 2010.

Auto repair

According to statistics issued by NISR, the automobile repair industry has more than quadrupled in terms of sales value compared to 2010 and is expected to continue. This is because sales of new and used cars are increasing, and in particular, sales of used cars by individuals are increasing due to the simplification of import procedures. It is expected that passenger volumes of transportation by bus and motorcycle taxi will increase further, and that the work required for maintenance and inspection work tends to increase.

(B) Other Service Subsector

Among service industry sector which accounts for 49% of the total GDP, other services subsector has the highest ratio with 34 %. This subsector includes tourism-related industries such as the hotel industry, information communication technology (ICT), and financial services, real estate transactions, professional services such as doctors and lawyers, education, and administration. Of these subsectors, real estate transactions have increased six times in sales volume from 1999 to 2014 [IZA, 2016]. Details of ICT and tourism-related businesses are described below.

Information Communication Technology (ICT)

Since the year 2000, Rwanda has continuously positioned the development of the ICT field as a cornerstone of national development policy. As a concrete measure, the government has made efforts on building up of related infrastructures, especially focusing on the development of telecommunications networks. According to ICTSSP（ICT Sector Strategic Plan(2018-2024)）of the Ministry of Information Technology and Communications, the government spent amount of Rwandan franc 590 billion for development of the communication network between 2001 and 2015. And Gross Value Addition (GVA) in the ICT field averaged an annual growth rate of 21.1% between 2000 and 2015 [Communications, 2017]. The number shows high growth rate compared to the growth rate of 5.5% to 8% in other sectors such as agriculture, mining and manufacturing, and service industry as a whole. In particular, the revenue obtained from the usage charges of communication networks such as mobile phones and Internet connections accounts for a very high ratio of 75% of the total revenue from the ICT sector [Communications, 2017].

Tourism Subsector

The tourism industry in Rwanda forms the basis of the country's service industry and is also designated as the government's priority industrial sector. According to the RDB's Annual Report 2019, the revenue from tourism, including domestic tourists, which was US $ 425 million in 2018, is 498 million in 2019, showing 17% growth rate. Particularly, tourism in national parks, mainly for gorilla tours, shows 14% growth rate when comparing these two years. Comparing with the statistics data for the last 10 years, the number of tourists to national parks increased from 38,000 in 2009 to around 110,000 in 2019, and the tourism revenue increased t from US$ 8 million in 2009 to 29 million in 2019. The total number of foreign visitors to the country for tourism, business visits, temporary visits, aircraft transfers, and such were about 1.53 million in 2019, of which 124,000 were for tourism. In addition, about 25% of foreign visitors are for the purpose of Meeting, Incentive travel, Convention, Exhibition/Event (MICE). The development of the service sector related industry is also remarkable. According to popular newspaper Kigali Today published on November 2, 2019, there were about 775 hotels in Rwanda, with a capacity of 14,800 nights per night. The new coronavirus (COVID-19) that prevailed in 2020 is expected to temporarily reduce the growth rate for the next few years, but expectations are still high for a future growth industry.

2.2.4. Current Status of Initiatives for Industrial Promotion by Sector

(1) Agriculture, Forestry, and Fisheries

(A) Current Status and Issues

Currently agriculture, forestry and fisheries have the following conditions and issues.

- With a population density of 430 people per square kilometer, which is the highest in Africa, small cultivated land is shared by households with many families to cultivate the land.
- Dryness due to drought, erosion of cultivated land due to irregularly falling heavy rains, underdeveloped infrastructure such as irrigation facilities and roads for transportation means, post-harvest storage means, and high transportation costs.
- Irregular rainfall conditions and changes in precipitation caused by global climate variability, landslides, reduced yield of crops, low productivity due drying, and damage caused by pest outbreaks.
- Delays and irreverent method and management in livestock breeding, feeding of inappropriate feed, and decreased productivity of dairy products due to illness.

(B) Initiatives for Industry Promotion

Rwanda is the first country in Africa introducing agriculture under the Comprehensive African Agriculture Development Program (CAADP), which is a policy based on economic development and

a tool for poverty alleviation. According to the Review of Industrial Policy in Rwanda issued in November 2018 by the International Growth Center, Rwanda cited the following policy as its inclusion in the promotion of agriculture, forestry and fisheries.

- Establishing an agricultural ecosystem such as thorough farming including development and maintenance of terraced rice paddy fields, development and expansion of irrigation facility, maintenance of water storage facilities and appropriate irrigation of cultivated land, use of wastewater disposed from households, use of organic fertilizer by utilizing composts.
- Improvement of productivity of agricultural and dairy products, and development of high value-added products
- Promote fertilization of land by using organic fertilizer under the policy of National Strategy for Climate Change and Low Carbon Development
- Expansion of variations such as types of crops, production of rice and beans that may be import substitute items, introduction of crops that can withstand climate change
- Establish and develop value chain systems
- Development of food processing facilities in each region and village, and improvement of value-added food processing
- Expansion of cultivation of crops such as tea, coffee and pyrethrum for export

（2）Industry and Mining

(A) Current Status and Issues

According to NISR's statistics, the manufacturing industry accounted for 43% of the industry and mining in the first quarter of 2020, which accounted for 8% of the total GDP, of which food processing and tobacco / beverage occupied main proportions. Among the companies which are involved in the manufacturing and mining sector, one-third is concentrated in Kigali and its vicinity, and the rest are evenly distributed in other regions of the country. Furthermore, about 90% of these companies are micro companies, and medium-sized companies account for only 0.2% of the total, and about 100 companies are classified as so-called large companies. Since 2001, the authority to restructure industrialization policy, development of investment environment, private sector development, etc. has been vested to RDB, and that so the promotion of policy has been progressed smoothly, and as a result the county enjoyed remarkable growth of economy. Furthermore, the stable government and its administration has actively promoted the enactment of investment laws, policy formulation for industrial development, and the eradication policy of corruption also contributed to the development of industry.

The problems and issues in the industry and mining sector will be described hereunder.

- The main reasons for the stagnation of foreign direct investment are due to small land area, landlocked country that is disadvantageous to trade, underdeveloped transportation infrastructure, and the lack of energy resources. In addition, it is said that the technical capabilities of general workers are low so as the productivity among East African countries, so that is also considered to be one of the reasons why foreign companies are avoiding entry and investment in the country [AFDB, 2014] [IGC (International Growth Center), 2018]
- According to the National Industrial Policy 2011, the total import amount of Rwanda climbed to US$ 325 million in 2003 and $ 1.389 billion in 2010. The ratio of exports to imports was 1:23 in 2008 and 1:18 in 2010, and the difference in trade imbalance became $ 1 billion, which consisted from 20% of GDP. In 2019, the proportion of the imbalance difference in GDP has decreased to 14%, however the span of difference indicates it is still large ratio [Countryeconomy.com]. Although trade imbalances arising from these imports and exports are being controlled to reduce the difference through tourism, foreign direct investment, and remittances from overseas migrant workers, further promotion of exports is desired. However, due to the recent global economic downturn, exports of garden crops, insecticide chrysanthemums, handicrafts, and leather have stagnated, and products with high processing technology have soared overseas, and their import prices are also rising. It is said that it is difficult to correct trade imbalance. The main import items are vegetable oil, sugar before processing, palm oil, soap, and many other products which can be produced with low processing technology. Other imported products include automobiles, building materials, pharmaceuticals, computers, etc. [IGC (International Growth Center), 2018]

(B) Initiative for Industry Promotion

RDB is providing exporters with various information such as exporter and buyer information, product directories, trade procedures, and actively involves and promotes economic activities for industrial development [RDB]. In addition, the implementation of SME development projects by international organizations also contributed to industrial promotion. The government is also actively inviting foreign direct investment. In 2009, foreign investment amounted to 645 billion Rwandan francs, that is due to the increase in investment in the energy development of Lake Kivu. In Vision 2020, amount of foreign direct investment is expected to account for 29% of GDP. In addition, because of the growth and expansion of the construction industry in recent years, it is expected that investment in this sector will be also increased. According to “Doing business in Sub-Sahara”, Rwanda has the second highest foreign investment introduction rate after Mauritius from 2013 to 2014, with ICT at 41.4%, tourism at 12.8%, industry and mining at 13.8%, manufacturing at 10.8%, and others 21.7%. In Vision 2020, the government aims for a growth rate of 13.5% and a GDP share of 42%. As other industrial promotion efforts, the government included improving access to the Manufacturing Development Fund, making industrial products compliant with international standards, and strengthening advisory services. It is

also necessary to prioritize energy supply and the development of transportation infrastructure. [Ministry of Trade and Industry, 2011]

(3) Service Industry Sector

(A) Current Status and Issues

In order to fill in gaps of restriction in transportation and distribution systems as a landlocked country, Rwanda positions the service industry as an alternative industry to replace the manufacturing industry, and aiming to boost the national economy by establishing the policy goal to acquire the position of East Africa as a service industry hub.

The current situation and problems of the service industry are described in the following.

- In tourism and its related businesses such as hotels, hairdressing and beauty services, vehicle maintenance, etc., there are many cases in which major companies are managed by foreign capital. In these cases, while the managements are foreigners and Rwandans are often engaged only in on-site work. And in such cases, according to the results of company visits during the TCT-Phase 2 project)Rwandans are not entrusted with important tasks and often do not properly transfer technologies such as advanced hotel management and operation, management skills, hairdressing and beauty techniques, and repair techniques, and such.
- In the financial field, there are restrictions such as poorly prepared financial services in the financial institutions, high interest rates and mortgages, collateral, and strict access to financial institutions.
- There is a shortage of professional and consulting services related to overall corporate management such as entrepreneurial methods, understanding of various laws and regulations such as tax laws, usage of financial institutions usage and negotiations, and marketing development in each region within the country.
- Efforts to improve the level of educational institutions such as level up of education, capacity development; science-related technology and innovation have not made much progress. In addition, strengthening links with companies, industry associations, universities and TVETs, developing appropriate curriculums at educational institutions and promoting educational practices, establishing and reviewing internship systems at TVET schools, improving and reorganizing programs at dispatch destinations for internship students are most necessary.
- It is necessary to disseminate and promote the business know-how and management knowledge possessed by employees of private companies or managers to educational institutions. The necessity of such skills can be grasped from the result of survey undertaken to the companies for new hires to be required that skills such as time management, sense of responsibility, and

communication related to the basics of work, the importance and priority of finance and sales skills are highly necessary.

- In ICT sector growth rate has been gradually declining since 2006, and instead, establishing network systems in specific fields such as finance, logistics, and services, software development for Internet connection, and other ICT services such as application development for personal computers and cellphones, sales/maintenance/repair of ICT equipment are remarkably increasing, and it tends to exceed the growth rate of communication network usage fees.
- In addition, government policies that support the development of the ICT industry have been put in place as future directions and measures in NST-1 and ICTSSP giving guidelines, and it is quite visible to find out the government's enthusiasm for ICT development.

(B) Initiatives for Industry Promotion

As an initiative to expand the service industry, the Rwandan government is targeting to enhance the grow rate of service industry to 57% of GDP by 2020. The expansion of the service industry not only stimulates economic activity, but also has a great impact on the promotion of urbanization that has been progressing in recent years. [IZA, 2016] In particular, the expansion of urbanization in local cities encourages women to participate in the service industry which is easier for women to enter, and promote into society and improve productivity. In addition, urbanization will not only contribute to the development of the service industry, but promote the construction of hotels and restaurants, as well as the development of medical services and cultural businesses.

The following are some examples of efforts to be made for promotion and development for the service industry.

- Provision of recommendation for promoting the service industry, advice to companies, and provision of consultation
- Preparation and implementation of various trainings including overseas dispatch of employees involved in the service industry, and to establish award/incentives and punishment system for employees.
- Preparation of tax incentives for corporate fixed assets such as machines, buildings and cars
- Establish a financial services system for companies and facilitate access to financial institutions
- Promotion of expansion of service industry to overseas
- The ICT industry is expected to continue to grow along with the further spread of high-speed Internet and penetration of mobile phones, however it also has many problems. The first issue is digital literacy of Rwanda. In 2018, its rate was about 8.4%, and it has not changed significantly. Secondly, a large amount of investment is required for preparation and development of

infrastructure which the government is not able to cover, and the local procurement rate of equipment and parts are low. The Rwandan government is expecting private companies to invest more in this field. The domestic electrification rate, which is said to be about 27%, is also one of the obstacles to the growth of the ICT industry [Communications, 2017]. The government has set a goal of increasing the domestic electrification rate to 100% by 2024, and further growth of the ICT industry is expected by achieving this goal [IZA, 2016].

2.3. Demographics

As shown in Figure 2-4 the population of Rwanda in 2019 is about 12.3 million, which is increasing at an average annual growth rate of about 2.6%. A comparison by urban and rural areas shows that rural areas have about 4.8 times the population of urban areas, as shown in Figure 2-5. As of 2019, about 17% of the total population was living in urban areas and about 83% was living in rural areas. Although the urban population is on a slight increase, there has been no major change in composition over the years. The Rwandan government targets to raise the urbanization rate from 18.4% to 35% by 2024, which is expected to accelerate population growth in urban areas in the future.

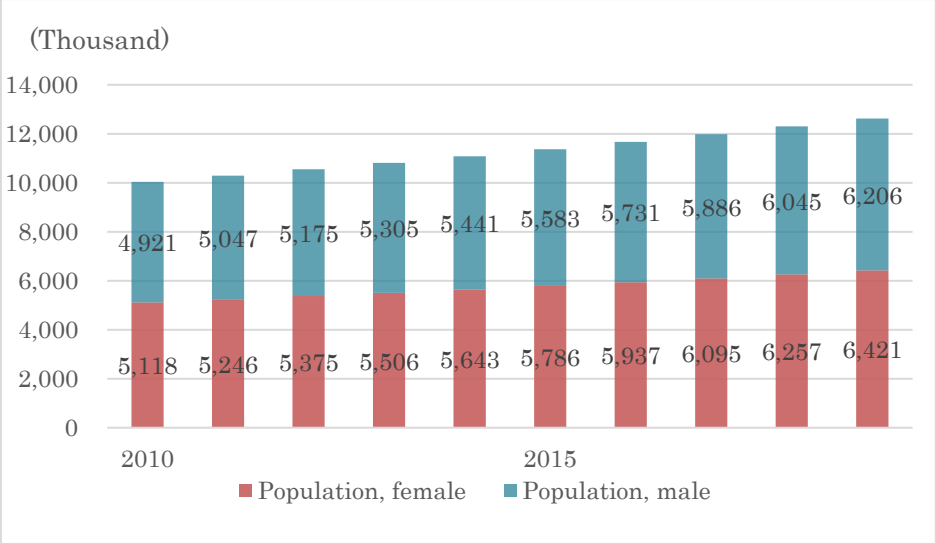

Figure 2-4 Trend of Population by Gender

Source：Created from World Bank Website

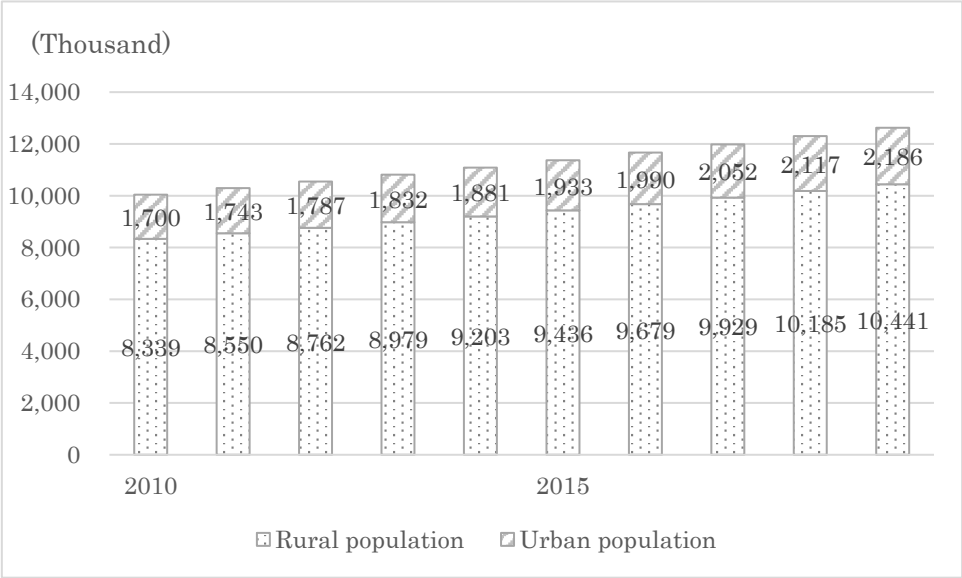

Figure 2-5 Rural and Urban Population

Source：Created from World Bank Website

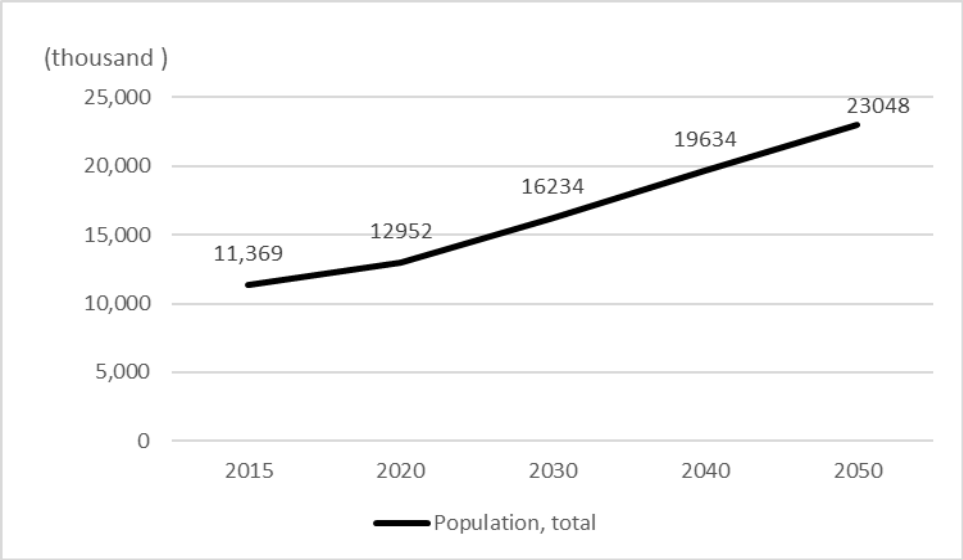

Figure 2-6 Projection of Population

Source：Created from World Bank Website

According to population projections, it is projected to increase to 16.2 million in 2030 and 23 million in 2050. Figure 2-7 shows the population distribution by age group. As the pyramid below is almost triangular in shape, the young population under the age of 19 is particularly large.

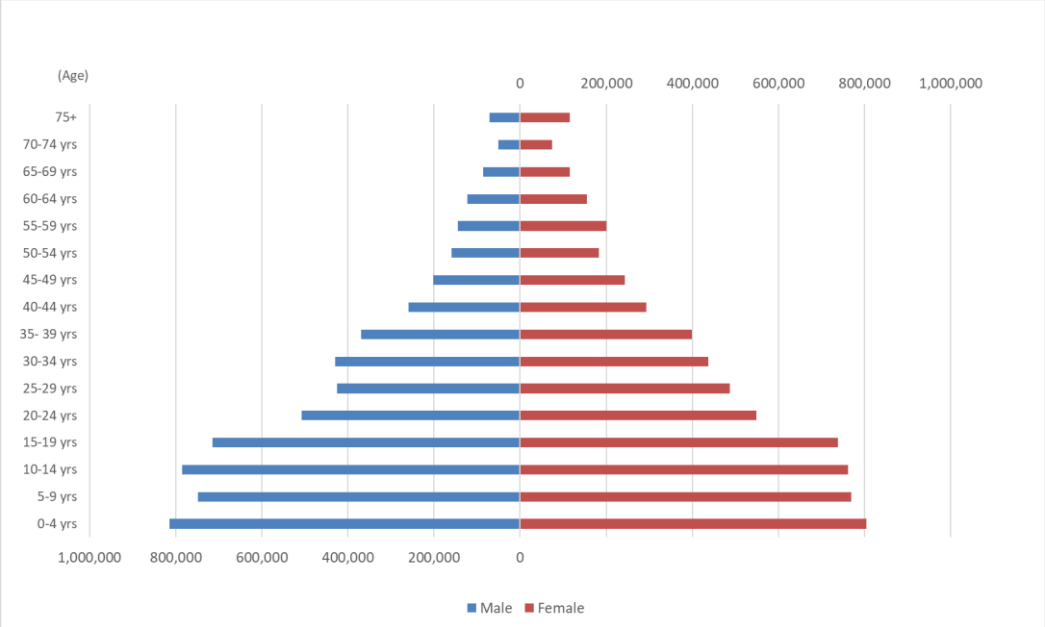

Figure 2-7 Population Pyramid

Source：Created from World Bank Website

2.4. Labor Force and Employment

2.4.1. Labor Force

In 2019, the population aged 16 and over (working generation) will be about 7.2 million, of which the labor force will be about 3.86 million[1]. The labor force population has increased by an average of 3.5% annually for the three years from 2017 to 2019, although it varies slightly from year to year. Rwanda as a whole is expected to continue to grow, and the labor force is growing at a pace that exceeds the growth rate of the total population (about 2.6% per year), so it is expected that the labor force will continue to grow steadily.

Table 2-1 Main Labor Force Indicators

Indicators	2017	2018	2019
Population 16 years and over	6,813,000	6,966,000	7,232,000
Labour force	3,601,000	3,779,000	3,863,000
Employed	2,960,000	3,207,000	3,274,000
Unemployed	641,000	572,000	589,000
Outside labour force	3,212,000	3,187,000	3,369,000
labour force participation rate (%)	52.9	54.3	53.4
Employment-to-population ratio (%)	43.5	46.0	45.3
Time related underemployment rate (%)	28.3	28.2	27.1

Source：Labour Force Survey Annal Report (2019)

[1] The total of those who aged 16 and over who have a paid job(s) and those who are looking for a paid job but currently have no job.

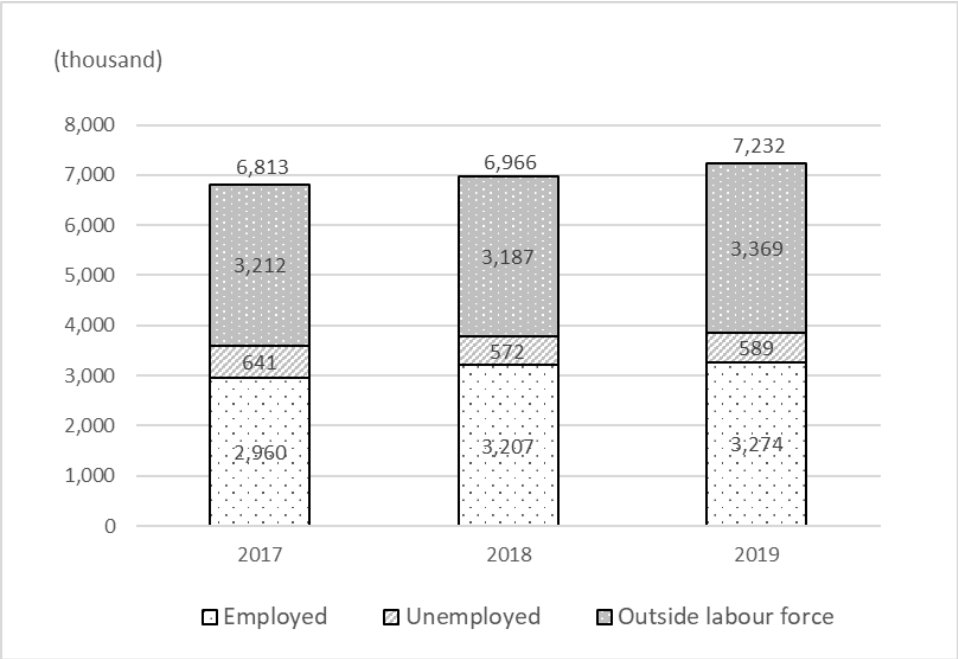

Figure 2-8 Breakdown of Population 16 Years and Over by Labor Force Status

Source：Created from Labour Force Survey Annal Report (2019)

2.4.2. Employment

Table 2-2 shows the number of employees in 2019 by industry sector. Agriculture and service industries each account for 37% of the total number of employees. In the service industry, wholesale / retail, transportation, and education occupy the largest portion, accounting for about 64% of the total service industry. Vision2020 has set a goal to increase the number of employees in the industrial sector to 1.4 million.

Figure 2-9 shows the secular change of the employment rate by industry. In 2018, agriculture accounted for 39.5%, 18.8% for industry (including construction), and 41.7% for service industry. Although data of some years are not available, comparing 2012 and 2018, the ratio of agricultural workers has almost halved, while the service industry has increased by about 2.5 times and the industry (including construction) has increased by about 2.7 times. are doing. As a job creation plan, 1.5 million new jobs are planned to be created from 2017 to 2024 (214,000 per year).

Table 2-2 Employment by Sector

Sector	Economic activity	Total	Share
Agriculture, forestry, and fishing	Agriculture, forestry and fishing	1,225,151	
Agriculture, forestry, and fishing total		1,225,151	37%
Industry (incl.construction)	Construction	315,022	
	Electricity, gas, steam and air conditioning supply	9,237	
	Manufacturing	208,956	
	Mining and quarrying	71,205	
	Water supply, sewerage and waste management	7,550	
Industry (incl.construction) total		611,970	19%
Services	Accommodation and food service activities	96,982	
	Administrative and support service activities	60,099	
	Arts, entertainment and recreation	11,371	
	Education	118,626	
	Financial and insurance activities	35,051	
	Human health and social work activities	46,020	
	Information and communication	11,515	
	Other service activities	72,319	
	Professional, scientific and technical activities	27,111	
	Public administration and defence	68,189	
	Real estate activities	4,260	
	Transportation and storage	170,913	
	Wholesale, retail trade, repair of motor vehicles, motorcycles	485,871	
Services total		1,208,327	37%
Others	Activities of extraterritorial organizations and bodies	20,546	
	Activities of households as employers	207,927	
Others total		228,473	7%
Grand total		3,273,921	100%

Source：Created from Labour Force Survey Annual Report (2019)

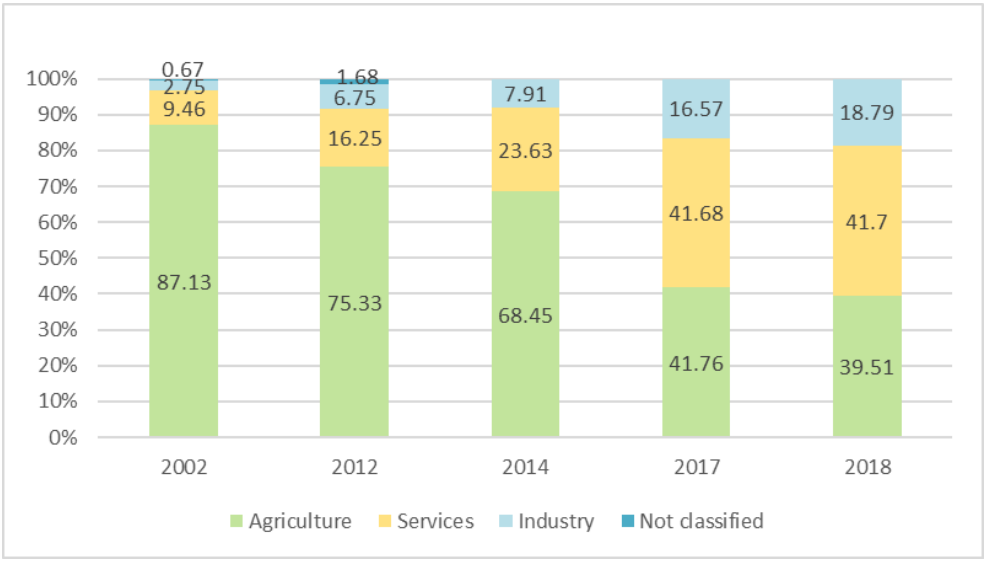

Figure 2-9 Distribution of Employed by Sector

Source：Created from ILO Website

Looking at by job type, as shown in Figure 2-10, about 1.7 million people (about 52% of the total) are engaged in simple work / routine work, that does not require specialization in 2019, followed by services / Sales positions (about 19% of the total) are followed by occupations related to handicrafts and trade (about 8%).

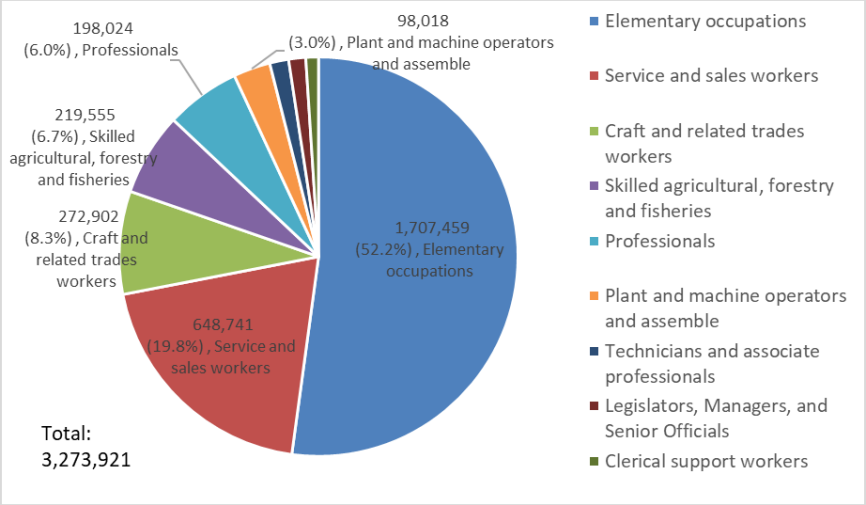

Figure 2-10 Distribution of Occupation

Source：Created from Labour Force Survey Annual Report (2019)

While the rates of employees in the service / industry is increasing year by year, few people are engaged in jobs that require specialty, high skill. In order to shift to an industrial structure centered on services and industry, which the Rwandan government is aiming for, it is essential to develop human resources with the expertise and technology to support them.

Figure 2-11 shows the rate of the labor force population percentage in 2019 (the total of those who aged 16 and over who have a paid job(s) and those who are looking for a paid job but currently have no job) by educational attainment. Nearly half of the total has not completed any education, and about 30% are elementary school graduates. Nearly 80% of the labour force has an education background of primary education or lower, while those who graduated university accounts only for 7.2% of the total, which is less than 10%. In Figure 2-11, it seems that IPRC graduates are classified as a part of university graduates[2]. The reality is that the number of people who have completed higher education in the labour force is very limited.

[2] The Rwanda Labor Force Survey Annual Report (2019) does not specify the definitions of upper secondary and lower secondary schools and the breakdown of the university level. However, in Rwanda's TVET, VTC corresponds to the primary and lower secondary level of general education, and TSS corresponds to the upper secondary level. IPRC is not exactly equivalent to university level in general education, but it is presumed that IPRC is classified as University in the above report.

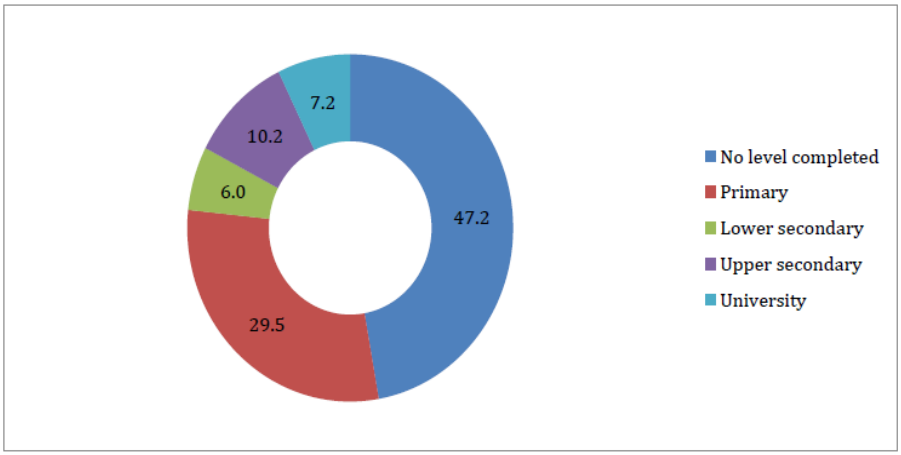

Figure 2-11 Percentage Distribution of Labor Force by Educational Attainment

Source：Labour Force Survey Annual Report (2019)

Table 2-3 shows the distribution of occupations by educational background. More than half of university graduates have jobs which require expertise or at technical jobs related to their profession (the first to the third occupation from the top of the table 2-3), while junior high school graduates and elementary school graduates are more likely to be on jobs that perform simple or routine work.

Table 2-3 Distribution of Occupation by Educational Background

ISCO High level	Primary or lower	Secondary(Lower and upper)	University	Total
Legislators, Managers and Senior Officials	0.0	0.8	14.2	1.4
Professionals	0.5	10.5	42.9	6.1
Technicians and Associate Professionals	0.2	2.1	11.4	1.5
Clerical Support Workers	0.1	1.5	8.2	1.0
Service and Sales Workers	17.3	31.5	15.4	19.8
Skilled Agricultural, Forestry and Fishery Workers	7.8	4.9	1.3	6.7
Craft and Related Trades Workers	8.0	12.0	3.4	8.3
Plant and Machine Operators and Assemblers	2.3	6.2	2.1	3.0
Elementary Occupations	63.8	30.6	1.1	52.2
Total	100.0	100.0	100.0	100.0

Source：Labour Force Survey Annual Report (2019)

Micro-enterprise companies with less than four employees account for more than 90% of all Rwanda companies, creating half of the employment opportunities. [RDB, 2019] In addition, about 90% of employment is employed in the informal sector (unincorporated company operated by households) [NISR, 2020]. Since these micro-enterprise companies and family-owned companies are small in scale, it is difficult for them to continuously create large-scale employment. Therefore, when considering ways to create employment opportunities, it is necessary to pay attention to encouraging entrepreneurs and start-ups in addition to the expansion of employment in these micro-enterprise companies.

Table 2-4 shows a comparison of the employment status of those who received only general education and those who completed TVET in 2019 in the population aged 16 and over (working generation). The Employment to population ratio shows the ratio of workers employed to the population aged 16 and over (working generation) in each educational background category. For example, among the aged 16 and over who have completed only general primary education, 43.1% of those are employed. In contrast, 55.2% of those 16 years and older who have completed primary level of TVET (VTC) are employed. It can be said that those who completed primary level of TVET (VTC) are more successful in getting a job than those who completed only primary school of general education. We can see the same trend in all categories of education. Regarding the unemployment rate, TVET graduates are slightly lower in the middle school level and above categories.

Table 2-4 Comparison of the Employment Status by Educational Background

Level of attained	Employment to population ratio			Unemployment rate		
	General education	TVET	Total	General education	TVET	Total
None		60.1	45.2		10.5	13.4
Primary	43.1	55.2	44.7	14.7	15.3	14.8
Lower secondary	24.9	65.8	30.9	19.3	13.9	17.7
Upper secondary	43.7	59.7	46.6	24	23.6	23.9
University	74.6	81.5	75.3	15.1	10.0	14.6
Young/Adult						
Young (16-30)	34.3	59.4	41.3	21.9	19.6	19.4
Adults (31+)	56	59.7	48.6	11.8	12.5	12
Total	43	59.6	45.3	16.9	15.4	15.2

Source：Labour Force Survey Annual Report (2019)

2.5. Needs of Human Resource Development

Analysis of the needs of future human resource development should be done considering industries that are expected to grow in the future. According to the job creation forecasts by 2050, it is predicted that the following sectors will lead job creation [RDB, 2019]:

- 2017-2024: Tourism, manufacturing, agriculture
- 2025-2035: Tourism, manufacturing, ICT, agriculture
- 2036-2050: Tourism, ICT, Finance

In this survey, interview survey using questionnaires were conducted in the companies of the following fields; IT companies, companies in the manufacturing industry, in the tourism industry, in the construction industry, and companies in the printing industry. IT field, manufacturing industry, and tourism industry are considered to drive job creation according to the job creation forecast. Construction industry currently generates a large number of jobs. And the printing industry is positioned as a priority industry in NST1 and it also requires IT technology.

The survey was carried out dividing those companies into two groups. The first group consist of IT companies whose business is based on ICT technology and services and major printing companies (hereinafter referred to as "ICT professional users"). The other group consists of companies in the field of manufacturing, tourism-related companies, construction, and small and medium-sized printing companies (hereinafter referred to as "ICT general users").

2 types of questionnaires are used in the survey. For ICT professional users' companies, the questionnaire contains questions that that measure human resource development needs in the ICT field in detail, in addition to the questions that measure needs of general human resource development. For ICT general user companies, the questionnaire contains the questions that measure needs of general human resource development, needs of general ICT skills.

Table 2-5 Interviewed Companies

Category	Sector	Number of valid answers
ICT professional user	IT companies	12
	Large Companies in printing industry	1
ICT general user	Companies in manufacturing industry	7
	Companies in Tourism and related industry	5
	Construction companies	5
	Small companies in printing industry	1
Total		31

2.5.1. Skills and Human Resources Required by Companies

（1）Skills Required for Newly Hired Employees

The graph below shows the skills required for newly hired employees featuring high on their list of priorities in order of importance. For all ICT general users such as manufacturing, tourism and its related industries, construction, small and medium-sized printing industry, the level of importance and priority of skills related to the basics of work such as time management, sense of responsibility, communication, and logical thinking are set as the highest. This is followed by general business skills such as finance and accounting skills, and sales skills. Next, ICT skills related to operations of both hardware and software such as use of Microsoft Office application software and various business applications, use of websites, and marketing skills are of high importance and priority.

(A) Overall ICT General User

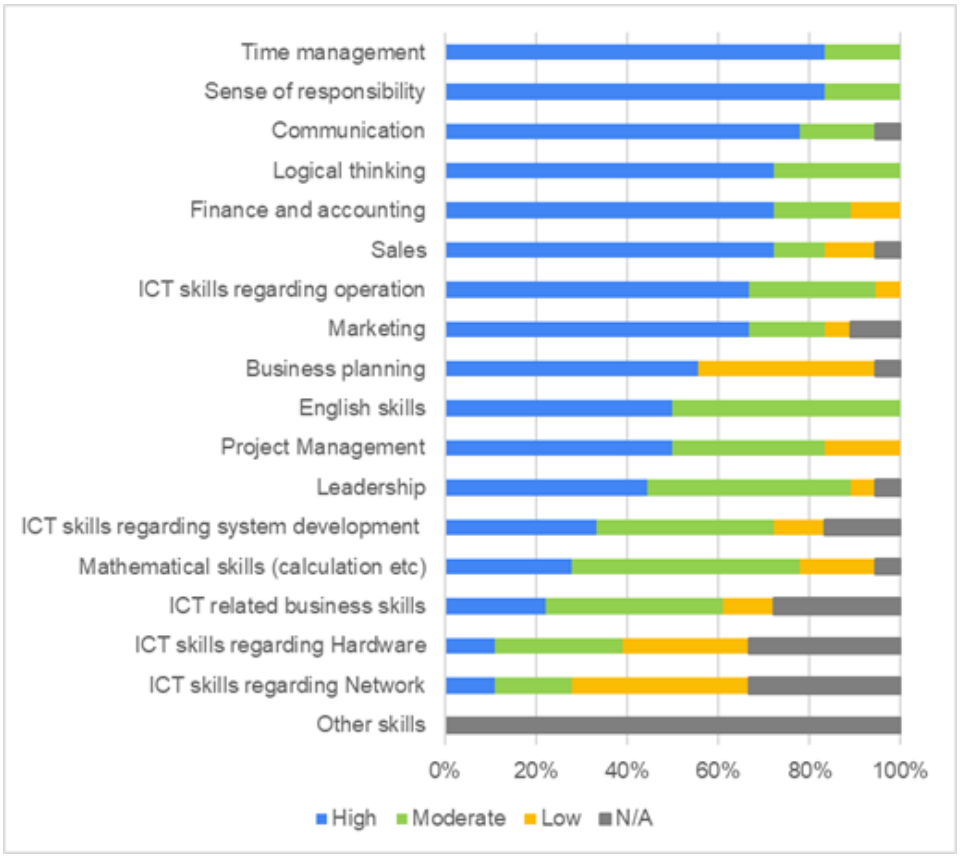

Figure 2-12 Importance/ Priority of Skills Required for Newly Hired Employees (Overall ICT General User)

The survey results of the importance and importance of each skill by industry are described below.

Manufacturing Industry

In the manufacturing industry sector, ICT skills regarding operation and project management skills are very important, and all 5 out of 5 companies answered that these skills are important. It is considered that these basic ICT operation skills are highly required in order to accurately operate ICT equipment and applications used in the manufacturing industry such as manufacturing process, quality control, and shipping.

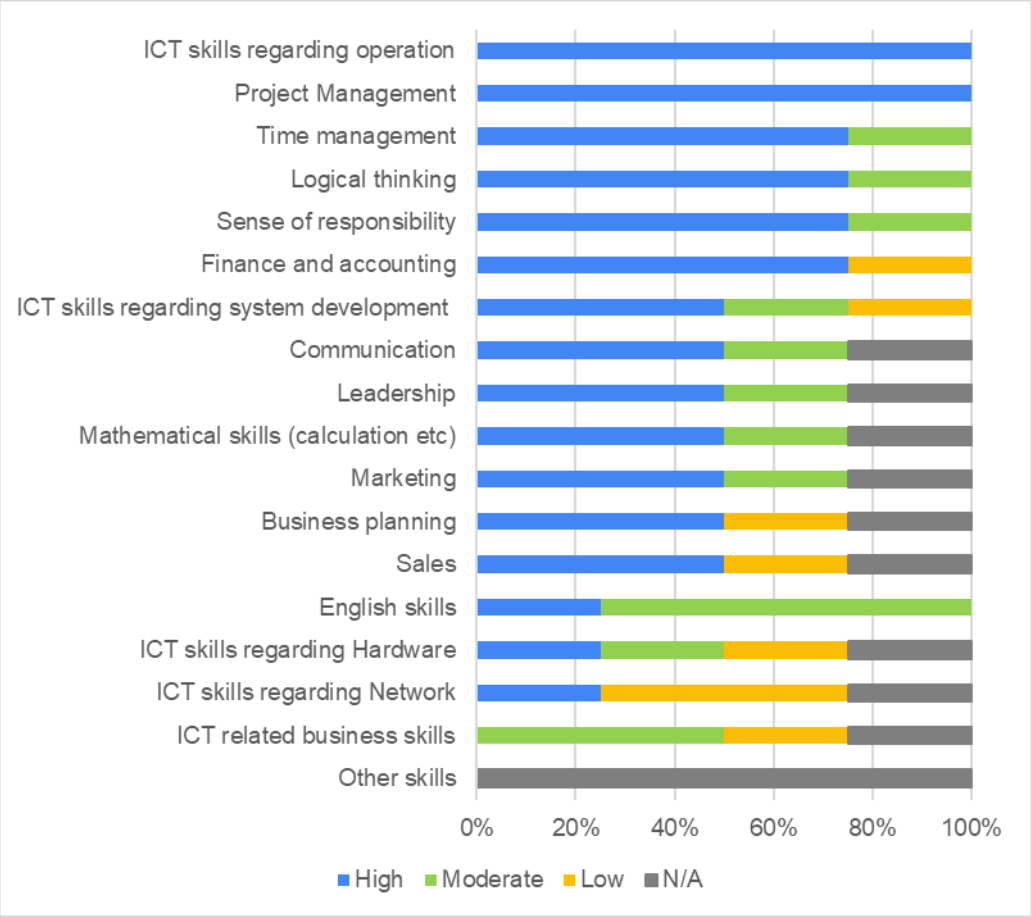

Figure 2-13 Importance/ Priority of Skills Required for Newly Hired Employees (Manufacturing Industry)

Tourism and its Related Industries

In the tourism and its related industry, marketing skills showed the highest, and all 5 out of 5 companies answered as such. It is considered that this is because hotels, travel agencies, and such industries require marketing skills including market research, analysis for accommodation plans, and tour planning to meet with customers' needs. And as next, sense of responsibility, communication, English skills, finance and accounting and sales are showing as high. In the tourism and its related

industry, having customer service and a high level of service mind are highly required, so it can be said that these skills are recognized as important.

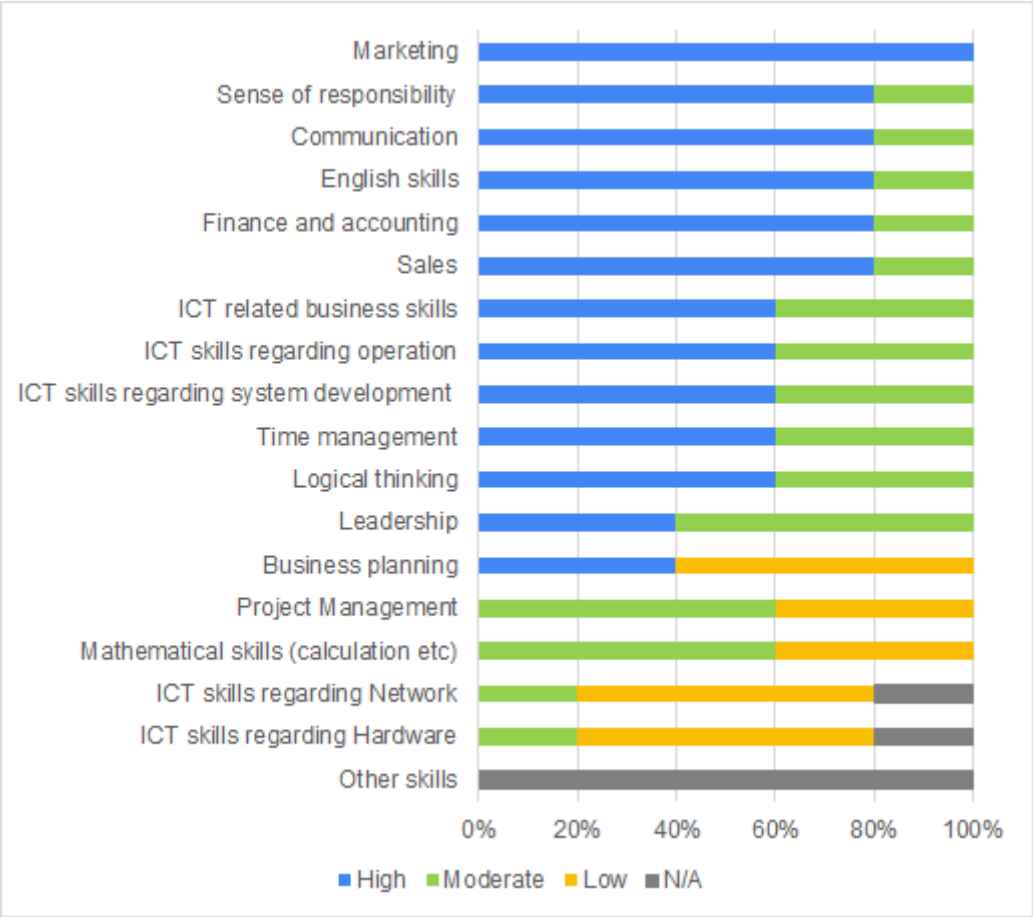

Figure 2-14 Importance/ Priority of Skills Required for Newly Hired Employees (Tourism and Its Related Industry)

Construction

In the construction industry, ICT skills regarding operations and project management skills were of high importance with 5 out of 5 companies. Next to these, time management, logical thinking, and a sense of responsibility are shown as the most important skills. In ICT skills regarding operations, ICT equipment and applications are generally used in the construction industry for research, design, construction process, maintenance management, repairs, etc. so it is considered that the acquisition of accurate operation of these ICT equipment and applications software are required.

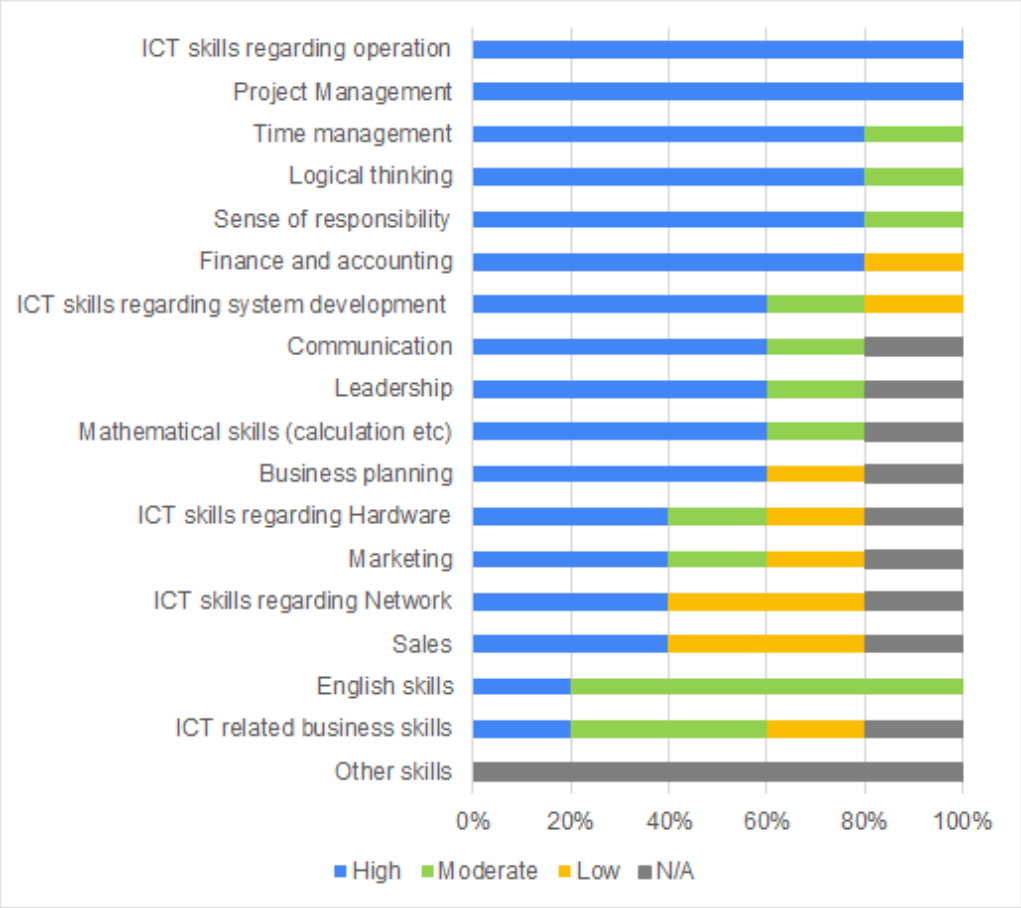

Figure 2-15　Importance/ Priority of Skills Required for Newly Hired Employees (Construction)

(B) ICT Professional Users

Among ICT professional user companies such as IT companies including software development, and personal computer equipment distribution and networking, along with general skills such as time management and sense of responsibility, ICT skills related to networks (network maintenance, network security, etc.) and skills related to hardware (PC assembly/disassembly, IOT sensor technology, RFID, digital devices and components, drones, 3D printers, etc.) are highly important, and nearly 80% of all companies answered that these skills are highly important. Next, ICT skills related to business skills such as ICT skills related to corporate digital transformation are of high importance.

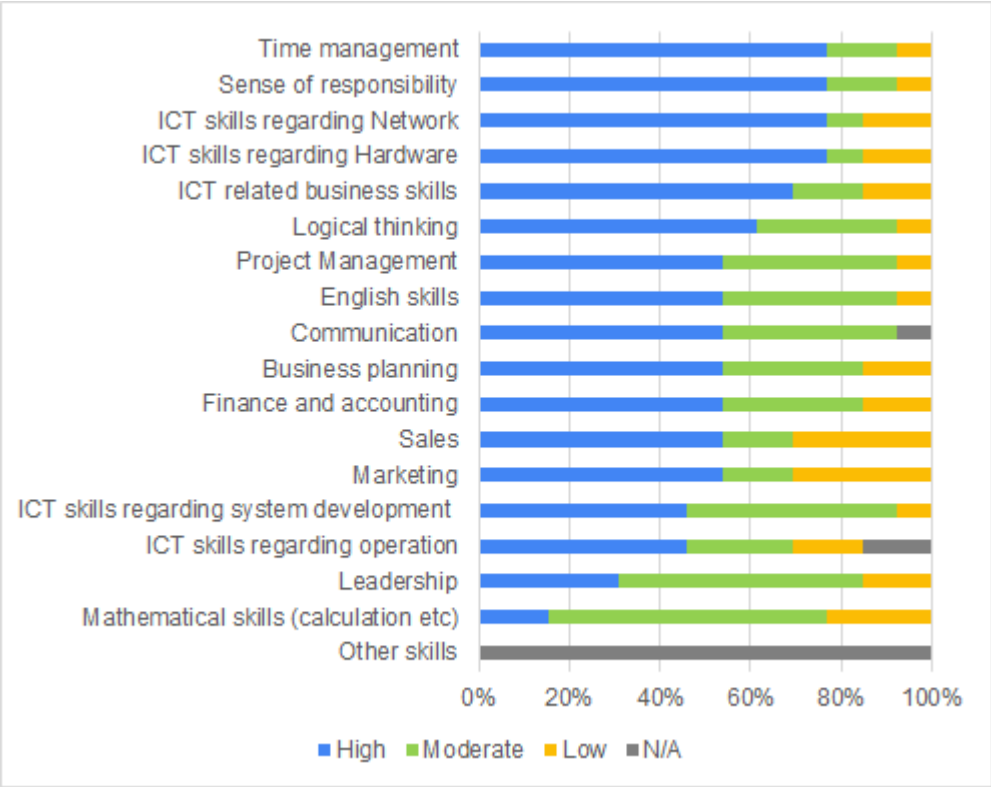

Figure 2-16 Importance/ Priority of Skills Required for Newly Hired Employees (ICT Professional Users)

（2） Level of Satisfaction with the Skills of Newly Hired Graduates after Hiring

Analysis of the level of satisfaction after hiring the graduates indicating the importance of the above skills is described in this section.

(A) Over all ICT General User

There were few ICT general users who replied as dissatisfied, however, the average percentage of respondents who answered that they were satisfied with each skill was as low as around 30%, and most of the companies answered "fair" for most of the skills.

Regarding time management and sense of responsibility which had the highest importance and priority, the percentage of companies answered that they were satisfied was less than 40%, and the percentage of companies that answered that they were normal was close to 60%. Less than 40% of companies answered that they were satisfied with their communication skills and financial/sales skills, which were also of high importance/priority.

Regarding ICT skills related to operations, which had the second highest importance and priority, only less than 30% of companies answered that they were satisfied.

Level of satisfaction on skill is generally low, but in terms of technical skills, ICT skills related to operations are high in importance and low in satisfaction, but in other words, it became clear that requires technical improvement and require for improvement.

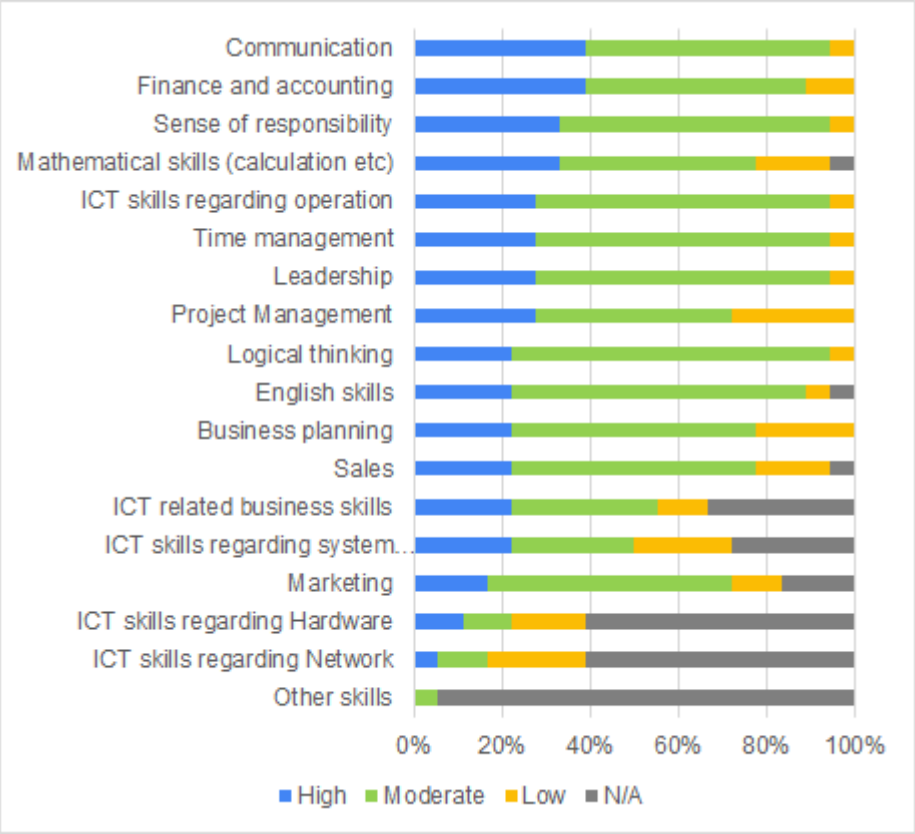

Figure 2-17 Level of Satisfaction with the Skills of Newly Hired Graduates after Hiring (Overall ICT General User)

(B) ICT Professional Users

Among ICT professional users, the results show that the level of satisfaction varies greatly depending on the skill. Of the four skills with the highest importance and priority (time management skill, sense of responsibility, ICT skill related to network, ICT skill related to hardware), the former two (time management skill and sense of responsibility), the number of companies that answered as highly satisfied was low at just under 30% of the total.

On the other hand, regarding the latter two (ICT skills regarding network and ICT skills regarding hardware), about 50% and 70% of the companies answered that they were highly satisfied, respectively, which are relatively high.

In terms of technical skills, both ICT skill regarding network and ICT skills regarding hardware are highly important, but if could be chosen in one ICT skills regarding network have the need for technical improvement.

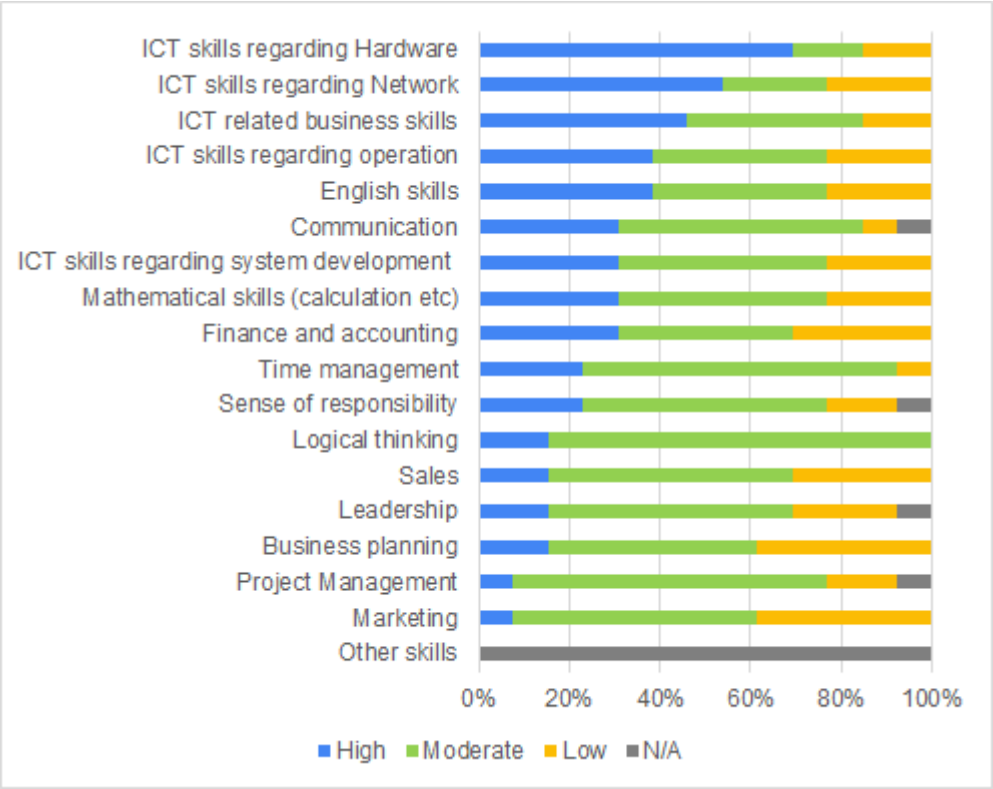

Figure 2-18　Level of Satisfaction with the Skills of Newly Hired Graduates after Hiring（ICT Professional User）

（3）Presence of In-House Education/Training and Details of Implementation

This section describes the existence and implementation of in-house education and training.

(A) Overall ICT　General User

Among ICT general ICT users, more than 70% which is 13 out of 18 companies answered that they are implementing in-house education and training. And about 70% of the companies answered that the frequency of training was irregular, and that most companies provide trainings when they feel the need, rather than conducting regular education and training programs.

The content of the training is diverse as follows.

【Contents of major training】

- Use of various software and improvement of ICT skills (4 companies)
- Customer care (3 companies)
- Safety management (3 companies)

- Marketing (3 companies)
- Machine design and operation (1 company)
- Online project management (1 company)
- Technical training related to construction (1 company)
- Others

The main targets of the training were clerical staff and management, followed by technical workers. More than half of the companies responded that the training period was two days or more. More than half of the respondents outsource training trainers, and mainly outsource training to external consultants as well as WDA, RIA (Rwanda Institute of Architects which carries out for training on construction technology), and IPRC Kitabi Training Centers, GIZ's training facility and training at overseas training centers.

Figure 2-19 Implementation Status of In-House Education and Training (Overall ICT General User)

(B) ICT Professional User

Among those responded to the questionnaire all 13 companies of ICT professional users provide education and training. Approximately 80% of the companies answered that the frequency of training was irregular, and that most companies, like general ICT users, conduct training irregularly when they feel the needs of trainings.

Figure 2-20 Implementation Status of In-House Education and Training (Overall ICT Professional User)

The contents of the training were most frequently related to network connection such as the Internet and updates to the latest knowledge and technology, and each of the three companies provided these trainings. Trainings related to network connection, some companies were undertaken the training conducted by Cisco Systems, a major network-related equipment manufacturer in the world.

【Contents of major training】

- Network connection (3 companies)
- Knowledge and technical updates on the latest products and devices (3 companies)
- Accounting (2 companies)
- Education and training related to hardware (2 companies)
- Marketing (2 companies)
- Project management (2 companies)

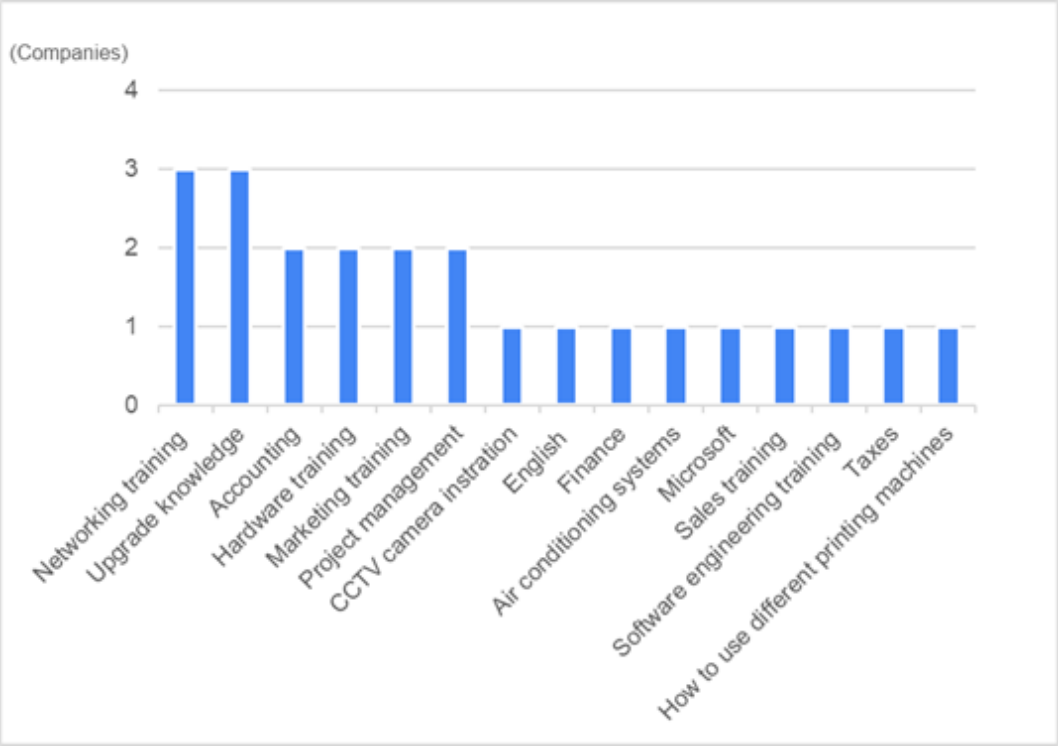

Figure 2-21 Main Contents of In-House Education and Training (ICT Professional User)

The main targets of the training were technical workers, followed by field engineers and clerical staff. Implementation of education and training for 3 days or more account for 60% of the total period. Nine of the 13 companies (about 70%) outsource training. The breakdown of outsourcing is mainly asking external consultants (4 companies), taking training provided by business partners such as Cisco, HP, Samsung (3 companies), to Kenya where the head office is located and external training institutions that employees were dispatched to take classes (3 companies).

2.5.2. Current Status of Recruitment in the Companies

（1） Frequency and Number of Human Resources (cumulative from 2017 to 2020)

All companies of both ICT general users and professional users recruit human resources irregularly and when necessary. The cumulative number of human resources recruited from 2017 to 2020 is as shown in the graph below. Among general ICT users, the largest number of companies answered that they hired 6 to 10 people, and they account for about 40% of the overall ICT general users. Among ICT professional users, about 40% of the companies answered that they hired 1 or 2 person(s). It can be said that many ICT professional user companies hired smaller number of staff compared to ICT general user companies.

The cumulative number of human resources recruited from 2017 to 2020 is as shown in the graph below.

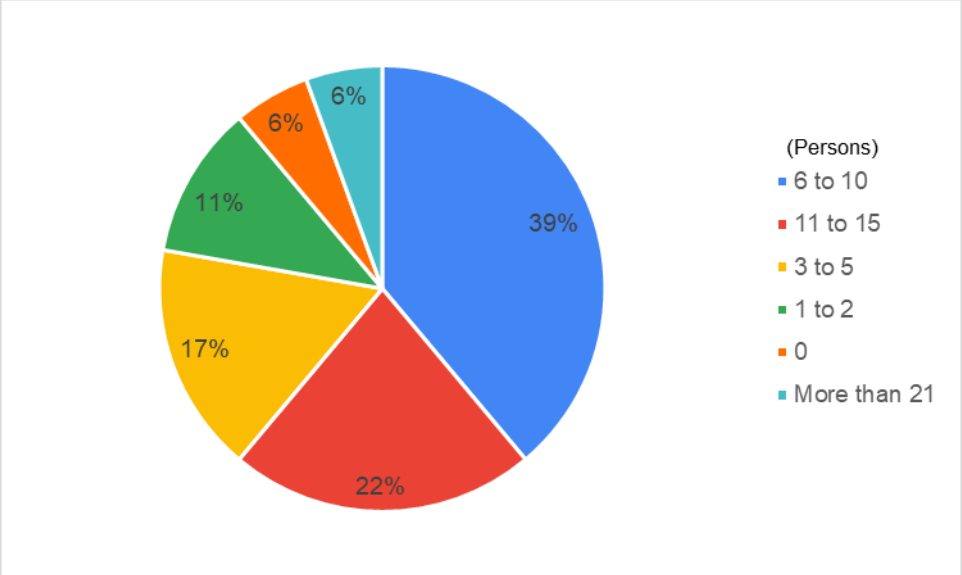

Figure 2-22 Number of Human Resources Recruited from 2017 to 2020 (Overall ICT General User)

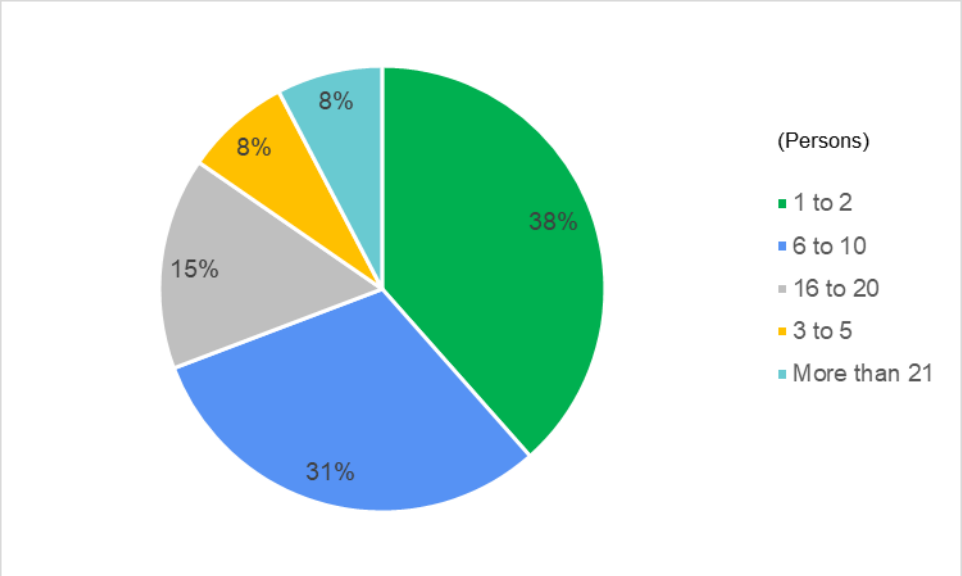

Figure 2-23 Number of Human Resources Recruited from 2017 to 2020 (ICT Professional Users)

In the past four years, about 40% of ICT general users and 60% of ICT professional users recruited IPRC graduates.

(2) Major Recruitment Methods

The most common recruitment method for ICT general users was through direct communication with internship students. Next were referrals and introductions from current and past employees and personal connections. In ICT professional user companies, direct communication with intern students and personal connections were the most common recruiting methods. Therefore, internship system is a good opportunity for official recruitment in both ICT general user companies and ICT professional user companies.

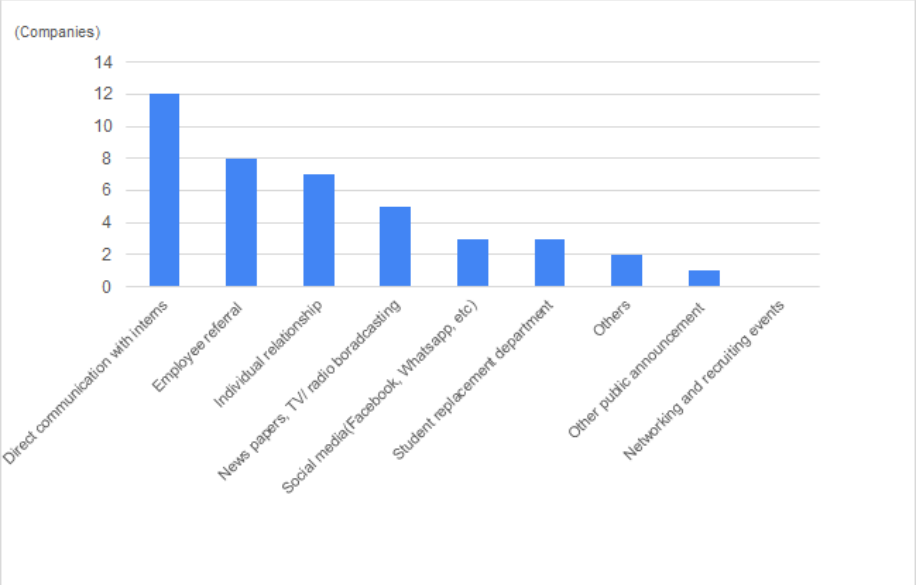

Figure 2-24 Major Recruitment Methods (ICT General User)

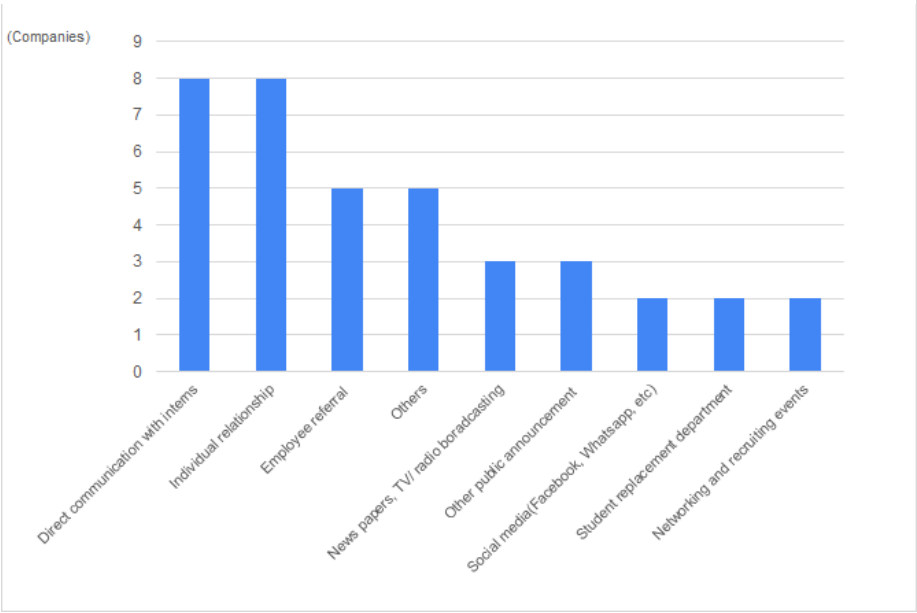

Figure 2-25 Major Recruitment Methods (ICT Professional User)

（3） Educational Background Required at the Recruitment

Nearly 40% of ICT general users require for candidates an academic level of primary school or higher upon recruitment. And secondary school and VTC each account for less than 20%. Both TSS and IPRC are about 11% each, and many companies think that the VTC academic level technical education is sufficient for qualification of new recruitment. In contrast, ICT professional user companies tend to require higher academic levels. More than 30% of ICT professional user companies seek secondary school academic level or higher education, and less than 25% of companies seek IPRC and university

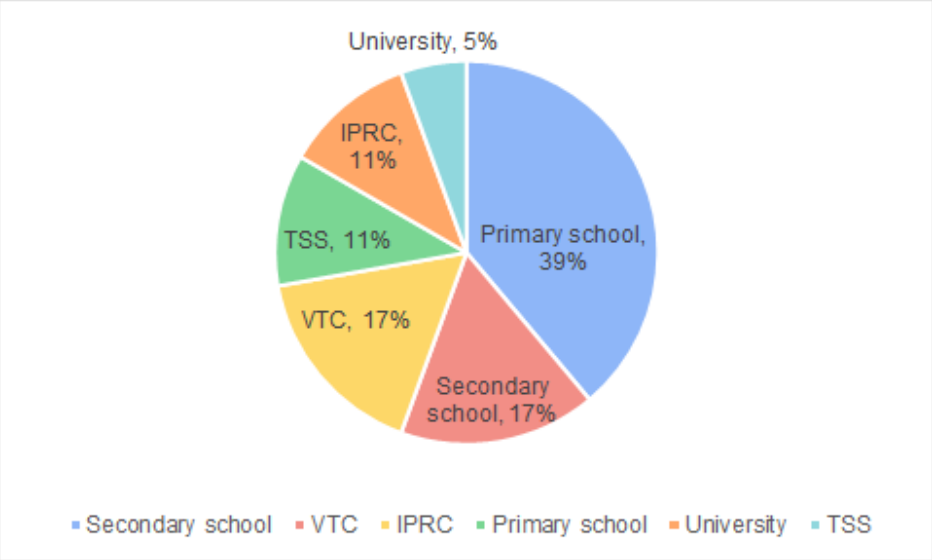

Figure 2-26 Minimum Academic Level Required at the Recruitment (ICT General Users)

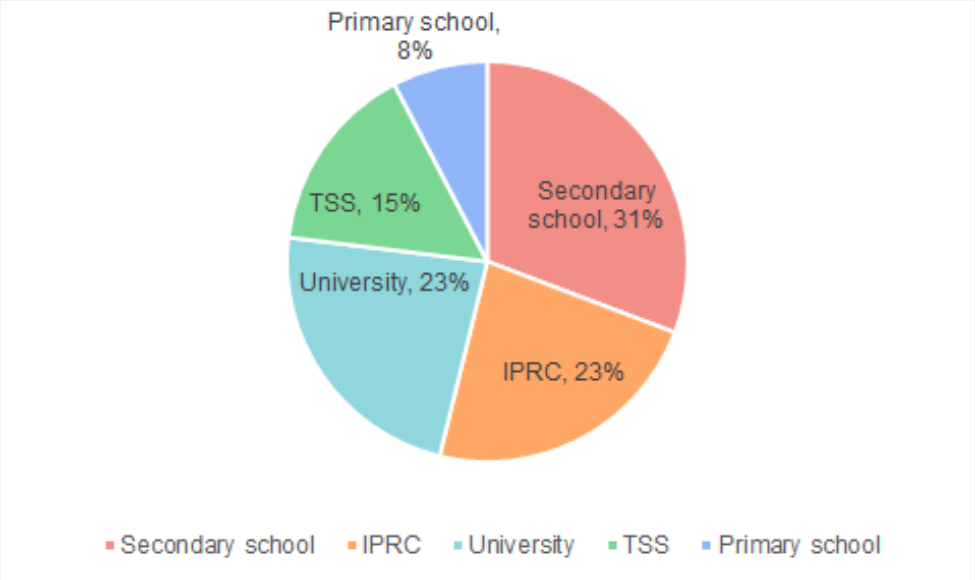

Figure 2-27 Minimum Academic Level Required at the Recruitment (ICT professional user)

（4） Decisive Factor for Recruitment

For both ICT general users and professional user companies, the large number of companies answered that they would decide to recruit based on the results of the interview, followed by the results of the practical test.

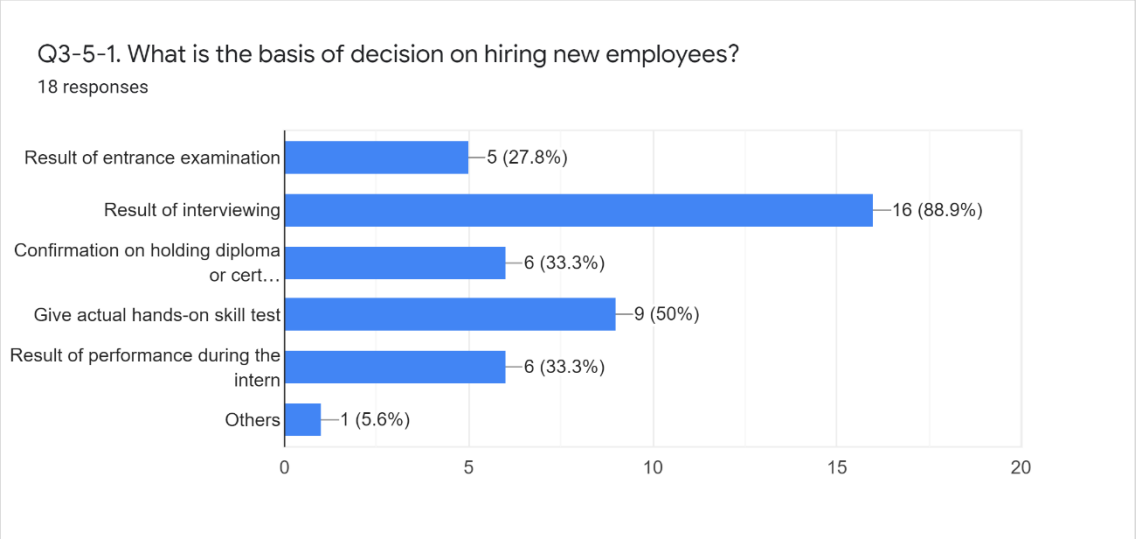

Figure 2-28　Decisive Factor for Recruitment (ICT General User)

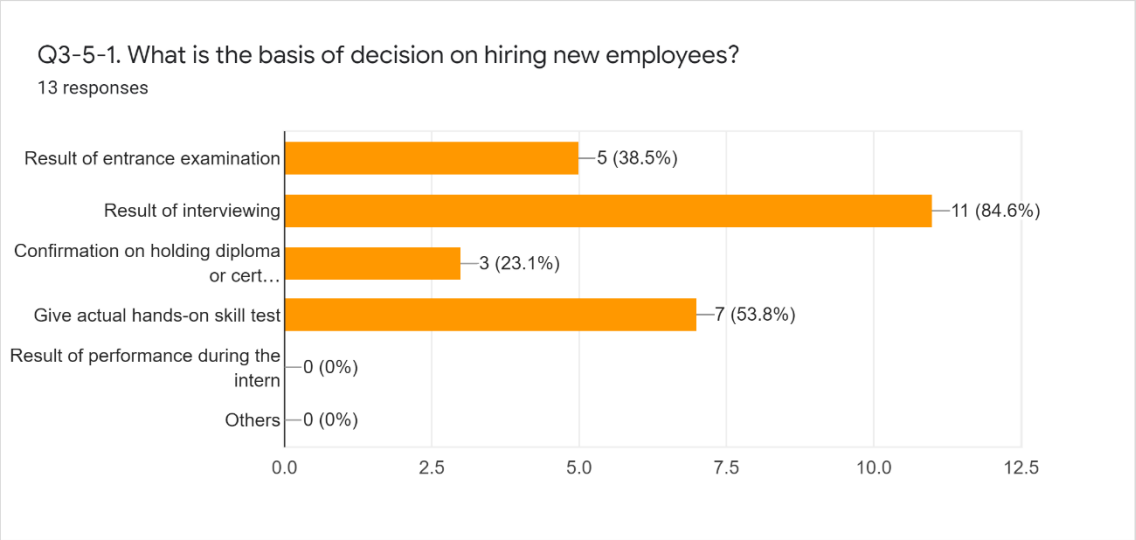

Figure 2-29　Decisive Factor for Recruitment (ICT Professional User)

（5） Possibility of Recruitment from Internship

Approximately 80% of both ICT general user companies and ICT professional user companies answered that they are accepting internship students from TVETs. Interns at ICT general user companies are mainly engaged unskilled labor (12 out of 15 companies). On the other hand, internship students in ICT professional user companies are engaged in IT-related work in all 10 companies, and they are engaged in simple work addition to IT- work in 5 companies.

Regarding the level of satisfaction of employers with the skills of internship students, more than half of the ICT general user companies answered "Fair" (8 out of 15 companies), followed by less than half of the companies answered "Satisfied" (7 out of 15 companies). On the other hand, among ICT professional user companies, 20% (2 out of 10 companies) responded as "Very satisfied", 60% of companies (6 out of 10 companies) are "Satisfied", and 20% of companies. (2 out of 10 companies) answered "Fair". In the survey, both "Very satisfied" and "Satisfied" account for 80% of the total respondents and from the result, it can be said that the degree of employer satisfaction with the skills of internship students of the ICT department graduates in ICT professional user companies is relatively high. Nearly 90% of ICT general users and 70% of ICT professional users answered that they would consider hiring depending on their performance during the internship, so it will be one of the effective ways for internships to be officially recruited.

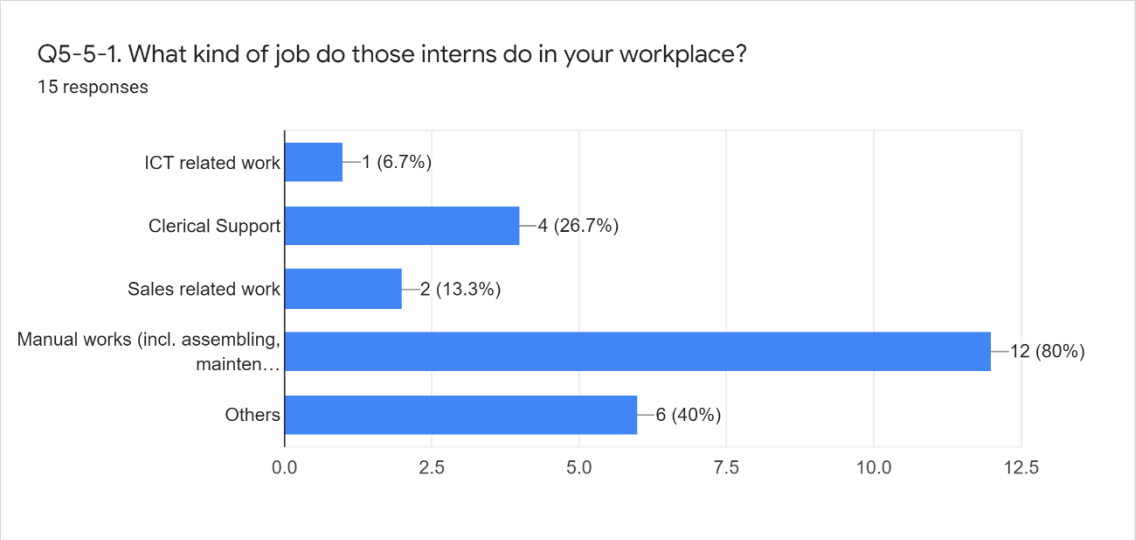

Figure 2-30 Works of Internship Students during Intern Term (ICT General User)

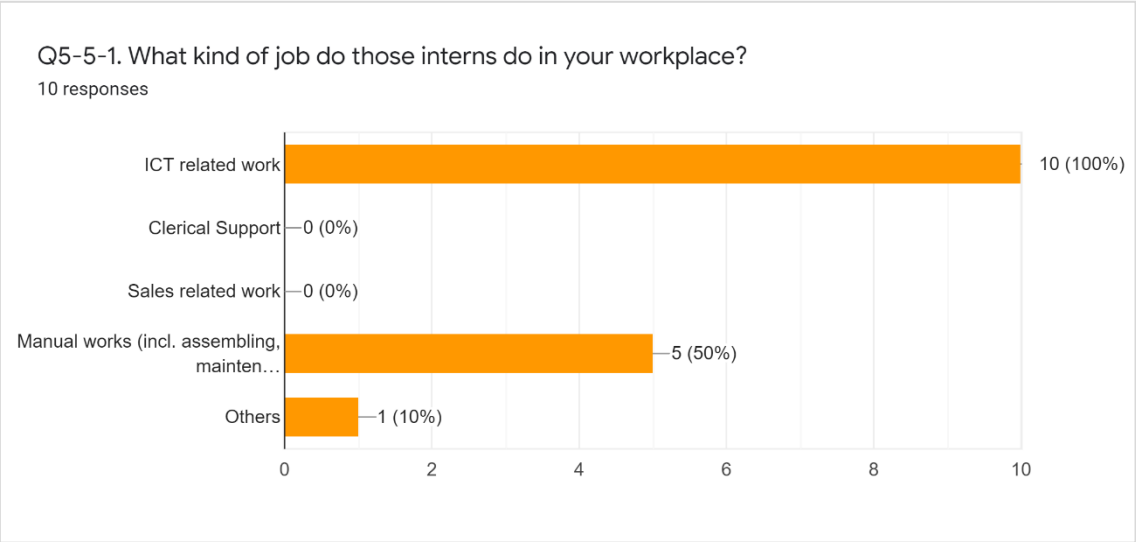

Figure 2-31 Works of Internship Students during Intern Term (ICT Professional User)

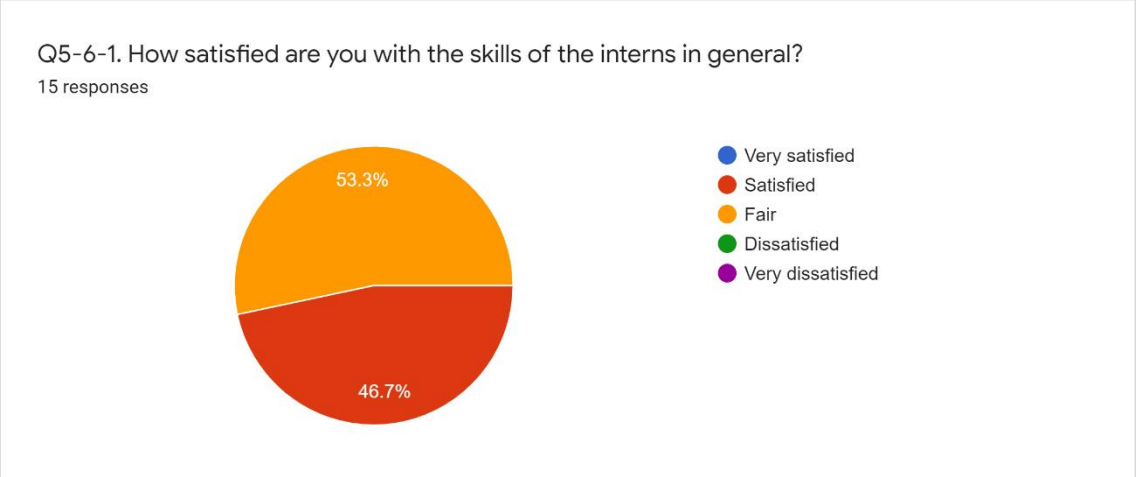

Figure 2-32 Level of Satisfaction of the Internship Students (ICT General Users)

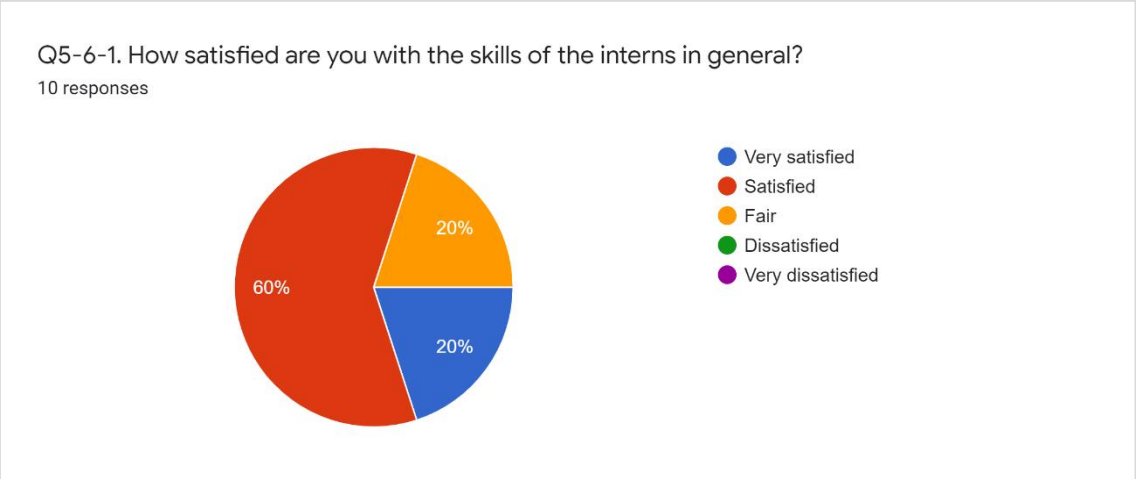

Figure 2-33 Level of Satisfaction of the Internship Students (ICT Professional Users)

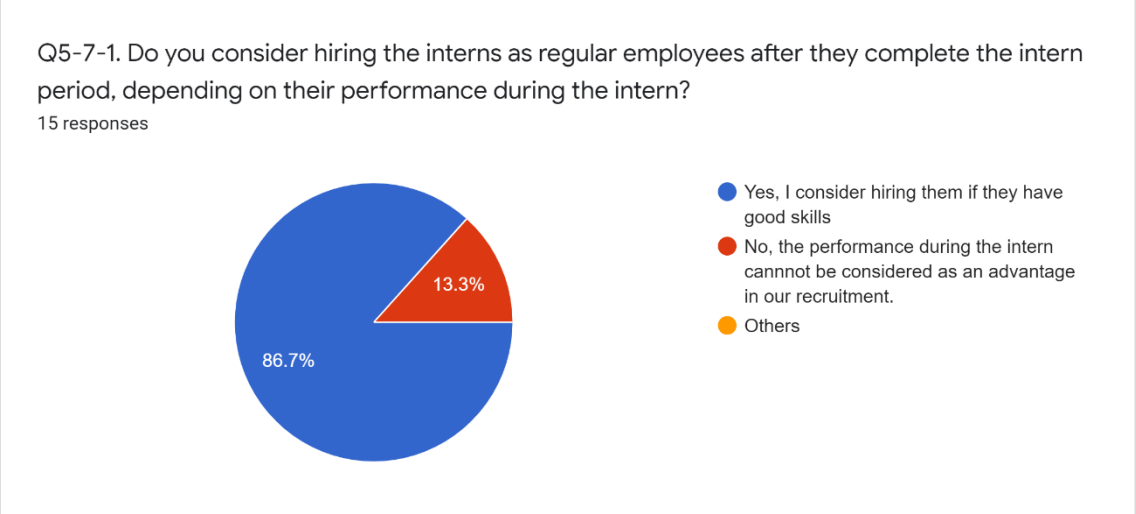

Figure 2-34 Possibility to Consider Recruitment of The Students due to Performance during the Internship（ICT General User）

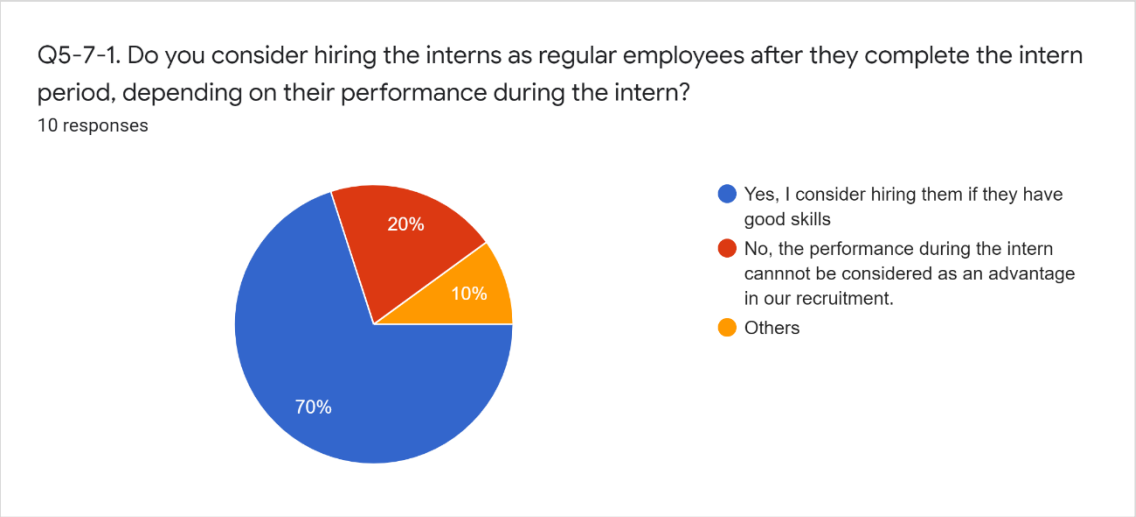

Figure 2-35　Possibility to Consider Recruitment of the Students due To Performance during the Internship（ICT Professional User）

2.5.3. Present Status of IT Use in Companies

Looking at the results of the questionnaire survey on the status of IT use in companies, there is no big difference in the basic IT environment between ICT general user companies and professional user companies, and most companies installed LAN system connected to several dozens of PCs which are mainly used for Office applications in a Windows OS environment. The number of PCs varies from company to company, and large companies, regardless of whether they are ICT general user or professional user companies use about 100 PCs.

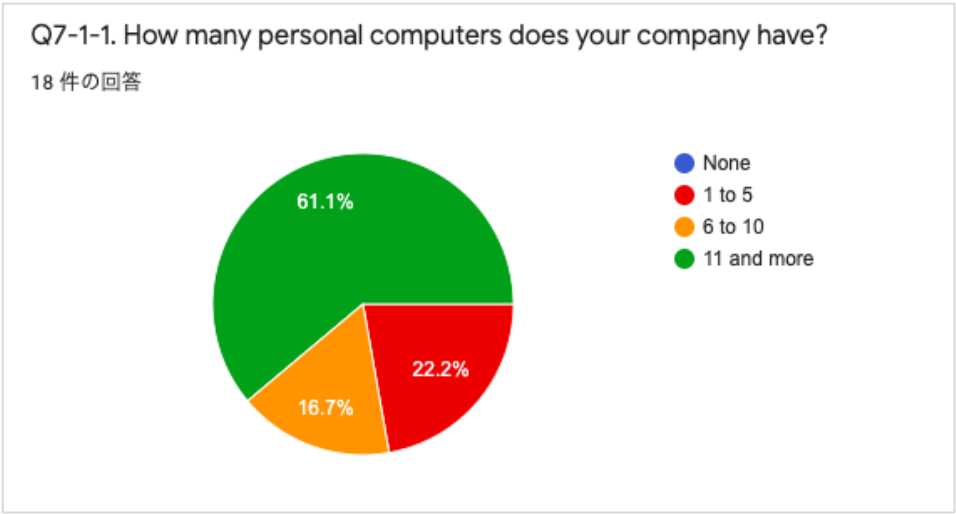

Figure 2-36　Number of PCs Used In-House (ICT General Users)

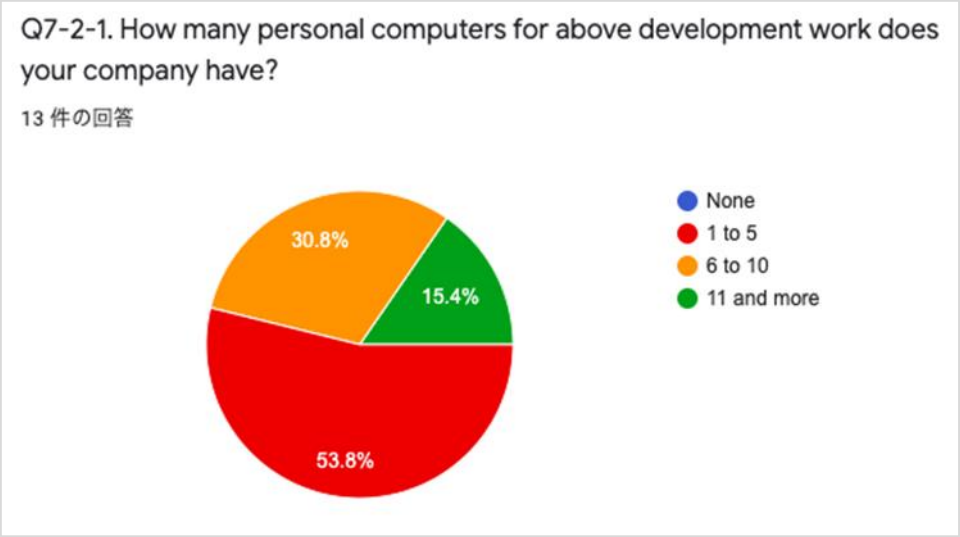

Figure 2-37　Number of PCs Used In-House (ICT Professional Users)

The purpose of utilizing IT in general user companies is to improve work efficiency by using Office applications such as Word and Excel, and e-mail, etc. About 10% of the companies replied that they are using database application, and all the companies that answered the questionnaire are indicated that they improve productivity by using IT. Specific uses of IT environment include improvement of efficiency of back office operations such as documentation, asset management, and accounting operations, and utilization in business development such as sales increase and market development.

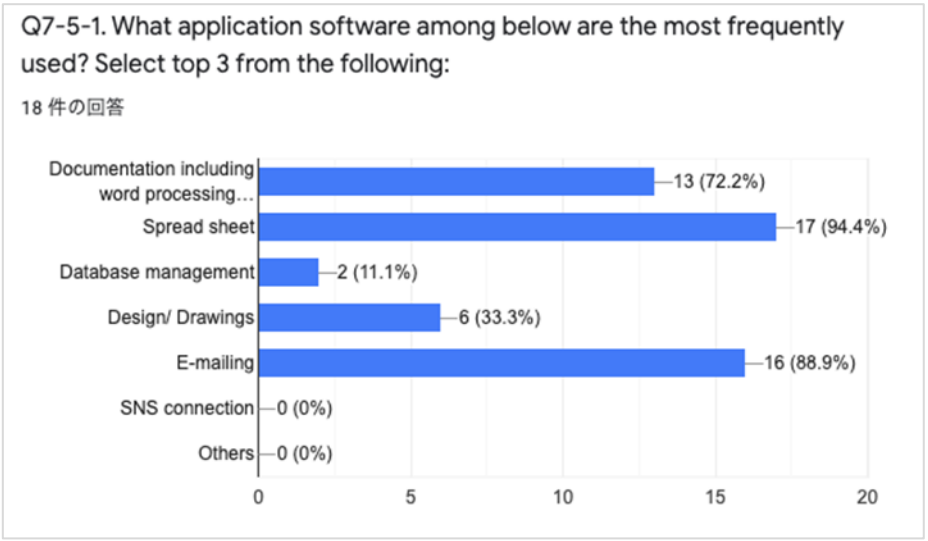

Figure 2-38　Use of IT Application (ICT General Users)

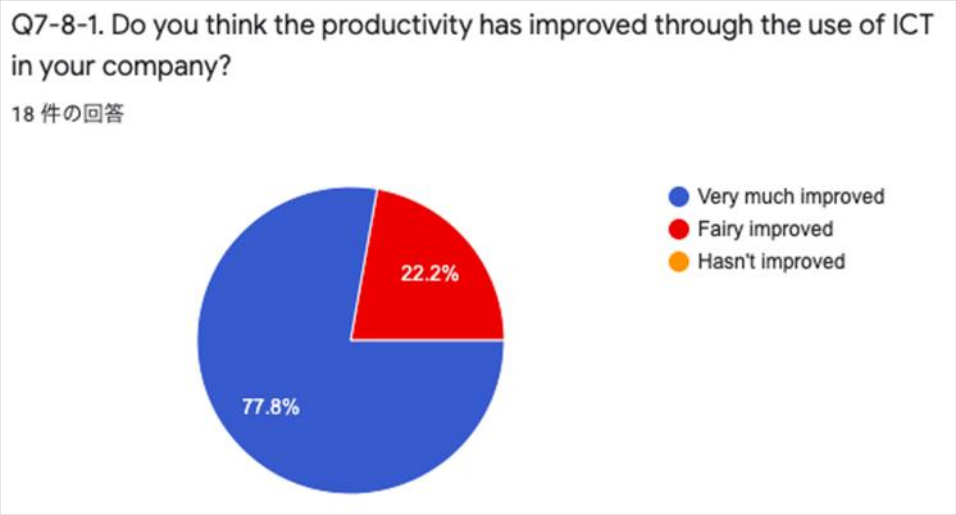

Figure 2-39 Improvement of Productivity by Using IT (ICT General User)

Figure 2-40 Improvement of Productivity by Using IT (Details on ICT General User)

On the other hand, IT related equipment and software are registered as assets for ICT professional user companies, and in addition to the same basic IT environment as ICT general user companies, system development environments (programming tools such as PHP, Java, Visual Basic) and integrated development environments (IDE's Integrated Development Environment), project management tool (Microsoft Project), and industry-specific system environment (CAD such as AutoCAD, SolidWorks, Adobe products for design, etc.) are prepared.

The skills that ICT professional user companies require from newly recruited human resources include network technology (including network security), applications and web development, PC assembly, etc., and the needs of technology attracting in the market such as big data, AI, and blockchain are not

high. Judging from the above-mentioned questionnaire results that only about 10% of ICT general user companies utilize database system and it is considered that the market needs for services that utilize those technologies are not high.

In addition, the level of satisfaction with the skills of IT staff (operators) in ICT general user companies is high (more than 70% answered as "very satisfied"), and the percentage of IT staff who have acquired IT skills while attending school is over 70% which is high.

On the other hand, in ICT professional user companies, satisfaction with system development skills decreased slightly, 60% answered that they were "Very satisfied", and around 45% replied as that they acquired system development skills while attending school. As a result, it is considered that it is not easy to acquire the necessary skills while attending school because more specialized skills are required in ICT professional user companies.

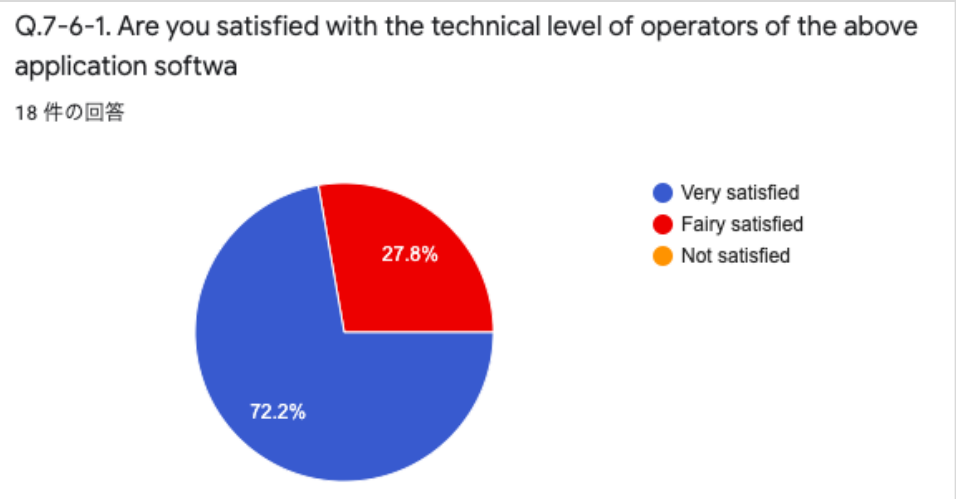

Figure 2-41 Satisfaction with the Technical Level of Operators IT Skills (ICT General User)

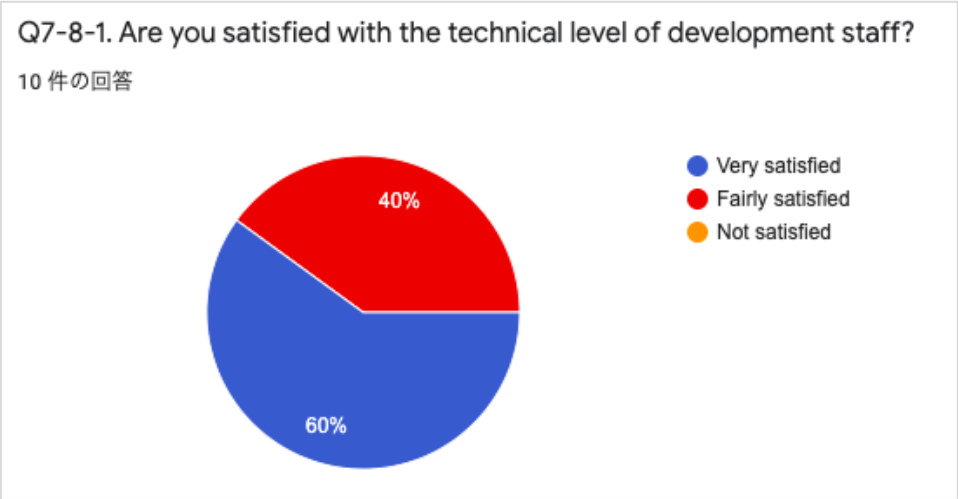

Figure 2-42 Satisfaction with the Technical Level of System Development Engineers (ICT Professional User)

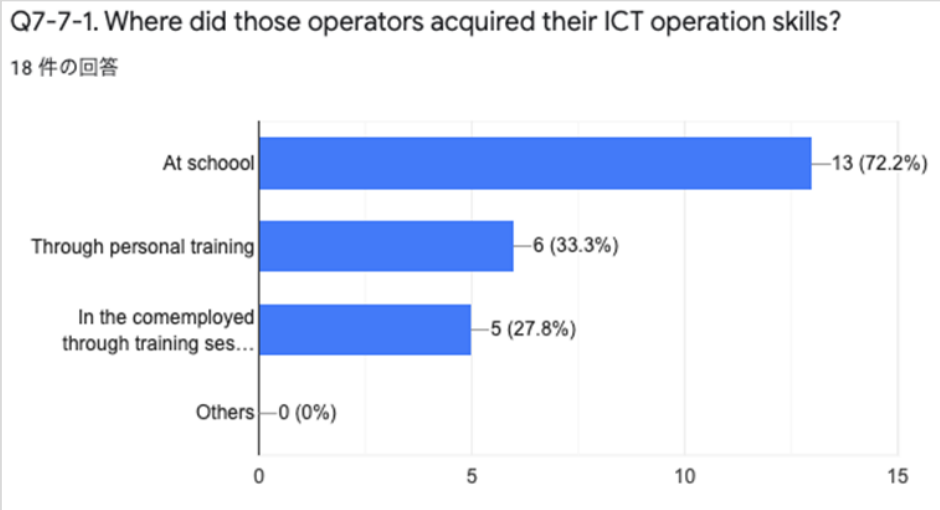

Figure 2-43 Opportunities to Acquire Operators' IT Skills (ICT General User)

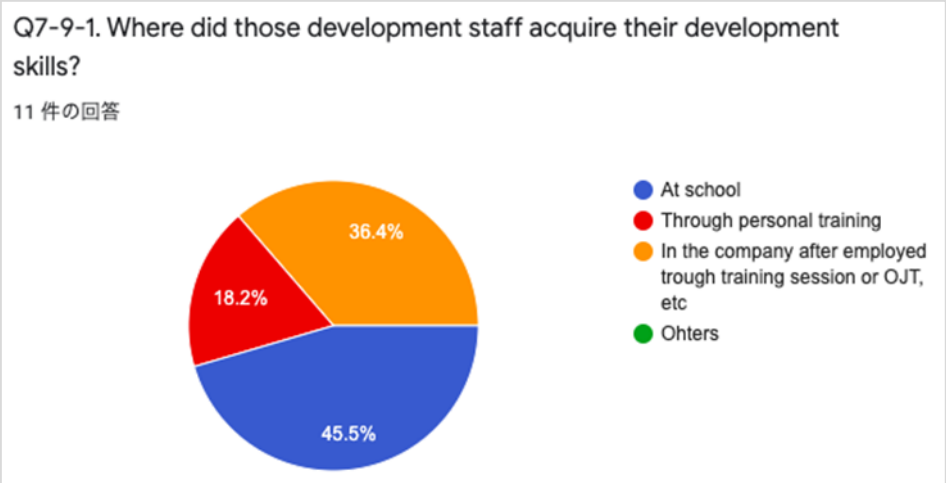

Figure 2-44　Opportunities to Acquire IT Skills (ICT Professional User)

2.5.4. Satisfaction and Recommendation by Private Sector on IPRC

（1） Satisfaction of Employers about the Skills of IPRC Graduates

Figure 2-45 and Figure 2-46 show the level of satisfaction of employers with the skills of IPRC graduates (including those other than Tumba) by skill.

(A) ICT general user

Among ICT general user companies, satisfaction levels vary depending on their skills. Regarding basic work skills such as sense of responsibility and time management, most of the companies answered that the satisfaction level was "Fair", which is the same tendency as the satisfaction level for newly hired employees (newly hired employees) described in 2.5.2.

It is worth mentioning that ICT skills related to operations, while less than 30% of companies answered that they were "Very satisfied" with the skills of their newly hired employees and the skills of IPRC graduates are 50% which IPRC graduates showed as an advantage.

On the other hand, regarding business skills such as marketing, sales, and business planning, the satisfaction level of IPRC graduates is lower than that of newly hired employees.

(B) ICT Professional User

In ICT professional user companies, among the four skills (time management skills, sense of responsibility, ICT skills regarding network, hardware such as such basic architecture of computer input/output devices, processing of CPUs, storage devices, and their connection systems, etc.), while less than 30% of companies answered that they were "highly satisfied" with the skills of IPRC graduates are shown as about 40% and 60% respectively.

Regarding ICT skills related to networks, which is also high in importance, about 50% of the respondents are "highly satisfied" with the skills of newly hired employees, and more than 60% of the respondents are "highly satisfied" with the skills of IPRC graduates. It shows that IPRC graduates have an advantage over newly hired employees in ICT skills related to networks. Regarding ICT skills related to hardware (such as skills related to computer input / output, CPU arithmetic processing, storage devices, connection systems and process of these), nearly 70% of the respondents are satisfied with the skills of their newly hired employees, while only 50% of the respondents are satisfied with the same skills of the IPRC graduates.

However, hardware-related ICT skills are the third highest of satisfaction, and it is said by Rwandan government and development partners that hardware-related ICT skills are the strength of IPRC. Since the results of the questionnaire survey for employers is subjective to each respondent, it is presumed that if the employers' expectations for IPRC graduates are high in the first place, the satisfaction level may become low. On the contrary, if the expectation for newly hired employees are low in the first place, and if their skills turns out to be better than expectation, the satisfaction level may become high because they had unexpected good skills.

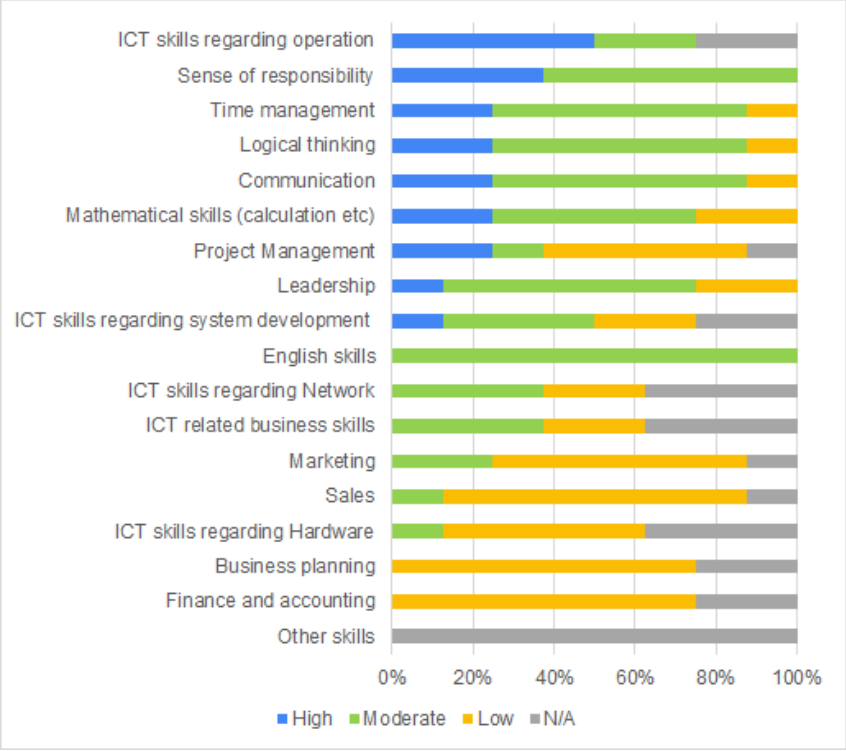

Figure 2-45 Satisfaction of Employers about the Skills of IPRC Graduates (Including Graduates of Tumba and Other IPRCs) (ICT General User)

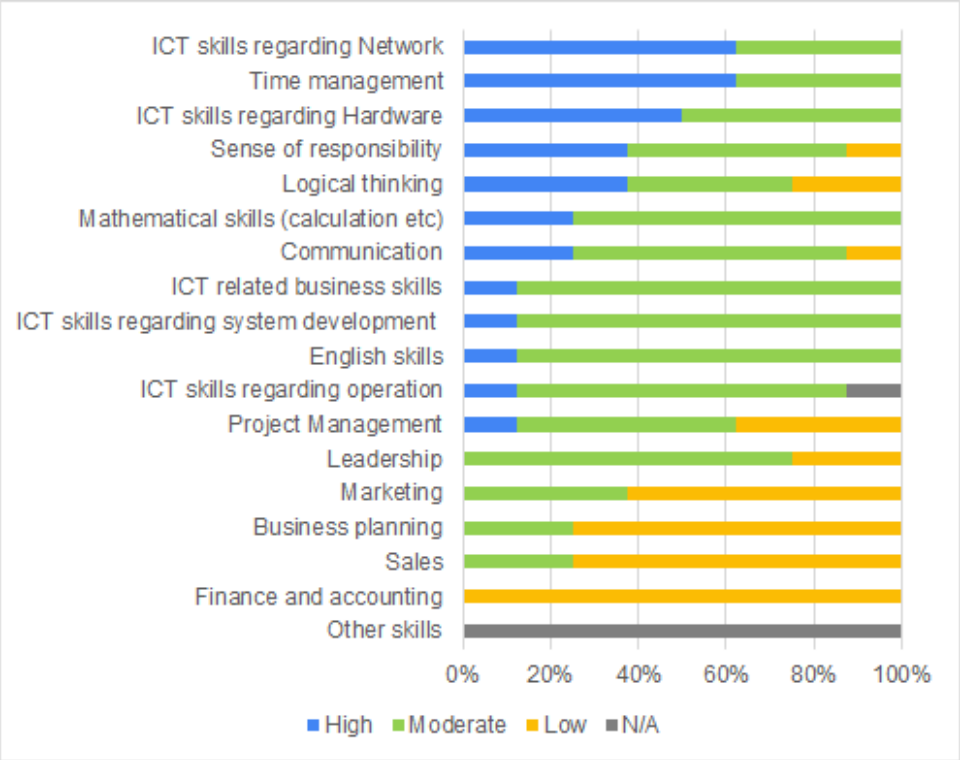

Figure 2-46 Satisfaction of Employers about the Skills of IPRC Graduates (Including Graduates of Tumba and Other IPRCs) (ICT Professional User)

（2） Level of Contribution of Learning at IPRC to Practical Work

Regarding the degree of contribution of learning at IPRC to practical work, 6 graduates each of IPRC Tumba's Department of Electronics and Telecommunication (hereinafter, referred to as ET), Department of Information and Communication Technology, and Department of Renewable Energy (18 in total) were interviewed.

In this section, "skills acquired in IPRC" and "how much each skill is actually used in the current job" are described by each faculty of IPRC Tumba. Firstly, all six graduates of the Department of ET answered that they had acquired specialized skills related to electronics and communications, mathematics, and ICT skills related to software, networks, and hardware at IPRC. The skills that are highly utilized in their current work are hardware-related ICT skills (5 people), time management (4 people), and logical thinking (4 people). The learning at IPRC was especially utilized in hardware-related ICT technology. Secondly,

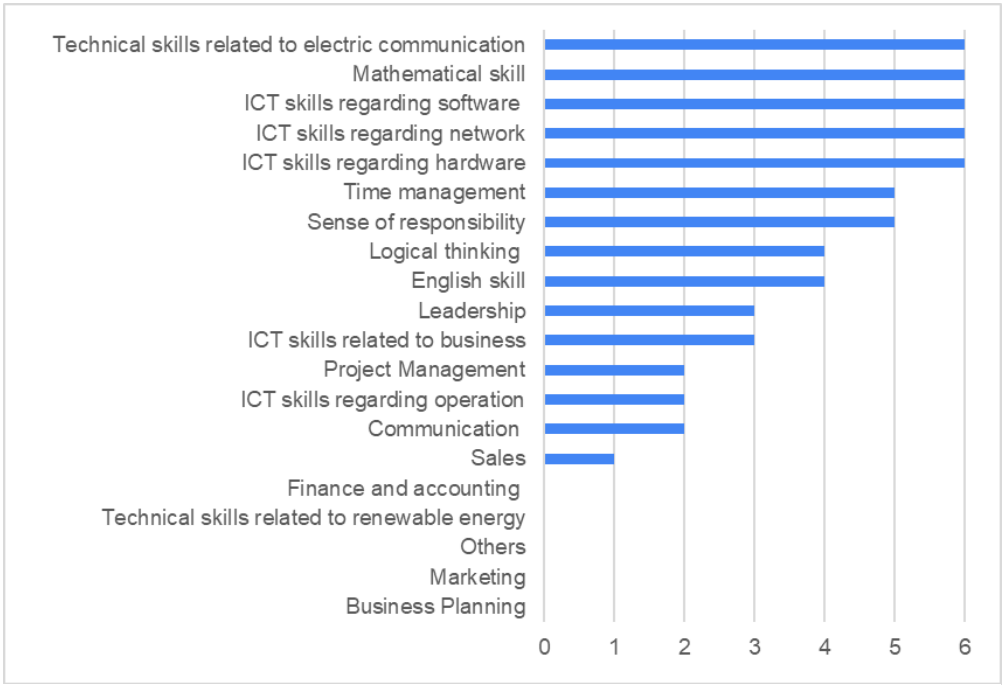

Figure 2-47 Skills Acquired at IPRC (ET Graduates)

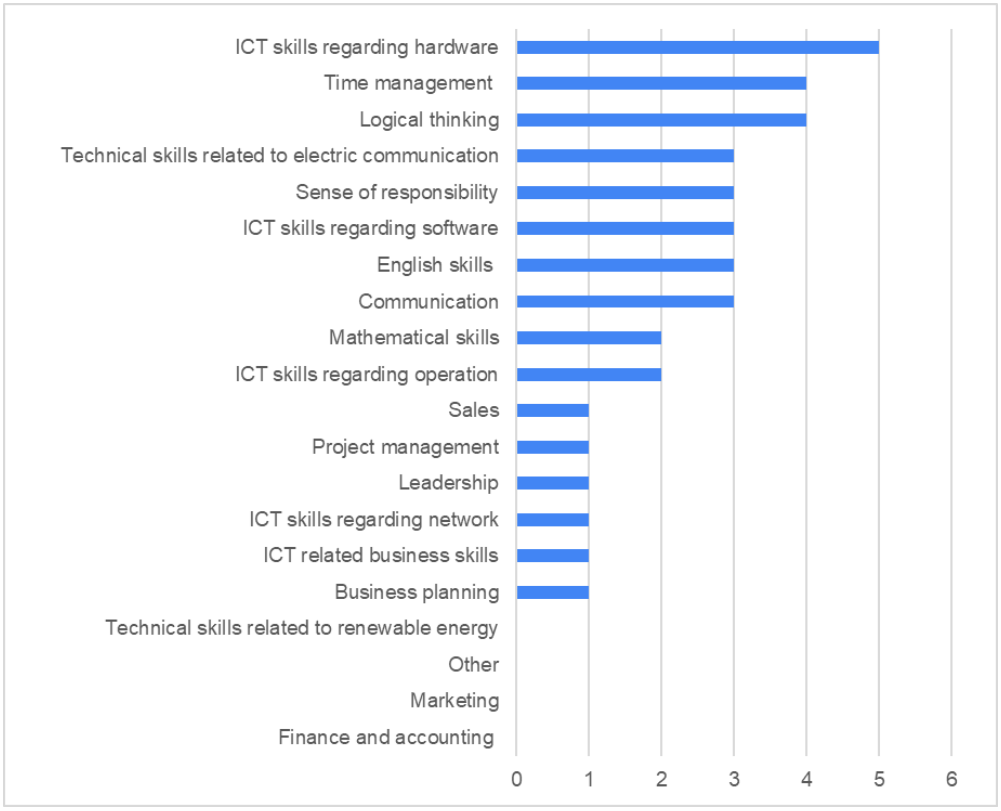

Figure 2-48 Utilized Skills at the Current Work (ET Graduates)

Graduates of the Department of ICT have acquired ICT skills related to networks (all 6 people), mathematics, and ICT skills related to software, hardware, and business as skills acquired at IPRC. English and business planning (5 people each) were also mentioned. Skills that are highly utilized in practice are time management (5 people), English (5 people), and ICT skills related to network and hardware (4 people). Aside from basic business skills, it was hardware-related ICT skills that were particularly relevant to learning at IPRC.

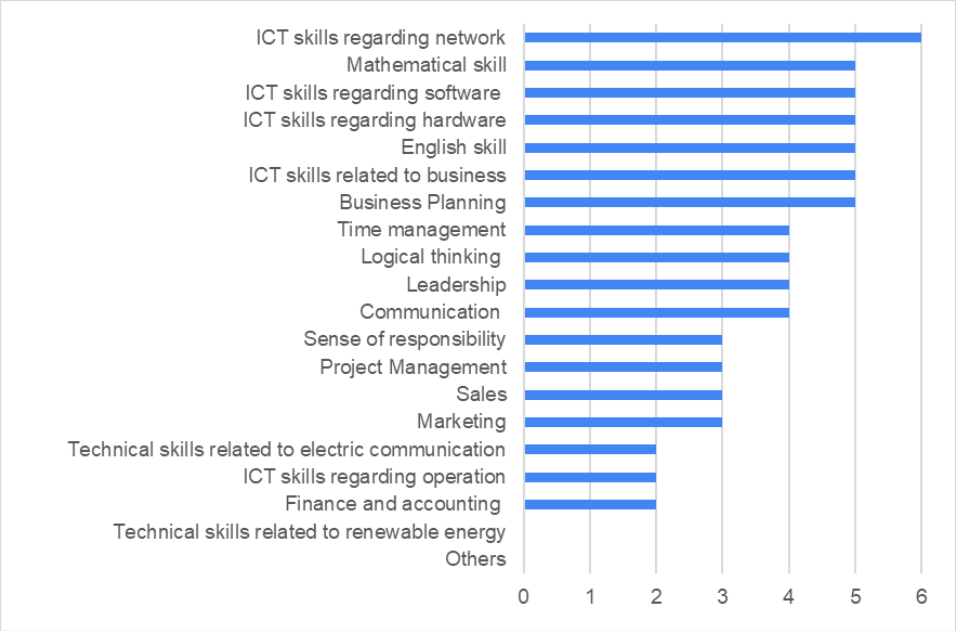

Figure 2-50　Skills Acquired at IPRC（ICT Graduates）

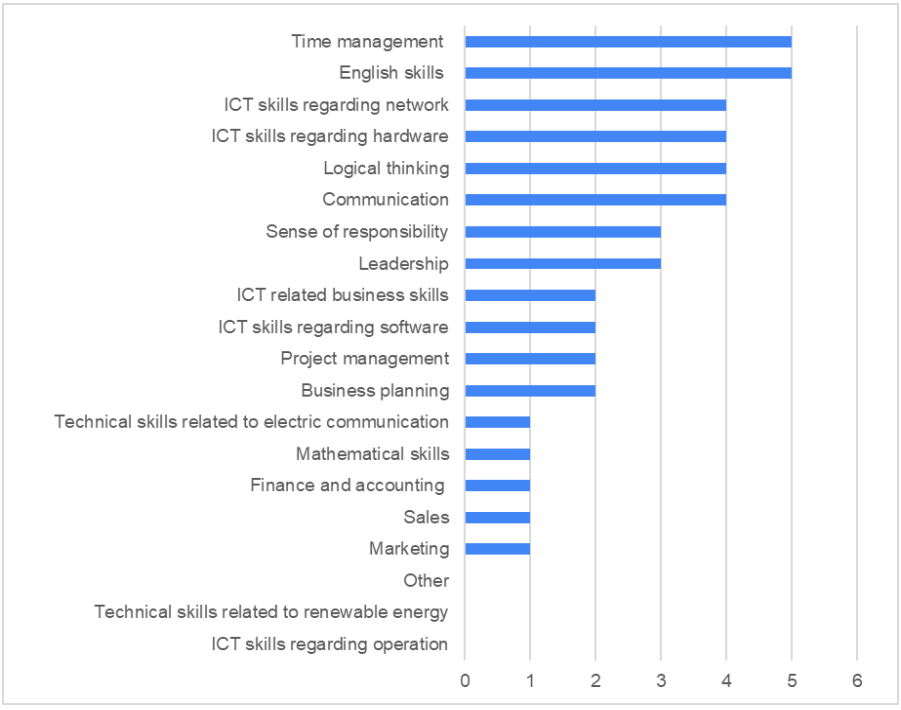

Figure 2-49　Utilized Skills at the Current Work (ICT Graduates)

All six graduates of the Department of Renewable Energy (hereinafter referred to as RE) answered that they had acquired specialized skills related to renewable energy, as well as skills related to basic business and work such as English, time management, and leadership at IPRC. Skills that are highly utilized in practice are time management, a sense of responsibility (6 people each), and specialized skills related to renewable energy (4 people).

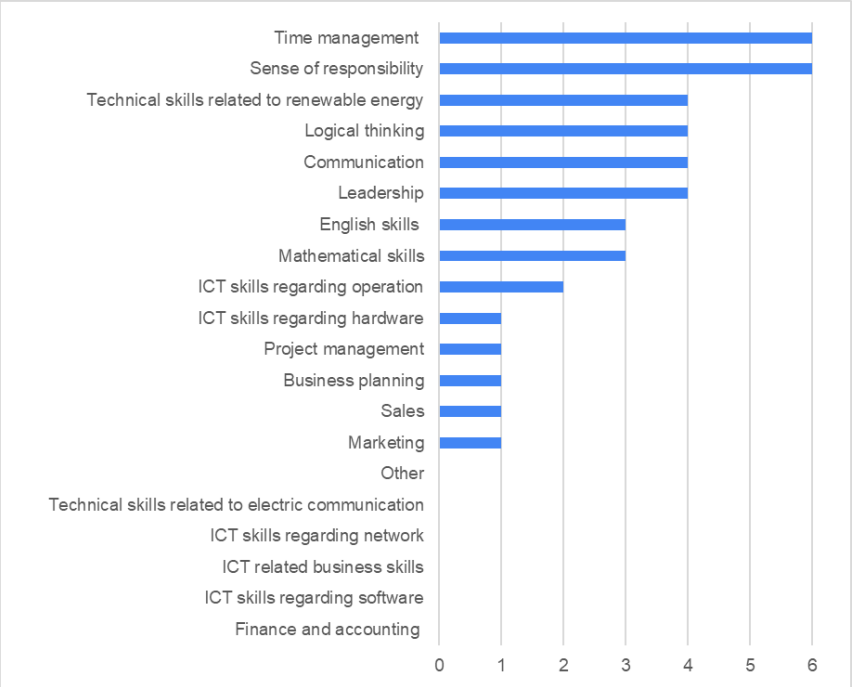

Figure 2-51　Skills Acquired at IPRC（RE Graduates）

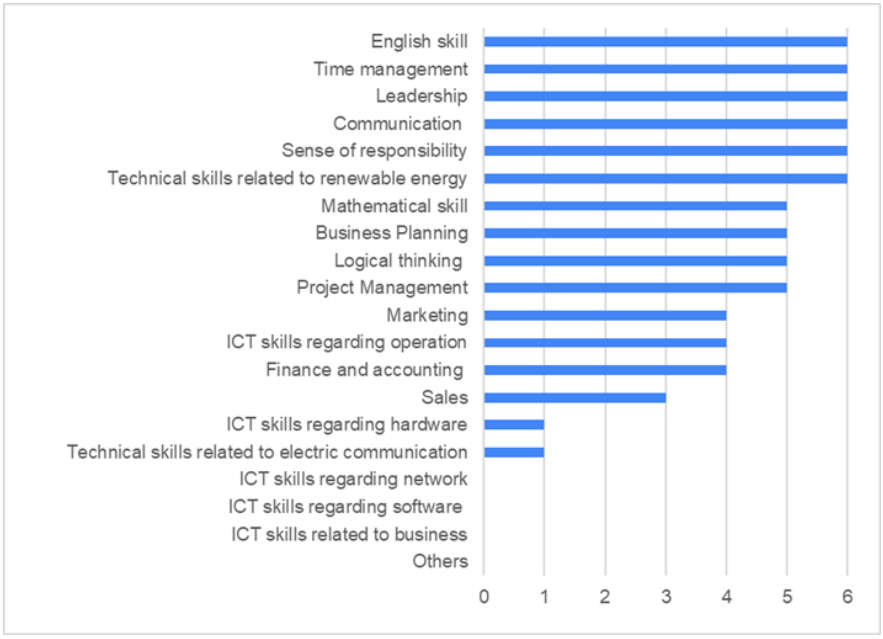

Figure 2-52　Utilized Skills at the Current Work (RE Graduates)

From the above, graduates of the ET and ICT have acquired ICT skills related to hardware at IPRC in common and are highly utilized in practice. On the other hand, as mentioned above, employers' satisfaction with hardware skills of IPRC graduates is relatively low, and there may be a gap between the technical level or content required by the employer and the technical level or content actually acquired/taught at IPRC.

（3） Desired Human Resource and Recommendation to IPRC

The literature and the data referred to this survey are not specifically focused on IPRC, but generally on TVET. However, since this survey aims to assess the needs of human resource development through education in IPRC, this section explores desired human resource and recommendation to IPRC. From the survey results, as a common suggestion among companies, it is recommended IPRC "to focus more on business knowledge and high skills related to ICT operations." This is the most common answer among ICT general user companies and professional user companies, and more than half of ICT general user companies and nearly 80% of ICT professional companies mentioned this point. The following are other suggestions and comments from companies to IPRC. Of these, most respondents called for the improvement of more practical skills, and most companies mentioned the need for more practical education and training.

- IPRC should boost practical skill trainings which matches to the market needs.
- I recommend IPRC to consider a curriculum that will allow the students to get internationally recognized ICT qualification such as CCNA and Cisco.
- I recommend that IPRC encourages its students to do “Dual Study”, in that, apart from regular class, students also develop mindsets of doing business/ entrepreneurship by engaging in problem solving of the local community and make money out of it.
- I recommend IPRC to focus also on language training.

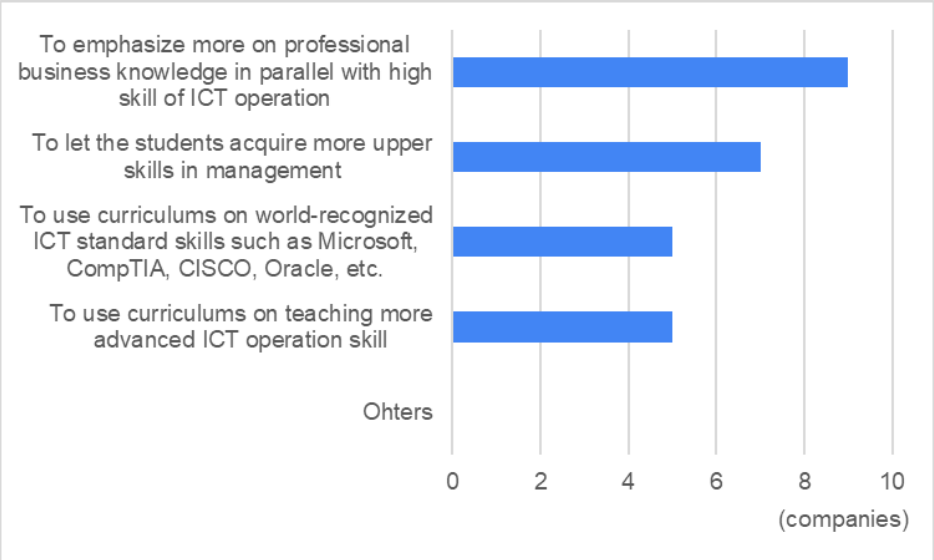

Figure 2-53 Expectation to IPRC（ICT General User）

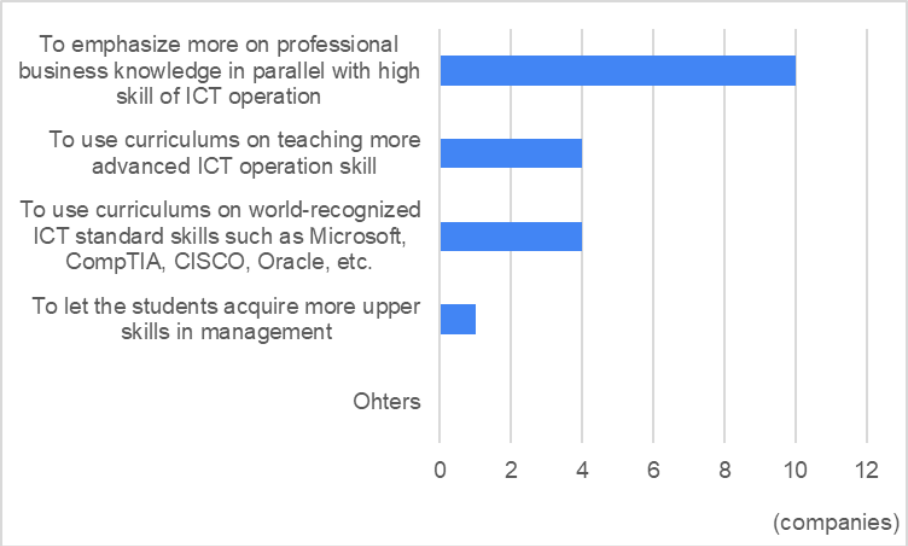

Figure 2-54 Expectation to IPRC (ICT Professional User)

2.6. Human Resource Development Needs and Possibilities of Contributions by IPRC

The following table summarizes the survey results of the private sector which was described in this chapter. This section describes the needs of human resource development clarified in the survey and the potential contribution of IPRC in the human resource development.

The skills that ICT general users require from new recruits are rather concentrated on basic work skills and general business skills. Although these skills are important, these skills can be acquired in general education, not in IPRC which is specialized as technical education institution. In fact, as for the educational background required from employers, many companies answered that academic level of

ICT general users are satisfied with primary school and secondary school, and in VTC level in technical education. In addition, ICT skills regarding operations are also mentioned as skills required for new recruits which can be acquired at private ICT educational institutions (PC schools' classrooms, etc.) other than IPRC. From these facts, IPRC has produced a large number of human resources required by ICT general user companies, and graduates are actually active, but they are also trained at educational institutions other than IPRC.

On the other hand, the skills required of newly recruited staff by ICT professional user companies are more technical such as ICT skills regarding networks and hardware. Upon the time of recruitment, educational background of graduates required secondary school level and above which account for 90% and 25% for IPRC and university, which has a tendency for technical skills and more advanced knowledge to be required.

As a result, comparing the level of satisfaction of newly recruited human resources and with the skills of IPRC graduates, the IPRC graduates have an advantage in terms of ICT skills regarding network.

In other words, it can be said that this is a field where IPRC has expertise. On the other hand, ICT skills regarding hardware are less satisfied with IPRC graduates, and it is hoped that IPRC will raise the level in this field. Many companies desire IPRC to learn more practically, and ICT professional user companies are looking for skilled personnel with more immediate and practical skills. Although there are strengths and future issues in IPRCs, there is a relatively large possibility that IPRC can contribute to the human resources needs from ICT professional user companies. The medium- to long-term strategies that IPRC should take based on the strengths and weaknesses and the surrounding environment is described in Chapter 9.

It should be noted that the result that "ICT skills regarding hardware are less satisfied with IPRC graduates" is contradicted by the fact that the same skill is ranked as the third highest level of satisfaction in the results of the survey of ICT professional user companies (Figure 2-46). It may be reasonable to assume that it is not necessarily true that IPRC graduates have low technical skills in hardware. In fact, in the interviews with the Rwandan government and development partners, there were several comments such as "IPRC graduates' strength is the skills in hardware". One possible reason for this contradiction is that this questionnaire is subjective, so if the expectations for IPRC graduates are high, the level of satisfaction may be lower, and if the expectations for non-IPRC graduates are low, the level of satisfaction may be higher. In addition, such high expectations for IPRC graduates in hardware skills suggests that this skill gaps between expectation and reality should be one of the prioritized fields where IPRC should improve in order to meet the needs required by companies.

Table 2-6 Summary of Survey Results for the Private Sector

	ICT General User Companies	ICT Professional User Companies
Skills required for new recruits (Highly important / priority)	Emphasize on the most important basic skills of work. Next, business skills and ICT skills related to operations are considered as important. ● Time management ● Sense of responsibility ● Communication ● Logical thinking ● Finance and accounting skill ● Sales skill	In addition to the basic skills of work, the following (the following two) are important as technical skills. ● Time management ● Sense of responsibility ● ICT skill regarding network ● ICT skill regarding hardware
Record of recruitment of IPRC graduates	40% of the respondents have hired IPRC graduates	60% of the respondents have hired IPRC graduates
Educational background required at the time of recruitment	Primary school, Secondary school, enough with VTC level	90% of the responded companies require secondary school and upper school level. Less than 25% of the responded companies require the level of IPRC, and also less than 25% of the responded companies require the level of university and upper.
Employer satisfaction with IPRC graduate skills (（Comparison of satisfaction with skills of newly hired employees in general）	Superior of IPRC graduates ● ICT skills regarding operation Inferior of IPRC graduates ● Business skill such as marketing, sales, and business	Superior of IPRC graduates ● ICT skill regarding network ● Basic business skill
Skills acquired at IPRC and highly utilized at their current work: （Perception of the graduates of IPRC Tumba）	Electronics and Telecommunication department, and ICT department Skills acquired at IPRC and highly utilized at their current work: ICT skill regarding hardware Renewable energy department Skills acquired at IPRC and highly utilized at their current work: Skills related to renewable energy, and general business skills	
Expectations for IPRC	● Focus on acquiring more practical skills that match the needs of the labor market	● Should focus on acquiring more practical skills that match the needs of the labor market

	ICT General User Companies	ICT Professional User Companies
	● Should Focus more on business knowledge and skills regarding ICT operations	● Focus more on business knowledge and skills related to ICT operations. ● Consider a curriculum that will allow students to obtain internationally recognized qualifications in ICT field such as CCNA and Cisco.

Source：Created from the survey results of the private companies and the graduates of IPRC Tumba

Chapter 3. Socioeconomics of EAC

3.1. Economy

The total nominal GDP of EAC member countries in 2018 is about 203.2 billion dollars (For South Sudan, the figures of 2015 is used because there is no data), and it accounts for 8.5% of the nominal GDP of the whole Africa (2018, about 2.4 trillion dollars). As shown in Figure 3-1, the economic scale of EAC member countries varies widely from country to country. Kenya (2019, about US $ 95.5 billion) is the largest in economic scale, which is more than 30 times larger than Burundi (2019, about US $ 3 billion). Although the GDP growth rate varies widely from country to country, the average GDP growth rate of EAC member countries in 2018 is 5.6% (calculated in 5 countries because data was not available in South Sudan). The growth rate is higher than the world average of 3.6%.

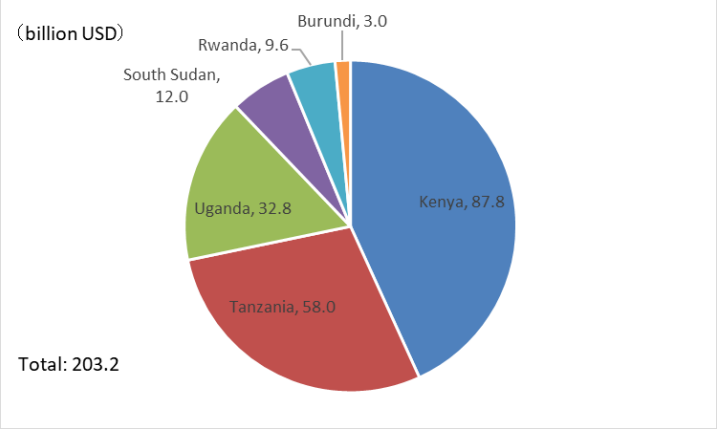

Figure 3-1 Nominal GDP of EAC Member Countries (2018)

Source：Created from World Bank website

Rwanda has the highest GDP growth rate from 2010 to 2018 (approximately 7%), followed by Tanzania (approximately 6%), Kenya (approximately 6%), Uganda (approximately 5%), and Burundi (approximately 2%). South Sudan's GDP growth during 2010 and 2015 was approximately -7%, and the economy is negatively affected by low oil prices and unstable security, which accounts for majority of government revenues. It can be said that the EAC economy is being driven mainly by four countries: Rwanda, Tanzania, Kenya and Uganda.

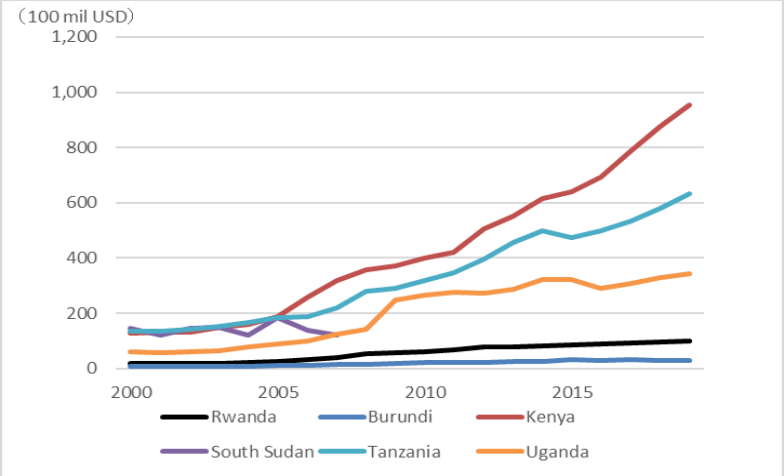

Figure 3-2 Nominal GDP

Source：Created from World Bank website

GDP per capita is below the average of the whole Africa (2018, about $ 1,809) in five countries except Kenya. The per capita GDP growth rate for the 20 years from 2000 to 2019 is particularly remarkable in Uganda and Rwanda, with growth of 4.6 times and 3.7 times, respectively.

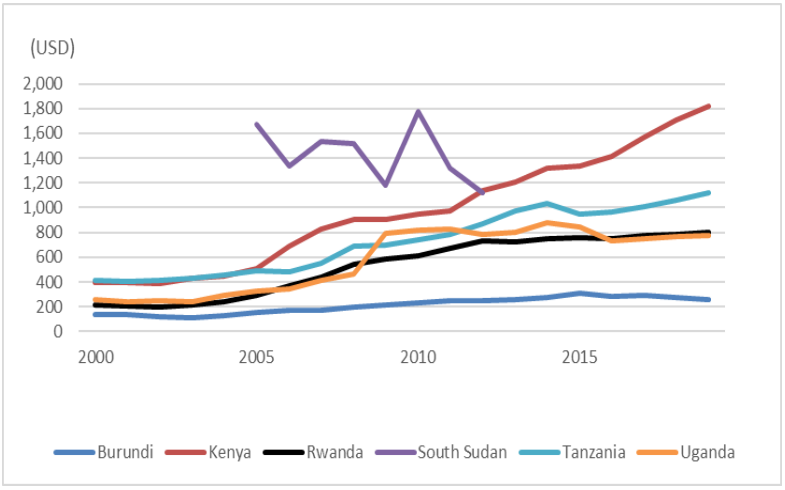

Figure 3-3 Trend of GDP Per Capita

Source：Created from World Bank website

3.2. Industrial Structure

3.2.1 Major Industrial Policies

According to the East African Community Industrialization Policy (2012-2032), the six strategic industries are listed as below, which EAC member countries have an advantage and should strengthen in the future.

- Agro-processing industry
- Iron, steel processing industries

- Fertilizers and agro-chemical industry
- Pharmaceutical industry
- Energy / biofuel
- Oil and gas processing industry

On the other hand, as shown in Table 3-1, the priority industries of each member country do not actually match the strategic industries of EAC. [Kenya, 2015] [Tanzania, 2016] [Rwanda, 2017] [Uganda, 2008] . For example, the spinning, garment, leather processing, and construction industries are not included in the EAC's strategic industries but are considered to have high priority in all four countries below. In the service industry, the ICT field is not included in EAC's strategic industry, but it is regarded as a high-priority industrial field in the three countries of Rwanda, Kenya, and Uganda. At the time of writing this report, no information was available on South Sudan and Burundi.

Table 3-1 Strategic Industries of EAC and Priority Industries of Its Member Countries

Sector	Sub sector	Strategic industries of EAC	Kenya	Tanzania	Rwanda	Uganda
Agriculture	Agriculture		✔			
Industry and Mining(including Construction)	Agro-processing	✔	✔	✔	✔	✔
	Textiles, leather processing		✔	✔	✔	✔
	Construction		✔	✔	✔	✔
	Manufacturing		✔		✔	
	Automobile industry			✔		
	Iron, steel, other metal processing industries	✔	✔		✔	✔
	Fertilizers and agro-chemical industry	✔				
	Pharmaceutical industry	✔				
	Energy/ bio fuel	✔				
	Oil, gas	✔	✔			
Services	ICT		✔		✔	✔
	Tourism		✔		✔	
	Retail, trade		✔			

Source：Created from EAC Industrialization Policy（2012-2032） and policy documents of each country

3.2.2 Industrial Structure

Figure 3-4 shows the ratio of each industry to nominal GDP (2017). No data are available for South Sudan. Uganda has a relatively well-balanced industrial development, with industry and mining and services accounting for about 70% of nominal GDP. On the other hand, in Burundi, Kenya and

Rwanda, the ratio of industry and mining is less than 20%. Especially in Kenya, the ratio of agriculture still exceeds 30%, and the conversion from agriculture to other sectors is not progressing very much.

The overall EAC target is to achieve the proportion in that agriculture at 18% of nominal GDP, industry and mining at 27%, and service industry at 43% by 2030 [EAC] . As of 2017, the service industry is almost achieving the target ratio, but the proportion of the industry and mining is far below the target, especially in Burundi, Kenya and Rwanda.

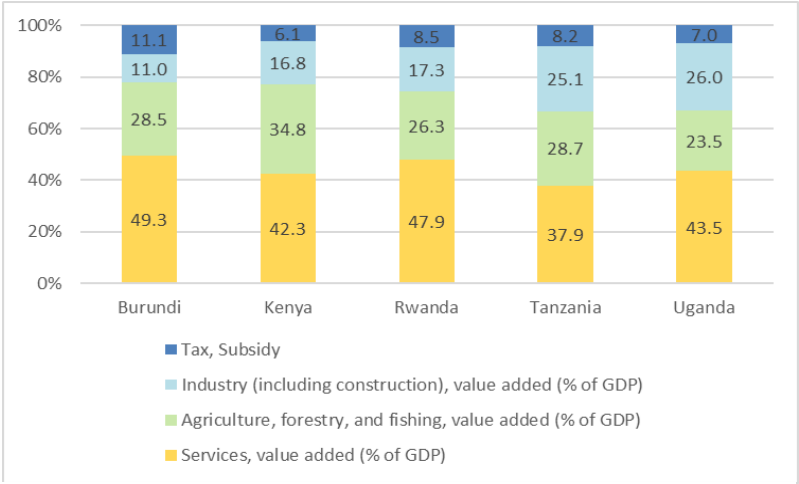

Figure 3-4 Proportion of Industries in GDP (2017)

Source: Created by World Bank website

3.3. Demographics

The total population of EAC member countries in 2019 will be approximately 190 million. Tanzania (31%) and Kenya (28%) account for nearly 60% of the total, followed by Uganda, South Sudan, Rwanda and Burundi. All countries are steadily increasing, especially in Uganda, Tanzania and Kenya, where the population is growing rapidly.

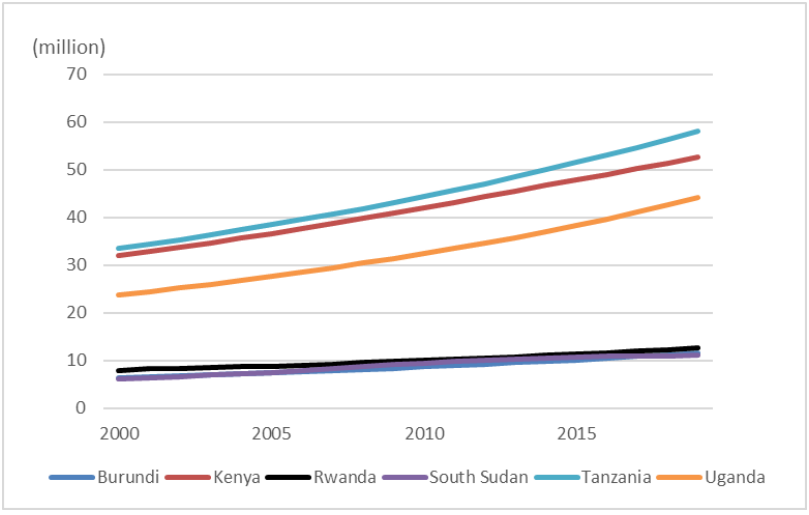

Figure 3-5 Population of EAC Member Countries

Source : Created by World Bank website

3.4. Labor Force and Employment

3.4.1. Labor Force

Table 3-2 shows the trends of economically active population of EAC member countries (in thousands, forecast after 2030). It is expected to be nearly double during 2015 and 2050.

Table 3-2 Trends in East Africa's Economically Active Population in Thousands

Country	1980	1990	2000	2010	2015	2030	2040	2050
Tanzania	9,978	13,758	18,860	24,891	28,833	38,840	44,760	51,822
Kenya	8,133	11,963	17,550	23,362	26,760	37,210	43,943	50,768
Uganda	6,625	9,205	12,353	17,331	20,713	29,284	33,462	40,153
Rwanda	2,783	3,633	4,314	5,925	6,749	9,450	11,025	13,265
Burundi	2,282	3,106	3,479	5,289	5,933	8,284	10,232	12,615
EAC	29,802	41,665	56,558	76,799	88,987	123,068	143,422	168,623

Source: Adapted - International Labour Organization's labour statistics database, LABORSTA and Estimates by EAC Secretariat.

Source: EAC Vision 2050

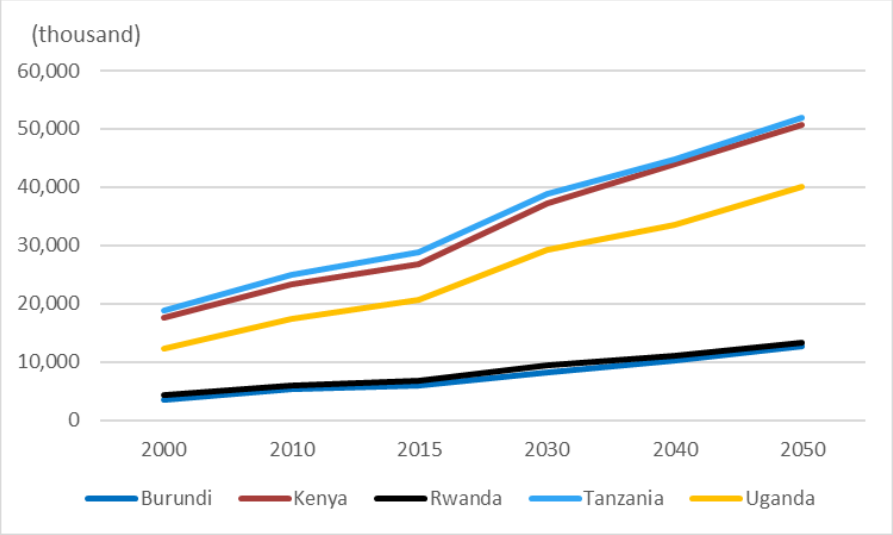

Figure 3-6 Trends of Economically Active Population (In Thousands, Forecast after 2030)

Source：EAC Vision 2050

Employment distribution by industry vary widely among EAC member countries. In Rwanda and Uganda, agriculture, forestry and fisheries workers account for around 40% of the employed, industry (including construction) at less than 20%, and service industry workers at around 40%, which is a relatively large number of service industry workers. On the other hand, in Burundi, Kenya and Tanzania, agriculture, forestry and fisheries workers account for more than 60%, industry (including construction) is less than 7%, and service industry workers are around 10 to 30% depending on the country. Since the ILO data is updated in different year depending on each country's available data, Figure 3-7 is not a comparison of the same year. Also, no data is available for South Sudan.

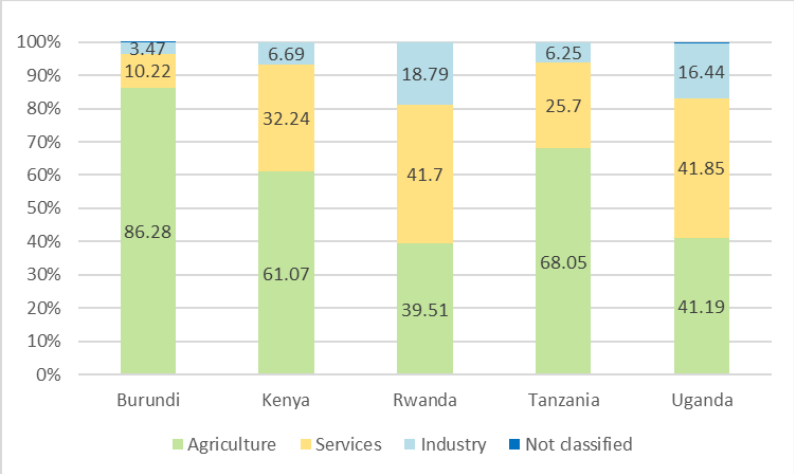

Figure 3-7 Employment Distribution by Industry

Source：ILO STAT

3.4.2. Employment

As shown in Table 3-3, it is estimated that 101.5 million jobs will be created within the EAC region from 2015 to 2050 [EAC]. The main sectors where job creation is expected are infrastructure such as railways and roads (30 million), tourism industry (24 million), and manufacturing and industry (20 million). 90% of all EAC companies are small and medium-sized enterprises, accounting for 60% of employment [EAC, 2012] . EAC aims to increase manufacturing-related employment from 460,000 in 2012 to 2.3 million by 2032 [EAC, 2012]. According to EAC Vision 2050, leather processing, automobile-related, food processing, mechanical parts, etc. are listed as the ones that are expected to create many jobs in the value chain in the manufacturing industry.

On the other hand, in terms of large-scale job creation in the manufacturing industry, effect of a shift in global production bases should be noted. For example, in developed countries, many companies are introducing automation and robotization in especially manufacturing of automobiles, rubber, plastics, metals, electric appliances, etc. It is said that the development of 3D printing technology and smart robotics will diminish the benefits of reducing production costs

by manufacturing in developing countries and lead to reshoring of production bases back in the United States, Japan, Europe, etc. Of course, there is another view that reshoring to developed countries is limited, and that automation in Asia will be promoted because suppliers, infrastructure, human resources, etc. have already been gathered and developed in China, India, Southeast Asia, etc. [Mattos, 2020] In any case, the global movement of automation and robotization may somewhat trigger reshoring back to developed countries, and it may also promote continuous manufacturing in Asian countries where industrial clusters have already been developed. In these relatively automated and robotized sub-sectors (automobiles, rubber, plastics, metals, electric appliances), it will take time for EAC countries, which have not yet agglomerated their industries, to become competitive as a large-scale manufacturing base. It is also expected that the trend of automating the manufacturing process itself will have a certain negative impact on job creation.

On the other hand, among the manufacturing industry, products which are consumed within the EAC region and the African region is considered to be manufactured locally, and it can contribute to job creation in the EAC region. Labor-intensive products such as leather processing and food processing, and the automation of manufacturing processes for electrical products are some examples. Besides, some manufacturing process can be done locally. For example, assembly process of electrical appliances is relatively unautomated, thus, it can contribute to job creation in EAC region.

As a support for the above-mentioned sectors, where job creation is expected, importance of ICT will be significant. It is also noted that ICT is a key in term shat ICT technology itself can lead to the creation of new products and services, such as financial services such as M-PESA (mobile money), which is widely used in Kenya.

Table 3-3 Job Creation Forecast

Focus Area	*2015-2020*	*2021-2025*	*2026-2030*	*2031-2035*	*2036-2040*	*2041-2045*	*2046-2050*	*Total*
Infrastructure								
Railways	230	1,400	1,200	1,300	1,350	1,900	1,970	9,120
Roads	63	900	950	980	990	1,500	1,600	6,920
Air Transport	142	100	213	870	980	1,500	1,700	5,363
Marine and Ship Building	161	161	210	240	980	1,700	1,350	4,641
Power Transmission	56	56	180	900	600	1,200	1,370	4,306
Sub-Total	**652**	**2,617**	**2,753**	**4,290**	**4,900**	**7,800**	**7,990**	**30,350**
Industrialization and Manufacturing								-
Iron and Steel	400	500	760	780	790	1,200	1,500	5,930
Manufacturing	300	600	650	890	950	1,200	1,350	5,940
Machine Tools	250	300	550	620	650	1,100	1,200	4,670
Agro Industry	200	400	500	560	560	980	900	4,100
Sub-Total	**1,150**	**1,800**	**2,460**	**2,850**	**2,950**	**4,480**	**4,950**	**20,640**
Agriculture								
Agriculture	200	350	360	360	360	450	500	2,580
Livestock	180	200	200	200	200	200	250	1,430
Fisheries	100	165	225	225	225	250	300	1,490
Forestry	175	180	195	185	185	200	250	1,370
Sub-Total	**655**	**895**	**980**	**970**	**970**	**1,100**	**1,300**	**6,870**
Natural Resource Management								
Mining	500	1,800	2,000	2,100	2,600	2,700	2,800	14,500
Tourism	1,700	1,980	2,100	3,600	3,700	4,800	5,600	23,480
Sub-Total	**2,200**	**3,780**	**4,100**	**5,700**	**6,300**	**7,500**	**8,400**	**37,980**
Human Capital								
Construction of Learning Institutions	1,580	1,600	980	990	1,000	3,200	2,800	12,150
Training	900	600	980	500	435	490	980	2,710
Research and	150	139	230	300	370	550	600	2,339
Sub-Total	**2,630**	**2,339**	**2,190**	**1,790**	**1,805**	**4,240**	**4,380**	**19,374**
GRAND TOTAL	**7,287**	**11,431**	**12,483**	**15,600**	**16,925**	**25,120**	**27,020**	**115,214**

Source：EAC Vision 2050

3.5. Needs of Human Resource Development

As mentioned above, the EAC's strategic industries and the priority industries of each member country do not actually match. Therefore, in this section, in addition to these, we will identify the industrial sectors that are thought to have human resource development needs, based on information such as interview results of the TVET department of EAC Headquarters, job creation forecasts by sector, and EAC development strategies.

Firstly, as shown in table 3-4, in the industry and mining (including construction), there is a need for human resource development in the following sectors; agricultural product processing, spinning / clothing, and leather processing, which are prioritized by the majority of member countries. These are included in the manufacturing industry, which is expected to create a great volume of jobs. It is expected that there is a continuous and growing demand of these sectors considering the trend of increase of population of EAC and Africa region. As for construction industry, although large-scale jobs creation is expected, it is presumed that most of the jobs created in the industry will not require

advanced technical skills. Therefore, it seems unlikely that construction sector becomes a target for human resource development at higher technical education.

Next, in the service industry, it can be said that human resource development needs are high in the ICT and tourism-related industries. According to the EAC development strategy (Situation analysis section), the main indicators related to ICT (indexes related to Internet access and usage, indicators related to the degree of use of carrier networks, indicators related to communication service charges, indicators related to the spread of mobile phones, etc.) is all-around increasing and expanding. In addition, the introduction of E-government services and electronic payment services is progressing in member countries, and the use of the Internet is also increasing. Although ICT is not positioned as an EAC strategic industry as an industrial field, it is expected that the needs for ICT human resource development will continue to increase based on the above trends.

For more details, the survey team has inquired of the EAC TVET staff about availability of a labor needs-related research report, however, there has been no response during the survey period. In order to understand the details of EAC's human resource development needs, it is desirable to confirm the existence and contents of the related survey report to EAC again.

Table 3-4 Priority Sector of EAC and Its Member Countries

Sector	Subsector	Priority sector of EAC	Sectors mentioned at interview with EAC TVET department	Priority sector for human resource development in EAC's development plan（2016/17-2020/2021）	Job creation forecast in EAC Vision 2050	Kenya	Tanzania	Rwanda	Uganda	South Sudan	Burund
Agriculture	Agriculture					✔				No data available	
Industry and Mining (including construction)	Agro-processing	✔		✔	✔	✔	✔	✔	✔		
	Textiles/apparel/garment				✔	✔	✔	✔	✔		
	Construction					✔	✔	✔	✔		
	Manufacturing				✔	✔		✔			
	Automobile industry						✔				
	Steel and other mineral processing	✔	✔（Important sector for EAC and there is a possibility to be TVET CoE）	✔		✔		✔	✔		
	Fertilizers and agro-chemicals	✔									
	Pharmaceuticals	✔									
	Energy and bio fuels	✔		✔							

Sector	Subsector	Priority sector of EAC	Sectors mentioned at interview with EAC TVET department	Priority sector for human resource development in EAC's development plan（2016/17-2020/2021）	Job creation forecast in EAC Vision 2050	Kenya	Tanzania	Rwanda	Uganda	South Sudan	Burund
	Oil, gas	✔	✔（Important sector for EAC and there is a possibility to be TVET CoE）	✔		✔					
	Infrastructure			✔	✔						
Service industry	ICT					✔		✔	✔		
	Tourism and its related industry		✔（Important sector for EAC and there is a possibility to be TVET CoE）		✔	✔		✔			
	Retail and trade					✔					

Source: Created from EAC development plan, policy documents of member countries

Chapter 4. Outline of TVET Sector in Rwanda

4.1. Major Policies

Major policies related to TVET in Rwanda are TVET Policy, Education Sector Strategic Plan 2018/19, Rwanda Polytechnic Strategic Plan 2019 – 2024 and Rwandan TVET Qualifications Framework. Cardinal points of each policy are shown in Table 4-1.

Table 4-1 Major Policies Related to TVET and Their Cardinal Points

Organization	Name of policy (Year)	Cardinal points
Ministry of Education (MINEDUC)	TVET Policy（2015）	Rwanda lost a large amount of human capital due to genocide and the lack of technicians and middle level managers is especially serious. To acquire employability skills, the enhancement of TVET for young people completing 9 years of basic education is desired, however, the acceptable enrollment number of TVET institutions is limited. Current TVET system has systematic and organizational constraints as follows. • The mismatch between industry demand for skills and the supply of skills by TVET institutions • Unable to pursue life-long skills improvement (vertical pathways) and the movement between TVET and general education (horizontal pathways) before the establishment of Rwandan TVET Qualifications Framework and National Qualification Framework • Insufficient human capacity of TVET personnel (both management staff and teaching staff) • Weak collaboration among TVET stakeholders especially TVET institutions and companies • Inadequate facilities and equipment • Traditional curricula • Low attractiveness of TVET due to a low valuation • Marginalization of women and people with disability in TVET sector • Unshared expenses for TVET among the whole society Based on the above recognition, countermeasures against the above constraints are mentioned as below. 1. Improved understanding of skill needs in priority sectors 2. Improved (horizontal and) vertical pathways 3. Develop the human capacity within the TVET system 4. Improved Coordination of TVET-Initiatives 5. Improve TVET facilities and its sourcing 6. Expand the availability of the responsive curriculum offer in TVET 7. Improve the attractiveness of TVET 8. Increase employer engagement in TVET 9. Increase equitable and inclusive TVET 10. Sustainable innovative financing mechanisms in TVET

Organization	Name of policy (Year)	Cardinal points
Ministry of Education (MINEDUC)	ICT in Education Policy (2016)	Descriptions focused on TVET were few. However, it is written that teachers should make sure that they use ICT in teaching and learning from the elementary education level to the TVET and tertiary education level, and ICT in education shall be overseen by an 'ICT in Education Steering Committee' with members from the Ministry of Education, the Ministry of Youth and ICT, Rwanda Education Board, Workforce Development Agency and the University of Rwanda.
	Education Sector Strategic Plan 2018/19 - 2023/24（2018）	Responding to 'National Strategy for Transformation (2017 - 2024)', a major target is placed on making sure Rwandan nationals shall acquire sufficient and appropriate competency (skill, knowledge and attitude) which can contribute to national social and economic development. ESSP is structured by 9 strategic priorities below and 17 sector outcomes. 1. Enhanced quality of learning outcomes that are relevant to Rwanda's social and economic development. 2. Strengthened Continuous Professional Development and Management of teachers across all levels of education in Rwanda. 3. Strengthened Science, Technology, Engineering and Mathematics (STEM) across all levels of education in Rwanda to increase the relevance of education for urban and rural markets. 4. Enhanced use of Information and Communication Technology (ICT) to transform teaching and learning and support the improvement of quality across all levels of education in Rwanda. 5. Increased access to education programmes, especially at Nursery (pre-primary), Primary, secondary, TVET and Higher education levels in Rwanda. 6. Strengthened modern school infrastructure and facilities across all levels of education in Rwanda. 7. Equitable opportunities for all Rwandan children and young people at all levels of education. 8. More innovative and responsive research and development in relation to community challenges. 9. Strengthened governance and accountability across all levels of education in Rwanda. In the context of TVET, followings are stated as outcomes for each strategic priority. **Strategic priority 1:** 1.3 TVET and HEI programmes are responsive to both labour market needs and Rwanda's social and economic development. **Strategic priority 2:** 2.1 All schoolteachers, TVET instructors and higher education lecturers have appropriate levels of skills and competencies to deliver the curriculum. **Strategic priority 3:** 3.1 STEM strengthened across all levels of education.

Organization	Name of policy (Year)	Cardinal points
		Strategic priority 4: 4.1 ICT strengthened across all levels of education. **Strategic priority 5:** 5.2 Increased number of students enrolled in TVET and higher education programmes. **Strategic priority 6:** 6.1 All schools, TVET and higher education institutions have sufficient modern infrastructure, facilities and resources. **Strategic priority 7:** 7.1 Ensure gender parity in participation and achievement at all levels of education. **Strategic priority 8:** 8.1 Increased research and development that responds to community challenges with innovative approaches **Strategic priority 9:** 9.1 Improved leadership in schools, TVET and higher education institutions, as well as administration, management and support services. 9.2 Improved public‐private partnerships (PPPs) in education.
Ministry of Education /Workforce Development Authority (WDA)	Rwandan TVET Qualifications Framework （2012）	RTQF stipulates TVET qualifications in Rwanda. RTQF corresponds with International Standard Classification of Occupations (ISCO) of ILO and International Standard Classification of Education (ISCED) of UNESCO and qualifications of EAC member states. There are 7 levels and knowledge, skills and competency at each level are also stated. It is stipulated that Vocational Training Center (VTC) mainly targeting dropouts from elementary schools and secondary schools is level 1-3, Technical Secondary School (TSS) targeting secondary school leavers is level 3-5 and Integrated Polytechnic Regional College (IPRC) targeting high school graduates is level 6-7. Competency for level 7 which can be obtained upon graduation from IPRC is defined as below. • Exercise autonomy and initiative in some activities at a professional level • Take significant managerial or supervisory responsibility for the work of others in defined areas of work • Manage resources within defined areas of work • Take the lead on planning in familiar or defined contexts • Take continuing account of own and others' roles, responsibilities and contributions in carrying out and evaluating tasks • Work in support of current professional practice under guidance
RP/ USAID	Rwanda Polytechnic Strategic Plan 2019 - 2024 （2019）	This strategic plan is the base of Rwanda Polytechnic whose missions are the provision of TVET education and modernization of technical labor force for national development. It sets 12 strategic areas as follows and their objectives, activities, implementing agencies, targets and the timing of reporting are stated. These strategic areas are selected by TVET policies of Rwanda and other countries, education sector strategic plan and results of SWOT analysis

Organization	Name of policy (Year)	Cardinal points
		and stakeholder analysis in the process of the development of this strategic plan. 1. Legislative, Regulatory, and Policy Framework 2. Oversight and Governance 3. Curriculum 4. Teaching and Learning 5. Student Support 6. Infrastructure and Resources 7. Human Resource Development 8. Applied Research and Innovation 9. Partnerships 10. Management Information and Statistics 11. Perception of TVET 12. Access
Ministry of Public Service and Labour	National Policy on Workplace Learning to Prepare Rwandan Youth for Employment (Workplace Learning Policy)（2015）	This policy aims at enhancing opportunities of industrial attachment of the Youth in Rwanda so that they can develop their skills responding to industry needs and contribute to the national development. Objectives of this policy are the following 5 points. 1. Development of Apprenticeship Training in the TVET Sector 2. Improvement of System and Management of Attachments and Internships 3. Development of a Private Sector-Driven Institutional Framework for Workplace Learning 4. Creation of sustainable Financing and Incentive Structures through a Levy-Grant System 5. Knowledge and Awareness Creation of Workplace Learning

Source: [Ministry of Education, 2019]

Besides the above, MINEDUC developed '2018/19 Backward -Looking Joint Review of The Education Sector (2019)' as the monitoring report for the progress of policies. Objectives of 2018/ 19, sector indicators, the progress of indicators of NST-1 and the current situation of each sub-sector were described. In terms of TVET, 1) Number of TVET trainers with technical and pedagogical skills and 2) Percentage of employers satisfied with TVET graduates are indicators. Responding to that, TVET trainers were trained on pedagogy and competency-based training/ assessment. Also, the importance of acquiring hands-on skills through industrial attachment program (IAP) since TVET graduates' employment rate was 68% which didn't achieve the target (74.6%). The example of IAP implemented in collaboration with companies through PSF is described.

4.2. Major Governmental Agencies

Major governmental agencies related to TVET and their roles are stated in Table 4-2. These agencies are currently under restructuring and going to change into the new structure. The large changes are the following 2 points, that is, WDA will not exist anymore and its most duties will be taken over to the new organization (National Examination and Standards Agency (NESA)), and RP has overseen all

level TVET institutions so far, however, after restructuring, the new organization (Rwanda TVET Board (RTB)) will oversee the under level (RTQF Level 1-5) TVET schools and RP will focus on IPRC level (RTQF Level 6&7).

Table 4-2 Major Governmental Agencies Related to TVET and Their Roles

Organization	Role
Ministry of Education	It takes overall responsibility on education policy, strategic plan, regulations, monitoring and reporting to the Ministry of Finance on the progress and achievement. Competent Authority of WDA and RP.
WDA	It was established under the Ministry of Education in 2009 as a coordinating organization of TVET related activities. It oversees training institutions and district and sector organizations which supervise training institutions on education standards, set-up of rules, monitoring, certification evaluation and assessment. In the beginning, WDA also developed curricula of TVET, however, after RP was established in 2017, RP became TVET implementing agency and WDA became the supervisory agency of RP and development of curricula was taken over by RP. WDA ceased to exist by restructuring in 2020. It was integrated into the Higher Education Council (HEC) and the National Examination and Standards Agency (NESA). Most of its duties such as national examination of general education and TVET schools and standards, quality assurance, will be taken over by NESA.
Rwanda Polytechnic (RP)	It was established in 2017to develop TVET skills in Rwanda and its duties are education, curriculum development and research. As a part of RP, there are 8 Integrated Polytechnic Regional Colleges (IPRCs). It also oversees Rwanda TVET Trainer Institute (RTTI) and Hospitality Management Institute (HMI: newly established organization in 2020). Until 2020, RP oversaw TVET schools (VTC, TSS, VTS[3]) as well, however, newly established Rwanda TVET Board (RTB) will oversee public and private TVET schools (RTQF Level 1 - 5) from 2020 and RP will supervise the upper level (RTQF Level 6-7 where IPRC belongs) only.
IPRC	Provision of technical development services to graduates of high school. There are 8 IPRCs, namely, Tumba, Kigali, Ngoma, Karongi, Musanze, Huye, Gishari, Kitabi. The duration of the courses is 3 years and upon graduation, students obtain Advanced Diploma.

Source: Developed by Survey Team in reference to [Ministry of Education, 2019], interviews with WDA (8 August 2020) and RP (9 and 24 September 2020)

4.3. Outline of Integrated Polytechnic Regional College

The formal education system in Rwanda is 3 years for early childhood development, 6 years for primary education, 3 years for lower secondary education, 3 years for upper secondary education and 4 years for tertiary education. Primary education and lower secondary education are compulsory and after graduation, students can proceed to upper secondary education with O level. Upper secondary education has 3 types, that is, general secondary school, Technical Secondary School (TSS) and Teacher Training College (TTC) which nurture elementary school teachers. After graduation of upper

3 It is an abbreviation of Vocational Training School. VTS is a vocational training school equivalent to RTQF level 3 - 5 for lower secondary graduates who obtained O level. In this regard, VTS is the same as TSS. However, their pathways are different. Graduates of TSS can choose either proceeding higher education or finding employment while those of VTS have only 1 pathway, being employment.

secondary school, students can proceed with either universities (4 years) or Integrated Polytechnic Regional College (IPRC) (3years). University graduates are provided a BA degree while IPRC graduates obtain an Advanced Diploma upon graduation. In 2019, the gross enrollment rate of tertiary education was 6.2% (Female 5.7%, Male 6.8%)[4]. Figure 4-1 shows the formal education system in Rwanda.

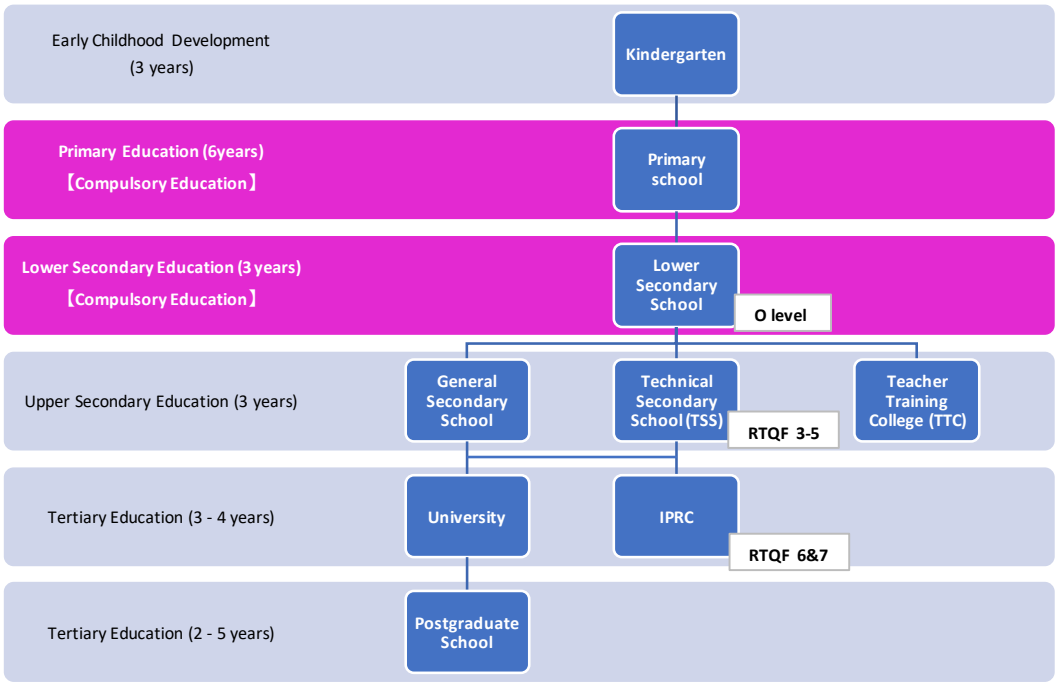

Figure 4-1 The Formal Education System in Rwanda

Source: Developed by Survey Team in reference to [Ministry of Education, 2019] [Ministry of Foreign Affairs of Japan]

As of October 2020, there are 8 IPRCs under RP in Rwanda and their departments are listed in Table 4-3. The number of administrative and academic staff and structure, the number of students, the situation of facility and equipment, the budget, pathways of graduates, collaboration with the private sector, curriculum, the use of ICT, applied research, innovation and entrepreneurship, capacity building of the staff, and cooperation with other IPRCs and development partners are described as follows.

4 http://uis.unesco.org/en/country/rw

Table 4-3 All IPRCs in Rwanda and Their Departments

Department	IPRC							
	Tumba	Kigali	Ngoma	Karongi	Musanze	Huye	Gishari	Kitabi
Information Technology	○	○	○	○		○		
Electrical and Electronics Engineering		○		○	○	○	○	
Civil Engineering		○	○		○		○	
Mechanical Engineering		○	○	○		○	○	
Electronics and Telecommunication	○					○		
Renewable Energy	○							
Mining Engineering	●	△						
Hospitality			○	○	○			
Forest Resources Management								○
Wildlife Management								○
Wildlife Tourism								○
Veterinary Technology						○		
Vocational Training							○	
Agricultural Engineering					●	●	○	
Construction Technology						○		
Animal Production			●					

○ : Existing department
● : Department which will start from the new academic year
△ : Department which won't exist from the new academic year

Source: Interviews with IPRCs

The Number of Staff and Structure

Organizational charts and staff placement of RP and IPRC are defined by the Ministry of Public Service and Labor. The same organizational chart and staff placement are applied to all IPRCs. Organizational charts of RP and IPRC are shown in Figure 4-2 and Figure 4-3.

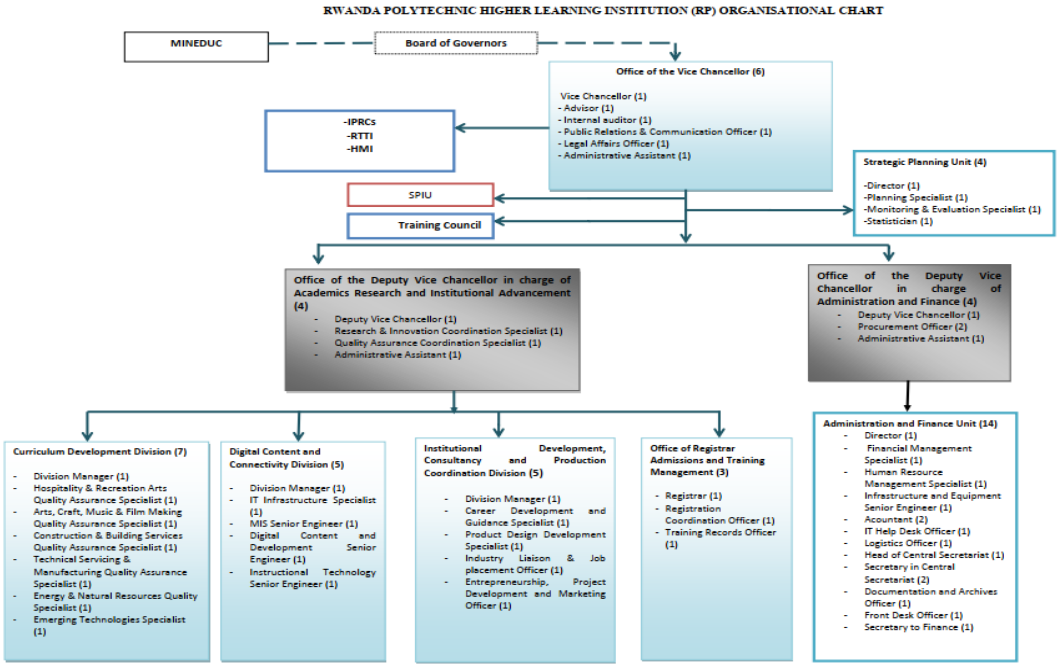

Figure 4-2 Organizational Chart of RP

Source: Government of Rwanda (2020) Year 59 Official Gazette n° Special of 20/08/2020

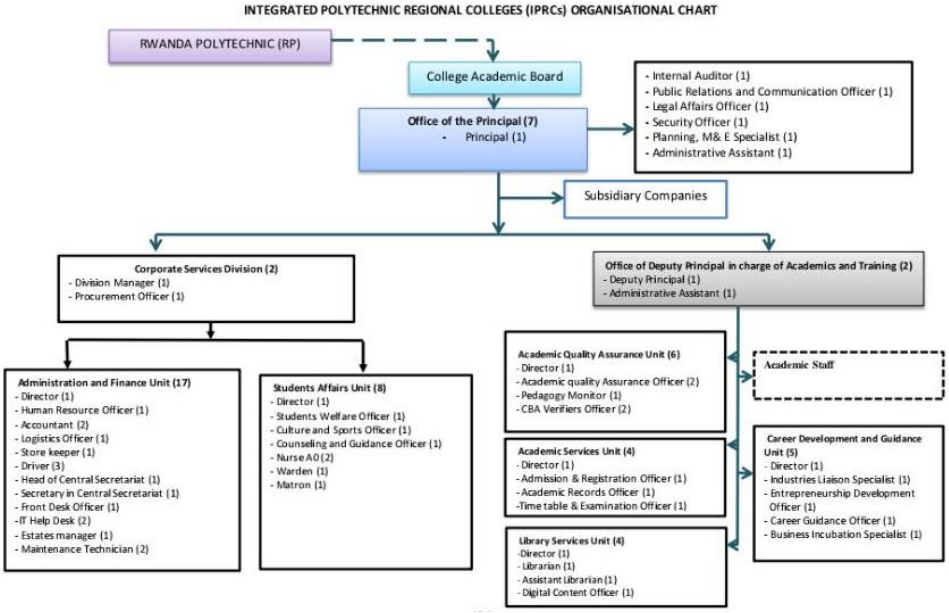

Figure 4-3 Organizational Chart of IPRC

Source: Government of Rwanda (2020) Year 59 Official Gazette n° Special of 20/08/2020

The number of administrative and academic staff are shown in Table 4-4. All IPRCs except IPRC Kigali have vacancies. This is because some posts are in the low priority for the smaller IPRCs and the budget and infrastructure are insufficient. The percentage of female staff is very low (that of administrative staff is approximately 28% and that of academic staff is approximately 10%).

Table 4-4 The Number of Administrative and Academic Staff of IPRCs

Name of IPRC	No. of administrative staff (No. of female)	No. of academic staff (No. of female)	Placement of Deputy Principal
Tumba	36 (10)	71 (8)	Yes
Kigali	76 (29)	182 (15)	Yes
Ngoma	39 (10)	103 (18)	Yes
Karongi	50 (13)	98 (9)	Yes
Musanze	38 (11)	86 (12)	Yes
Huye	71 (21)	115 (1)	No
Gishari	44 (12)	108 (7)	Yes
Kitabi	33 (4)	17 (3)	No

Source: Interviews with IPRCs

The Number of Students

It is depending on the number of departments of each IPRC but the number of students of each IPRC is around 1,000. IPRC Kitabi has the smallest number of students and IPRC Kigali has the largest number. Also, the percentage of female students is the highest in Hospitality Department of IPRC Musanze (54%), the lowest in Mechanical Engineering Department of IPRC Gishari (4%) and approximately 20% on average.

Table 4-5 The Number of Students of Each IPRC

IPRC	Department	No of students (Female)	% of female	Total number of students
Tumba	Information Technology	360（112）	31%	975（239）
	Electronics and Telecommunication	280（67）	24%	
	Renewable Energy	335（60）	18%	
Kigali	Civil Engineering	1,194（155）	13%	3,070（527）
	Mechanical Engineering	462（29）	6%	
	Mining Engineering	139（49）	35%	
	Information Communication Technology	469（150）	32%	
	Electrical and Electronics Engineering	806（144）	18%	
Ngoma	Mechanical Engineering	216（24）	11%	844（182）
	Civil Engineering	345（31）	9%	
	Hospitality	141（73）	52%	
	Information Communication Technology	142（54）	38%	
Karongi	Information Communication Technology	287（93）	32%	1,012（245）
	Hospitality	83（38）	46%	
	Electrical and Electronics Engineering	209 (41)	20%	
	Mechanical Engineering	433 (73)	17%	
Musanze	Civil Engineering	238（11）	5%	1,117（296）
	Agricultural Engineering	430（117）	27%	
	Hospitality	257（138）	54%	
	Electrical and Electronics Engineering	192（30）	16%	
Huye	Construction Technology	309（32）	10%	1,336（277）
	Veterinary Technology	214（51）	24%	
	Crop Production Technology	161（42）	26%	
	Mechanical Production	153（31）	20%	
	Electrical Technology	153（20）	13%	
	Electronics and Telecommunication	155（32）	21%	
	Information Communication Technology	191（69）	36%	
Gishari	Electrical and Electronics Engineering	482（120）	25%	1,454（245）
	Civil Engineering	457（47）	10%	
	Mechanical Engineering	274（10）	4%	
	Agricultural Engineering	33（21）	64%	
	Vocational Training	208（47）	23%	

IPRC	Department	No of students (Female)	% of female	Total number of students
Kitabi	Wildlife Management	125（32）	26%	349（112）
	Wildlife Tourism	68（33）	49%	
	Forest Resources Management	156（47）	30%	
			Grand Total	10,157（2,123）

Source: Interviews with IPRCs

Facility and Equipment

Installed equipment for IT and ICT Departments of 5 IPRCs are shown in Table 4-6.

Table 4-6 Equipment for IT and ICT Departments

IPRC	Item	Quantity (piece)
Tumba (Including Kigali and Musanze satellite labs)	Desktop computer	327
	Laptop computer	16
	UPS	27
	RACK	6
	Projector	7
	Switch	31
	D-LINK	11
	CISCO router	22
	IP telephone	18
	Linksys	20
	Server	3
Kigali	Desktop computer	451
	UPS	341
Ngoma	Desktop computer	80 (2 are unusable)
	Laptop computer	50 (2 are unusable)
	Monitor for a computer	84
	projector	3
	CPU	33
	UPS	2
Karongi	Desktop computer	43
	Laptop computer	65
	APC	7
	Rack	2
	CPU	40
	Projector	3
	Scanner	2
	Switch	4
Huye	Desktop computer	124
	Laptop computer	45
	Printer	1
	Plastic card printer	1
	Scanner	1
	Projector	5
	Router	6
	Switch	5
	Camcorder	1

Source: Asset lists of 5 IPRCs

In terms of maintenance of facility and equipment, there are 2 patterns; that is, specialized staff for the maintenance are in charge (Tumba, Kigali, Ngoma, Musanze, Huye, Gishari, Kitabi) and external contractors are called (Karongi). Regarding the frequency of maintenance, regular maintenance is done in Tumba, Kigali, Ngoma, Musanze, Huye, and Gishari, while maintenance is done depending on needs in Karongi and Kitabi. The budget for the maintenance is shown in Table 4-7.

Table 4-7 The Maintenance Budget of Each IPRC (FY 2018 - FY 2020)

Currency: RWF

	FY 2018	FY 2019	FY 2020 (Planned)
Tumba	30,725,705	50,707,987	40,862,000
Kigali	100,000,000	100,000,000	100,000,000
Ngoma	23,000,000	41,000,000	42,000,000
Karongi	12,061,800	7,225,400	24,274,000
Musanze	11,000,000	14,500,000	114,250,000
Huye	27,000,000	27,000,000	29,860,000
Gishari	12,300,000	6,440,000	20,200,000
Kitabi	7,788,000	10,500,000	33,500,000

Source: Interviews with IPRCs

It is explained in the later section, but the infrastructure is under construction by the Chinese government in IPRC Musanze. Also, the Rwandan government is constructing workshops in IPRC Huye. In addition to that, CSC Koblenz which is supported by BMZ donates equipment for lectures in IPRC Ngoma.

Budget

Regarding the workflow of the budget, IPRC sends the request for the next fiscal year's budget to RP, then RP submits it to the Ministry of Education and the Ministry of Education also requests to the Ministry of Finance. After the approval of the Ministry of Finance, the budget will be sent to RP, WDA etc. directly. Then RP distributes the budget to each IPRC. However, the approved amount is not the same as the disbursed amount. The disbursed amount is lower than the approved amount at all IPRCs.

The amount of the budget was asked at RP and all IPRCs but in most cases, the amounts of both don't match. Table 4-8 shows the recent 3 years' budget of each IPRC which was obtained from RP. Only highlighted parts match the amount heard by IPRCs. Moreover, among the matched parts, some are the same as the approved amount, and some are the same as the disbursed amount. The budget of RP is also shown in Table 4-9.

Table 4-8 The Budget of IPRCs (FY 2018 - 2020)

Currency: RWF

	FY 2018	FY 2019	FY 2020
Tumba	604,510,405	405,527,455	414,165,256

	FY 2018	FY 2019	FY 2020
Kigali	3,680,514,247	3,215,183,858	2,115,032,247
Ngoma	421,393,407	541,634,490	518,671,266
Karongi	621,789,622	569,420,716	637,288,500
Musanze	461,270,000	573,384,250	603,260,000
Huye	515,000,968	437,693,552	529,241,791
Gishari	419,879,227	383,480,840	382,179,190
Kitabi	284,984,083	311,232,000	320,221,608

Source: Interview with RP (9 and 24 September 2020)

Table 4-9 The Budget of RP (FY 2017 - 2020)

FY	Amount (RWF)
2017/18	13,225,291,624
2018/19	15,284,356,536
2019/20	18,602,599,788
2020/21	18,267,613,027

Source: Interview with RP (9 and 24 September 2020)

Each IPRC has other income such as students' tuition fee and the income from income-generation activities, besides the governmental budget. This income also utilized for school operation. This type of income of each IPRC in recent 3 years is shown in Table 4-10. The expenditure was also asked at each IPRC but all IPRCs except IPRC Gishari answered this is the same as the governmental disbursed amount or the total amount of the governmental disbursed budget and their own income.

Table 4-10 Own Income of Each IPRC (FY 2018 - FY2020)

Currency: RWF

	FY 2018	FY 2019	FY 2020
Tumba	267,646,705	229,759,386	276,383,500
Kigali	1,234,000,000	1,234,000,000	1,234,000,000
Ngoma	318,496,938	343,957,806	567,806,404
Karongi	126,915,112	383,943,628	300,025,680
Musanze	255,981,256	272,965,802	132,074,865
Huye	455,158,957	517,758,280	745,441,410
Gishari	86,584,500	110,396,900	108,503,028
Kitabi	29,055,675	23,690,763	27,961,400

Source: Interviews with IPRCs

In terms of students' tuition fee, students need to pay RWF 600,000 per year to IPRCs directly if they don't receive the bursary. This will be posted in their own income. On the other hand, the students who receive bursary from the government, their tuition fee is included in the governmental budget and paid to IPRCs. According to RP, approximately 90% of IPRC students receive the bursary from the government. Students who receive the bursary can use students' loan package for tuition fee and living

expenses which was set by Development Bank of Rwanda (BRD)[5] and the student and BRD conclude a contract. Their tuition fee is paid from BRD to the government and the government pays to each IPRC through RP. Living expenses are provided to the students every month. The students pay back the loan after obtaining a job.

Graduates' Pathways

RP doesn't trace IPRC graduates' pathways. On the other hand, only IPRC Tumba, IPRC Karongi, IPRC Ngoma and IPRC Kitabi conduct a tracer survey and the data of IPRC Ngoma mixed with other levels such as TSS and couldn't obtain the accurate data of IPRC graduates. The reasons for not conducting the tracer survey are; the budget restriction (IPRC Musanze and IPRC Huye), unnecessary since WDA conducts[6] (IPRC Kigali), never considered to conduct the tracer survey (IPRC Gishari).

The rate of being employed, that of starting their own business and that of proceeding with further education of graduates of IPRC Tumba, IPRC Karongi and IPRC Kitabi are shown in Table 4-11. In IPRC Tumba, the total rate of these 3 pathways is approximately 60% (employment rate is approximately 49%, the rate of starting businesses is approximately 7% and the rate of proceeding to further education is approximately 5%) for all 3 departments. On the other hand, results vary depending on departments in IPRC Karongi. The rate of being employed or starting their own business is approximately 89% in the Electrical and Electronics Engineering department and the Mechanical Engineering department but that in the Information Communication Technology department is approximately 53%. At the same time, the rate of starting a business is outstanding in the Mechanical Engineering department, followed by the Information Communication Technology department. Moreover, all 3 departments don't have the graduates proceeding to further education. Regarding IPRC Kitabi, the total rate of these 3 pathways in FY 2017 is more than 100% in all 3 departments. This is because there are many cases of working and studying in higher education simultaneously. Until 2020, IPRC Kitabi issued Diploma for 2 courses which is the lower degree than other IPRCs. This might be the reason why more graduates proceed to further education than other IPRCs. From the new academic year (2021), IPRC Kitabi will offer 3 years courses which will provide Advanced Diploma upon graduation.

5 https://edu.brd.rw/#/

6 WDA conducted a tracer survey in 2019 targeting graduates from TVET schools to universities. In this survey, employers' satisfaction was also researched.

Table 4-11 The Employment Rate, the Rate of Starting a Business and the Rate of Proceeding Further Education of Graduates of IPRC Tumba, IPRC Karongi and IPRC Kitabi (FY 2017 – FY 2018)

IPRC	Department	FY 2017				FY 2018			
		1.Being employed	2.Starting business	3.Proceeding further education	1-3 All	1.Being employed	2.Starting business	3.Proceeding further education	1-3 All
Tumba	Information Technology	49%	7%	5%	60%	49%	8%	5%	62%
	Electronics and Telecommunication	48%	7%	4%	60%	48%	7%	4%	59%
	Renewable Energy	48%	7%	4%	60%	48%	8%	5%	61%
Karongi	Information Communication Technology	33%	22%	0%	56%	23%	23%	0%	46%
	Electrical and Electronics Engineering	100%	0%	0%	100%	86%	0%	0%	86%
	Mechanical Engineering	12%	77%	0%	88%	50%	38%	0%	88%
Kitabi	Wildlife Management	70%	4%	44%	119%	49%	12%	15%	76%
	Wildlife Tourism	69%	31%	69%	169%	67%	5%	11%	84%
	Forest Resources Management	89%	0%	21%	111%	81%	0%	7%	88%

Source: Interviews with IPRC Tumba (20 August 2020), IPRC Karongi (31 August 2020) and IPRC Kitabi (17 September 2020)

In terms of employers' satisfaction survey, IPRC Ngoma and IPRC Kitabi conducted with graduates' tracer survey. The reasons of not conducting this survey are; the budget constraint (IPRC Musanze, IPRC Karongi and IPRC Huye), unnecessary since WDA conducts (IPRC Kigali), unnecessary since RP is going to conduct for all IPRCs (IPRC Tumba) and never considered (IPRC Gishari).

As Table 4-12 shows, graduates in all IPRCs found jobs through their own personal connection and by starting their own business. Therefore, these ways are the most common. The following them, graduates found jobs through industrial attachment program, IPRC's job matching/ job placement, and through job information websites.

Table 4-12 The Way of Finding Jobs by IPRC Graduates

The way of finding jobs by graduates	IPRC
1. Through the personal connection of students	Tumba, Kigali, Ngoma, Karongi, Musanze, Huye, Gishari, Kitabi
2. Starting their own business	Tumba, Kigali, Ngoma, Karongi, Musanze, Huye, Gishari, Kitabi
3. Through industrial attachment program	Tumba, Kigali, Ngoma, Karongi, Musanze, Huye, Kitabi
4. IPRC's job matching/ job placement	Kigali, Karongi, Musanze, Huye, Gishari, Kitabi
5. Through job information websites	Tumba, Kigali, Ngoma, Karongi, Huye, Kitabi
6. Through Alumni Associations	Tumba, Ngoma
7. Through professional internship (e.g. Skills Development Fund Program and National Employment Program)	Huye

Source: Interviews with IPRCs

IPRCs' answers on challenges in graduates' employment and measures to improve the employment rate are shown in Table 4-13 and Table 4-14. The largest challenge is a few job opportunities since IPRC graduates' Advanced Diploma which is lower than a bachelor's degree is not recognized to the employers as necessary qualification. As the countermeasures against that challenge, the followings are stated as the effective measures, that is, increasing information exchanges on the educational contents of IPRC and its technical skills between industries and IPRCs and inviting companies to various events at IPRCs so that they understand educational contents provided by IPRCs; by encouraging the private sector to be involved in curriculum development more, making educational contents reflect industrial needs. Also, the provision of more career guidance to students, such as mental preparation for work, career plan etc. to improve not only the practical skills but other skills, and the provision of more companies' information to students are evaluated as important.

Table 4-13 Challenges in Graduates' Employment

Challenges in graduates' employment	IPRC
1. A1 level (Advance Diploma) is not very demanded at the job market and there are not so many job opportunities, they prefer university graduates to IPRC graduates	Tumba, Kigali, Ngoma, Karongi, Huye, Gishari, Kitabi
2. Lower salary than graduates' expectation	Tumba, Gishari, Kitabi
3. Contents of the department aren't well-known	Kigali, Gishari, Kitabi
4. Location of the work is not the graduates' preference.	Gishari, Kitabi
5. Cooperation with Companies is weak	Tumba
6. Lack of enough capital to start their own business	Kitabi

Source: Interviews with IPRCs

Table 4-14 Measures to Improve the Employment Rate

Measures to improve the employment rate	IPRC
1. Provide more career guidance to students, such as mental preparation for work, career plan etc.	Tumba, Kigali, Ngoma, Karongi, Musanze, Huye, Gishari, Kitabi
2. Increase information exchanges between industries and IPRCs	Tumba, Kigali, Ngoma, Musanze,

Measures to improve the employment rate	IPRC
	Huye, Gishari, Kitabi
3. Provide more companies' information to students	Tumba, Musanze, Huye, Gishari, Kitabi
4. Advertise more about departments' activities in the school website, exhibitions and workshops	Tumba, Huye, Gishari, Kitabi
5. Consideration of Diploma and Advanced Diploma by employers during the elaboration of job profiles	Musanze
6. Upgrade the level of IPRC from A1 (bachelor's degree) to A0	Huye
7. Engage a lot with the private sector to market what IPRC offers as Institution and also invite the private sector for public lectures to IPRCs for them to share with staff and students what they do. Also, through such a forum, there will be an exchange of information. Besides, involve the private sector in program development to make sure they really own the program and its graduates, and this will ease market absorption.	Gishari
8. Review the existing program and curriculum	Kitabi

Source: Interviews with IPRCs

Major companies where IPRC graduates work are shown in Table 4-15. Most IPRCs responded that no graduate works abroad, or the existence of such graduates is unknown. However, IPRC Kitabi answered some students of Wildlife Management department and Wildlife Tourism department were from abroad and after graduation, they went back to their countries and work at national parks. Also, IPRC Kigali has some graduates who work in South Sudan, Tanzania, Malawi, South Africa, Uganda, Burundi and the Democratic Republic of the Congo. The reasons of not working abroad are; information of working abroad is not available, obtaining a passport or visa is difficult, and students' mindset is working in their area and not considering themselves working abroad.

Table 4-15 Major Companies and Organizations Where IPRC Graduates Work

IPRC	Department	Major companies by which graduated were employed
Tumba	Information Technology	IPRCs, TVET Schools, Equity Bank, Access Bank, Business Development Fund, Mara Phone
	Electronics and Telecommunication	IPRCs, ZIPLINE, TVET Schools, Remi Rwanda
	Renewable Energy	IPRCs, TVET Schools, REG, NAICO (Nasho Irrigation Cooperative)
Kigali	Civil Engineering	Wasac, Afri Precast (concrete precast company), NPD Contraco, Horizon, Real Contractor, Fair Construction
	Mechanical Engineering	Inyange, African Improved Food, NPD Contracto, Cimerwa (Cement company),
	Information Communication Technology	Positivo BGH, KT Rwanda, Private Software Development Company, Internet Service Provider, Telecommunication Companies
	Electrical and Electronics Engineering	Wasac (The Water and Sanitation Corporation), REG (Rwanda Energy Group Limited), Hygiene products Industry, Inyange (food processing company), African Improved Food
Ngoma	Mechanical Engineering	Rwanda Motor, Akagera business Group, Volkswagen Garage, Steelrwa industries, Bralirwa PLC, AZAM

IPRC	Department	Major companies by which graduated were employed
	Civil Engineering	China Road& Bridge Corporation, Horizon Construction Ltd, Landmark Studio Ltd, Talent Contractors Ltd.
	Hospitality	Serena Hotel, Kigali Convention center and Hill Top
	Information Communication Technology	Broadband system corporation, Rwanda Broadcasting Agency, ISPA, MTN
Karongi	Information Communication Technology	MTN, KIVU Watt, Rwanda Energy Group, Airport Kanombe
	Hospitality	Unknown
	Electrical and Electronics Engineering	Rwanda Energy Group
	Mechanical Engineering	Rwanda Energy Group, African Improved Food, Kivu Watt, Garages, Volkswagen
Musanze	All	Unknown
Huye	All	Unknown
Gishari	All	Unknown
Kitabi	Wildlife Management	National park, conservation NGOs (Karisoke research center, Rwanda Wildlife Association etc.), museum, tour company (Wulson Tour, etc), veterinary
	Wildlife Tourism	National parks, museums, booking and reservation in business companies, culture center, tour companies
	Forest Resources Management	Forest production supervisor, forest manager

Source: Interviews with IPRCs

Major universities where IPRC graduates went on to are shown in Table 4-16. Gradates went on to various universities but among them, the University of Rwanda and the University of Tourism, Technology and Business Studies received graduates from several IPRCs.

Table 4-16 Major Universities Where IPRC Graduates Proceed

IPRC	Department	Major University
Tumba	Information Technology	The University of Kigali, The University of Technology and Arts of Byumba
	Electronics and Telecommunication	The Adventist University of Central Africa
	Renewable Energy	The University of Technology and Arts of Byumba
Kigali	Civil Engineering	INES Ruhengeri, College of Science and Technology
	Mechanical Engineering	Cyambogo University
	Information Communication Technology	The University of Tourism, Technology and Business Studies, The University of Kigali, Universite Libre de Kigali
	Electrical and Electronics Engineering	The University of Rwanda, College of Science and Technology
Ngoma	All	Unknown
Karongi	All	Unknown
Musanze	All	Unknown
Huye	Construction Technology	The University of Rwanda, College of Science and Technology
	Veterinary Technology	The University of Rwanda, College of Agriculture, Animal Science and Veterinary Medicine

IPRC	Department	Major University
	Crop Production Technology	Unknown
	Mechanical Production	The University of Rwanda, College of Science and Technology
	Electrical Technology	The University of Rwanda, College of Science and Technology
	Electronics and Telecommunication	The University of Rwanda, College of Science and Technology
	Information Communication Technology	The University of Rwanda, College of Science and Technology, Adventist University of Central Africa
Gishari	All	Unknown
Kitabi	Wildlife Management	The University of Lay Adventist of Kigali, the University of Tourism and Business studies, Mount Kenya University
	Wildlife Tourism	The University of Tourism and Business studies, Mount Kenya University, East African University
	Forest Resources Management	The University of Lay Adventist of Kigali

Source: Interviews with IPRCs

Collaboration with the Private Sector

In terms of collaboration status with the private sector, mainly 1) collaboration such as curriculum development and research and development, and 2) Industrial Attachment Program (IAP) were asked. Seven out of eight IPRCs responded that they receive enough cooperation from the companies on curriculum development. On the other hand, half of them stated they cannot obtain sufficient cooperation from companies on IAP. Each IPRC's answers are shown in Table 4-17.

Table 4-17 Collaboration Status with the Private Sector

IPRC	Collaboration such as Curriculum Development and Research and Development	Cooperation for IAP
Tumba	• Input for the curriculum development • Cooperate community outreach activity • Training of companies' personnel • Obtaining technical advice at meetings • Sending students to company visits • Inviting companies' personnel to lectures/ practical lessons as lecturers	• Companies' cooperation is insufficient. • The reasons are they are too busy to take care of students, the number of students is more than companies' availability, condition of work is not good.
Kigali	• Since companies do not have enough capacity and they are still building their capacities, their input for the curriculum development is insufficient. • However, IPRC Kigali and companies are working together for the following activities: applied research, development/	• Sufficient support is obtained from companies.

IPRC	Collaboration such as Curriculum Development and Research and Development	Cooperation for IAP
	improvement of products, cooperate community outreach activity, training of companies' personnel, obtaining technical advice at meetings, sending students to company visits.	
Ngoma	• Input for the curriculum development so that students familiarize with new equipment and updated software for engineering design and other technologies on-trend • Obtaining technical advice at meetings • Sending students to company visits • Inviting companies' personnel to lectures/ practical lessons as lecturers	• Sufficient support is obtained from companies.
Karongi	• Input for the curriculum development • Sharing facility and equipment each other, sending students to company visits	• Companies' cooperation is insufficient. • The reasons are; they are too busy to take care of students, the number of students is more than companies' availability, and the condition of work is not good.
Musanze	• Input for the curriculum development • Applied research • Development and improvement of products • Cooperate community outreach activity • Sending students to company visits	• Companies' cooperation is insufficient. • The reasons are; they are too busy to take care of students, the timing of IPRC's IAP is too late (TSS and VTC students already occupied seats), the number of students is more than companies' availability, condition of work is not good, most of the hotels are requesting money for caution, lunch, uniform, etc.
Huye	• Input for the curriculum development • Development/ improvement of products • Cooperate community outreach activities • Training of companies' personnel • Sending students to company visits	• Companies' cooperation is insufficient. • The reasons are; the number of students is more than companies' availability, condition of work is not good, companies request money to buy materials to be used by our students.
Gishari	• Provision of opportunities of employment • Input for the curriculum development • Training of companies' personnel • Sending students to company visits	• Sufficient support is obtained from companies.

IPRC	Collaboration such as Curriculum Development and Research and Development	Cooperation for IAP
Kitabi	• Participation in curriculum review while developing a curriculum framework, course content and assessment procedure • Participation in the summative assessments of current trainers especially for specific modules • Provision of an update on competencies required to perform the task at labor market • Provision of job to fresh graduates • Provision of internship to fresh graduate • Provision of a place for training and learning to current students especially for learning at the workplace • Provision of seminars to current trainees and trainers	• Sufficient support is obtained from companies.

Source: Interviews with IPRCs

IAP's implementation is arranged the same among all IPRCs. Students need to pay the transportation fee, the daily allowance and the accommodation fee by themselves. Regarding the insurance during IAP, students need to pay the cost to IPRCs. Then each IPRC selects the insurance company, applies for all students and gives the insurance paper to students. Also, before IAP, IPRCs provide the students with logbooks. Companies monitor and supervise daily and IPRC staff visit them for monitoring from 1 to 3 times during the IAP period. After IAP, students submit their reports and give presentations. IPRC Musanze organizes Industrial Attachment Effectiveness Verification to ensure students have been supervised properly during IAP. At least 5 companies are selected in every department and they are visited by the IAP coordination team after 2 weeks of the end of IAP. To increase the number of companies which cooperate in IAP, each IPRC visits companies regularly, updates company information, invites companies to their school events to help them to understand more what IPRCs do and makes MoU with more companies for the cooperation in IAP.

Curriculum

IPRCs have been using the curricula which were developed by themselves in collaboration with WDA and development partners till 2020. The ratio of lecture and practical lessons is 40:60 in most departments. However, RP is currently developing curricula for all departments of IPRCs and they will be introduced from the new academic year.

Regarding the ICT department, IPRCs harmonized the curriculum under the supervision of RP and the same curriculum is used in all IPRCs. There is no Rwandan ICT certificate, but each IPRC recommends students to obtain the international certificates during their study. Among them, CCNA

is incorporated into the curriculum of the ICT department, therefore, all students are obligated to obtain it. Other certificates obtained by students are ICDL, IT Essentials PC Hardware and Software, CCNA Essentials, Oracle Certified Associate, etc.

The Utilization of ICT

There is no IPRC which developed a plan or documents on digital contents and ICT infrastructure development. However, responding to COVID-19, RP issued 'E-Learning Guidelines for Rwanda Polytechnic' in September 2020 and IPRCs refer to this guideline [Rwanda Polytechnic, 2020]. Also, training on remote education for teachers was organized or planned by the Ministry of Education, RP and each IPRC during the temporary school closure period due to COVID-19. Teachers were already trained on how to teach students through online using E-learning platforms such as Moodle and Microsoft Teams, however, it is not enough, according to IPRCs. ICT utilization status in teaching and administrative work at IPRCs are shown in Table 4-18.

Table 4-18 ICT Utilization Status in Teaching and Administrative Work at IPRCs

IPRC	The use of ICT in teaching	The use of ICT in administrative work
Tumba	• Academic staff develop digital content and upload it to the RP's platform. Also, online meetings and online training for both administrative and academic staff are done. • CISCO's VR on computer assembly and the tool for PC maintenance is used to teach at IPRC Tumba. • IPRC Tumba also plans to use VR in mining because it seems the site training is not easy. This is still at the planning stage. Details will be decided when the mining department start in the next academic year.	• Asset & Consumable Management System which was developed by JICA's support is used. • IPRC Tumba plans to use ICT tools during administration work like document sharing, meeting, reporting and training.
Kigali	• E-Learning and Youtube Channel are used. • In the coming academic year, mobile learning and classes using VR and AR will be introduced in all departments.	• E-mboni is used for Letter Sharing among concerned staff, there is as well Invictus Logistics, which is used to request and approve stationaries that may be required by staff. Fingerprint for handling Staff Attendance, Management Information System which deal with students' application, admission, attendance, payments and each and status of students are used.
Ngoma	• IPRC Ngoma trains students though e-learning platform via RP e-learning platform (TVET MIS （https://mis.rp.ac.rw/）) and smart screen. Also, IPRC Ngoma uploaded	• Internet Banking of National Bank of Rwanda (BNR) to pay supplies online, Integrated Financial Management Information System

IPRC	The use of ICT in teaching	The use of ICT in administrative work
	tutorial/practical modules videos for the students' use via RP's youtube channel. • There is no plan to introduce mobile learning and use AR and VR in the class.	(IFMIS) in planning, budgeting, payment and reporting, • Smart HR for staff salary payment and management of annual leave are used. • IPRC Ngoma also uses Rwanda employee self-service portal in the performance contract. • Microsoft Teams (video conference) in teaching and management meetings is utilized. • In the future, IPRC Ngoma plans to develop an online channel where different requests and claims of students are received and can be processed. This regards only academic issues at IPRC level since all other administration procedures (recruitment, payroll,) are managed through ICT government infrastructure.
Karongi	• IPRC Karongi is teaching online. • Introduce new teaching methods such as mobile learning and utilizing VR and AR is also considered but how to introduce it is not yet decided.	• IPRC Karongi holds meetings using an online platform like Microsoft Teams. • Using ICT systems to reduce the administration work is also planned but still at the concept stage.
Musanze	• Currently, in IPRC Musanze, teaching and administration staff are using digital contents even though the wireless network does not cover the whole campus. • There is no plan to introduce mobile learning, AR and VR in the class.	• Unknown.
Huye	• Moodle is utilized. • There is no plan to use AR and VR in the class.	• Microsoft Teams is used for virtual meetings. • Logistics Management System, Integrated Financial Management Information & System, and smart HR are also introduced. • In the future, IPPIS (Integrated Payroll and Personnel Information) and RBM (Risk-based management) and different MIS are intended to be used.
Gishari	• Students are using online platforms to study. • There is no plan to use AR and VR in the class.	• The digital contents and infrastructure are used in almost every process of daily activities. MIS TVET for uploading and accessing students' marks is used by teachers and students. Procurement and

IPRC	The use of ICT in teaching	The use of ICT in administrative work
		finance also have their own systems. Databases to speed up the work are also in use. • In the future, IPRC Gishari intends to introduce the well-equipped digital library, equipped e-book materials, MIS for academic performance and evaluation, online system for external expertise and guidance academic support, and inventory and logistical management system.
Kitabi	• The learning management systems (LMS) and Microsoft Team are currently used by both IPRC Staff and trainees. • There is no plan to introduce mobile learning, AR and VR in the class.	• Integrated Payroll and Personnel Information System (IPPIS) is used by academic and administrative staff. • In the future, ICT is intended to be used in managing following things; financial resources, human resources, quality of teaching and learning as well as assessments, blended model of teaching and learning, and teaching and learning documents.

Source: Interviews with IPRCs

Challenges on the utilization of ICT are discussed below by IPRCs. There is a need that they are tackling these challenges within their budget but there is also a need that they cannot solve these challenges due to a lack of the budget.

【Teachers' Skills】

- Teachers teaching skill using ICT in classes is still insufficient, therefore, more training is required. (Tumba, Kigali, Musanze, Karongi, Ngoma, Gishari, Kitabi)

【Infrastructure】

- ICT infrastructure and devices are limited. (Tumba, Musanze, Huye, Ngoma, Gishari, Kitabi)
- Internet connection/ network is insufficient and unstable. (Tumba, Musanze, Karongi, Huye)
- Insufficient electrical power backup (Huye)

【Curriculum and Teaching/ Learning Materials】

- Lack of required tools and materials (Gishari)
- Curricula materials and contents not designed with ICT consideration (Tumba)

【Others】

- Communication and behaviors barriers (some staff are reluctant to use ICT) (Tumba)
- Plans and decisions on how to use ICT in public institutions are made at the central level (Ministry level) but not at the institutional level (Ngoma)

Applied Research, Innovation and Entrepreneurship

A plan on applied research, innovation and entrepreneurship was developed by IPRC Tumba and IPRC Musanze, but other IPRCs didn't develop it. A team consisting of all IPRCs' representatives and RP are developing research innovation and entrepreneurship policy and research agenda of each IPRC, and they were supposed to be completed by the end of November 2020. However, as of February 2021, they were not uploaded on the website, so it is not clear whether they were finalized or not.

Research, Development and Production Unit (RDPU) was set up at all IPRCs. However, because of the restructuring of all organizations under the Ministry of Education in 2020, it became the unit outside of IPRC and is operated as a company. RDPU activities at each IPRC are shown in Table 4-19. Each IPRC developed products which are useful in daily life and some products are in practical use.

Table 4-19 RDPU Activities at Each IPRC

IPRC	Recent RDPU activities
Tumba	• Student clearance system[7], Girinka Monitoring System[8] (IT department) • Irish Potatoes seeds Incubator, Smart Urwina (Banana ripening) (ET department) • Analysis of the performance of locally made stoves with Energy Development Corporation Limited, Hybrid of Solar/Grid system (RE department)
Kigali	• IPRC Kigali has Innovation Club, and Innovation Competition each year. The best project is supported. Students do conduct Final Year Project and the best one is awarded. Also, teachers are encouraged to develop innovative projects and apply for the fund in Funding Institutions. • The recent products are; a Ventilation, Smart Voma[9], Milk Vendor, E-Ticketing. There is another applied research which is being conducted: Contribution of Mining Activities to the Segmentation road to Nyabarongo River
Ngoma	• IPRC Ngoma has a Business Incubation Center under RDPU. By this Business Incubation Center, following activities were conducted; innovation competitions, business incubating, mentoring, development of innovation, participation in competitions at the higher level (some projects were given awards), and establishment of a makerspace[10]. • Each year IPRC Ngoma carries out Innovation Competition through incubation center unit where students get guidelines about the competition and procedures. Students develop projects. Those with good projects are selected and rewarded. • In 2020 action plan, IPRC Ngoma planned to conduct one applied research in addition to the innovation competition organized every year.
Karongi	• Recycling plastic residues into papers, classrooms teaching board, the transformation of old tires into tiles, and melting metallic scratches and making teaching materials and consumables.

7 Before graduation, all graduates have to visit the campus and get signatures from different departments to attest that they don't have any issues remaining like unpaid fees, no book not bringing back after borrow from the library etc, IPRC Tumba calls that collection of signatures from different departments 'Clearance'. They want to make an online system to make that process easier.

8 Rwandan government provides cows to poor families in return after that cow give birth to a calf the beneficiary family gives away the calf to another poor family and so on. Rulindo district asked IPRC Tumba to make a system to monitor that initiative.

9 It is introduced in the newspaper (https://www.newtimes.co.rw/technology/iprc-kigali-student-invents-water-meter-looks-roll-out-device)

10 A maker space is a collaborative workspace inside a school, a library or separate public/private facility for making, learning, exploring and sharing that uses high tech to no tech tools. It provides hands-on learning, helps with critical thinking skills and even boosts self-confidence.

IPRC	Recent RDPU activities
Musanze	• Considering the limited budget allocated to research & innovation activities, IPRC Musanze has adopted the culture of partnership with other (co-funding) institutions (International Organization for Migration, NUFFIC (Dutch organization for internationalization in education), Ministry of ICT and Innovation, National Council for Science and Technology, Erasmus Plus etc.) and this led to a good number of research/innovation ongoing projects. Also, academic staff have been trained in research grant proposals writing and the aim is to apply to any call where IPRC Musanze fields of expertise and interest match the best. With the support of TechnoServe, IPRC Musanze now has at least one lecturer and one instructor trained in Entrepreneurship in each of the academic programs. • The recent activities are as follows; 1）The role of kitchen gardens in food security and nutrition diversity to support school feeding program: a case study of Musanze and Nyabihu District primary schools, 2）Comparative assessment of economic sustainability of drip irrigated and overhead irrigated Irish potato (Solanum tuberosum) production during the dry period, 3）Strategies to foster potato quality production for the satisfaction of market demand in Rwanda, 4）Design and fabrication of Mechanically Operated Single Wheel Driven Sprayer Pump, 5）Manufacturing of Irrigating Sky Travelling Prayer, 6）Performance evaluation of irrigation schemes in Rugeramigozi Marshland, Rwanda, 7）Manufacturing of an electric corn threshing machine, 8）Manufacturing of solar-powered & self-traveling irrigation machine.
Huye	• Regenerative Charger, Solar Tracker, Welding Machine, Gate Control System, Remote Gate, Juice Point, Quadcopter Drone, Cartoon Animation, Video Streaming And Conferencing System, Industrial Robot, Electronic Vending Machine, Automatic Irrigation, Powered By Solar Tracking Panel, The Urea-Molasses Mineral Block, Automatic Electronic Water Counter, Sofa Bed, Multifunction Shelf, Convertible Dining Table, Convertible Bench Table etc.
Gishari	• Smart Eggs Incubator applied ICT, Students Bio-Data Monitoring system, Smart farm data acquisition and control using a smartphone, Upgraded automatic irrigation system based on SMS notification, Digital water meter-based Arduino (One-board microcomputer) with automatic billing, counting and charger, Hotel information management system, Design and implementation of 30v DC generator based on LED and the Sun's radiation with GSM control, Smart Energy Meter Rechargeable, Production of shoe polish from charcoal powder, beeswax and banana peels, Crime Reporting System
Kitabi	• A project on Eucalyptus Grandis (tree) multiplication and a project on added value product manufacturing are conducted.

Source: Interviews with IPRCs

Capacity Building of Staff

Competency-based staff capacity building plan and work exposure program which were stated in the Rwanda Polytechnic Strategic Plan were not yet developed. Each IPRC holds in-service training as well as letting academic and administrative staff receive training of RP and Ministry of Education for their capacity building, but still training needs are not fulfilled and more training for both academic and administrative staff is requested by all IPRCs. Contents of in-service training and training needs are shown in Table 4-20.

Table 4-20 Implementation Status of In-service Training and Training Needs

IPRC	Implementation status and contents of in-service training	Training needs and points need to be strengthened
Tumba	• Quarterly training targeting teaching staff and administration staff, Competence-Based Training/ Competence-Based Assessment (CBT & CBA) and ICT training are conducted. These courses are held by IPRC Tumba as well as the online platform provided by RP and other platforms such as COURSERA. Some modules in RP's platform can be used by IPRCs without charge.	• Vocational Training which meets specialization of each core business is necessary. For example, peat and biogas training for the teachers of Renewable Energy department, Oracle, Java, Frameworks, Linux training for IT department teachers, telecommunication (wired and wireless), IoT and big data training for ET department teachers. • The following points need to be strengthened; infrastructure for teaching, staff capacity building (technical aspect), the level of skills in consultancy processes and proposal writing for funds (innovation design) (operation and management aspect).
Kigali	• Administrative staff received training from Rwanda Management Institute and teachers received training from Rwanda TVET Trainer Institute (RTTI).	• There is a need for pre and in-service training for teaching and administrative staff. Policy development and training of administrative staff about managerial skills are also necessary.
Ngoma	• Competence-Based Training/ Competence-Based Assessment Training (CBT & CBA) targeting academic staff is held by Rwanda TVET Trainer Institute (RTTI) sponsored by KOICA once a year. • Cyclical Management leadership training targeting administrative staff was held by RDB in partnership with SEAD (a project sponsored by the Kingdom of Netherlands) in 2019 and 2020.	• Training on ICT, English, research and publication and mentorship is necessary for both teaching staff and administrative staff. • Industry exposure is necessary for teachers. • In the technical aspect, improvement of infrastructure especially the construction of classrooms and workshops (they are insufficient compared to the number of students), capacity building of teachers, updating workshop equipment (technical training equipment) are necessary. • In the operation and management aspect, IPRC needs to have different policies from RP like capacity building, research, and others. • Improving partnership with the private sector by working on the exchange of teachers, teachers' exposure and student exposure. Then obtaining their input in improving IPRCs' curricula.

IPRC	Implementation status and contents of in-service training	Training needs and points need to be strengthened
Karongi	• Leadership management training targeting managerial staff is held for 4 weeks every year • Competence-Based Training/ Competence-Based Assessment Training (CBT & CBA) targeting all newly hired staff is held for 3 months every year. • Refresher courses on Competence-Based Training/Competence-Based Assessment are held for teachers and the staff of Quality Assurance Unit. Depending on the level of the trainees, the duration of the courses varies (1 week, 3 months and 1 year).	• Technical training of teaching staff depending on their respective trades (e.g. software training like Solid works, Matlab, CAD etc.) is necessary.
Musanze	• None	• Almost all academic and administration staff need to receive training. Training needs for each staff depends on their academic background and their professional work exposure, as far as frequency is concerned at least each staff needs to be trained once a year. • Capacity building of all staff is necessary. Once IPRC Musanze submitted the capacity building plan at the central level, at least at the beginning of the quarter one each institution should have its approved training and the allocated budget to follow up the implementation. Besides, at the institution level, there should be a capacity-building policy (whether at RP or IPRC) also a team in charge of the implementation of the policy.
Huye	• For academic staff, before starting their job they get trained by the Quality Assurance Unit on various teaching methodologies, pedagogy, assessments, etc. • For administrative staff, they receive the series of training related to their duties organized by Rwanda Management Institute （RMI）. Training is on e-procurement, communication strategies, strategic planning, planning, M&E, budgeting, and project management.	• Both academic and administrative staff need the training to upgrade and improve their knowledge according to the core service they deliver. Also, it is necessary to improve the implementation and monitoring of employment laws and regulations.

IPRC	Implementation status and contents of in-service training	Training needs and points need to be strengthened
Gishari	• There is in-service training provided to staff depending on their field of work. For example, staff in human resources and all Managers are trained in Result Based Performance Management system where they learn how to use this system for staff evaluation. Those in finance are trained on the use of financial accounting systems; procurement trained in procurement operational systems; academic staff are trained in pedagogical skills and any other training relevant to their jobs. This is always planned at Institutional (IPRC) level.	• Teaching staff need industrial training in their respective technical discipline/field, training on CBT/CBA teaching approach to be able to implement competency-based curricula, and any other training both long term and short term which is provided in the capacity building plan. • Besides the above, there is a need to avail policies and guidelines especially those which are not available while implementing a specific activity. These policies are; 1）Anti-plagiarism Policy, 2）Online learning Policy, 3） Guidelines for Curriculum Development, validation & approval, 4） Academic staff appointments, development, career path & promotion policy, 5） Outreach & Extension Services Policy, 6） Applied Research & Innovation Policy, 7 ） Entrepreneurship, consultancy & incubation policy and 8）Gender & Inclusion Policy.
Kitabi	• Training on teamwork was conducted for academic staff (2days in 2018), this is not the regular training • Competence-Based Training/Competence-Based Assessment was conducted for academic staff (1 week this year), this is not the regular training • Induction week for new employees (whenever a new employee is hired)	• IPRC Kitabi developed 'Capacity Development Plan for Academic Year 2019-2020'. According to that, necessary training are on; applying TVET methodology and pedagogy, use of ICT in teaching and learning, research and publication, use of ICT in tourism, skills in teaching and general industry trends, application of GIS and remote sensing in natural resources management, skills in digital marketing, skills in graphic and design, statistical data analysis, quality management system, and ICT in booking, customer databases.

Source: Interviews with IPRCs

Cooperation with Other IPRCs and Development Partners

There is no division of roles among 8 IPRCs and all of them are working for the same mandate of teaching TVET related subjects based on their departments. They cooperate with other IPRCs in sharing teachers, laboratories and workshops. Some IPRCs make advocacy for all TVET schools as a leader of the area and allow TVET schools' students to make study visits to their campus. Besides, there are some IPRCS which signed MOU with not only TVET institutions in Rwanda but also

overseas institutions for exchange of academic and administrative staff, knowledge and technical transfer and collaborative research (Table 4-21).

Table 4-21 Cooperation with Other IPRCs and TVET Organizations

IPRC	Contents of cooperation with other IPRCs and TVET organizations
Tumba	• Sharing the academic staff with other IPRCs depending on needs.
Kigali	• None
Ngoma	• Making advocacy for all TVET schools in Eastern province on TVET related issues and allowing them to make study visits at IPRC Ngoma. • IPRC Ngoma works with schools in Germany in the exchange of knowledge and skills. Also, IPRC Ngoma has MoU with the Institute of Applied Sciences (INES) and the University of Tourism Technology and Business Studies (UTB) on knowledge and skills exchange. • IPRC Ngoma has a plan to work with a Finland Vocational Education Institution called Tampere Adult Education Center (TAKK) in the energy sector. However, the MoU is not signed yet
Karongi	• IPRC Karongi has an internal arrangement with other IPRCs to share teaching staff if needed.
Musanze	• Staff exchange has been done with Jinhua Polytechnic (Chinese institution). Also, IPRC Musanze and Jinhua Polytechnic work to offer two programs together (E-commerce, and Electrical Automation). • IPRC Musanze is a part of EnRHEd project. This is a consortium of 3 EU Universities (Universita di Parma in Italy, Rheinische Fachhochschule Köln in Germany and Université de liège in Belgium) and 4 Rwandan higher education institutions (the University of Rwanda, INES (Institut d'Enseignement supérieur de Ruhengeri), UTB (the University of Tourism Technology and Business Studies) and IPRC Musanze). This consortium promotes internationalization (international standards) of training through staff exchange and sharing teaching and learning experience. • Research in Agriculture is done with the University of Rwanda, College of Agriculture, Animal Sciences and Veterinary medicine • General MoU was concluded to share facilities with Muhabura Integrated Polytechnique College (Rwanda).
Huye	• IPRC Huye collaborates with other TVET Institutions mainly inside the country in terms of knowledge sharing, for example, different TVET schools in Southern province make study visits at IPRC Huye's campus. Moreover, IPRC Huye collaborates with other IPRCs in sharing some teaching facilities like labs and materials, helping students to go to other IPRC to upgrade their skills, sports events between staff and students of different IPRCs, and sharing information among IPRCs in order to market the institution, etc.
Gishari	• On exchange of laboratories, workshops, other academic facilities and teaching staff during practical sessions every academic year is done with IPRC Kigali, IPRC Ngoma, IPRC Tumba, IPRC Musanze, IPRC Huye and Saint Joseph Integrated Polytechnic.
Kitabi	• IPRC Kitabi has been working with other IPRCs to develop and review the curriculum. For instance, in July 2020, IPRC Kitabi in partnership with different experts developed 3 curriculums to shift from Diploma to Advanced Diploma (Tourism, Nature Conservation and Forestry). IPRC Kitabi often uses external lecturers as there are some courses that need special expertise like topology, or when it is one course that needs special equipment and its user. • As short courses are part of Kitabi's programs, IPRC Kitabi plans to work with other IPRCs like Musanze, Ngoma and Karongi in the field of Tourism because those colleges have permanent personnel in hospitality. There are some TVET

IPRC	Contents of cooperation with other IPRCs and TVET organizations
	curriculums that are being reviewed at IPRC Gishari in partnership with other 8 IPRCs and IPRC Kitabi intends to maintain that partnership.

Source: Interviews with IPRCs

The past and present support from the development partners was found in 6 IPRCs while planned support was found in only 2 IPRCs, namely, IPRC Tumba and IPRC Ngoma. Also, regarding the present support, a perception gap was found between development partners and IPRCs. For instance, a development partner responded they provide the support to IPRCs, but these IPRCs did not recognize that development partner's support[11]. It will be stated in '4.4 TVET Cooperation by Other Development Partners', other development partners are going to support mainly RP and RTTI which supervise and train IPRCs, and direct training of IPRC's academic and administrative staff and infrastructure development are not included in their future plans except the above mentioned 2 IPRCs. The past and present support from development partners and their planned support for each IPRC is shown in Table 4-22.

Table 4-22 Development Partners' Support

IPRC	The past of present support from the development partner	Planned support from the development partner
Tumba	• JICA supported IPRC Tumba by the Project for Strengthening the Capacity of Tumba College of Technology (Phase 1 & 2) until 2018.	• By the project of AFD, the Mechatronics department is going to be established. In this Project, following activities will be conducted; building additional floors to the existing school blocks, procurement of equipment, development of curriculum and facilitating internship. It includes capacity building of RP for project management.
Kigali	• IPRC Kigali was supported by KOICA and China. Especially, KOICA developed infrastructure, provided equipment and sent Korean experts who provided training (2010 – 2017, USD 20 million). • IPRC Kigali received the support from Kuwait. Expansion and Development of the Integrated Polytechnic Regional Center Project by Kuwait Fund between 2010 and 2015. The project budget was KD 4,100,000. In this project, the learning center was constructed, and the equipment was supplied.	• None

[11] For instance, supports by SEAD of Netherland was not aware by IPRCs.

IPRC	The past of present support from the development partner	Planned support from the development partner
Ngoma	• TVET Partnership Project has been implemented by CSC (Chamber of Skilled Crafts) Koblenz financed by BMZ since 2014. It was supposed to end in 2017 but extended to 2020. Major contents are the following 3 activities; technology and know-how transfer through ToTs in Automotive Technology, donation of didactic equipment, and students exchange programs (further studies of IPRC Ngoma students in Germany). The budget for the project is unknown. This project does not include the activities on promotion of ICT utilization and innovation. • Pilot project on the fabrication of sanitary pads out of banana fiber was implemented by Sustainable Health Enterprises between 2012 and 2019. By skills transfer in fiber technology, piloting the fabrication of sanitary pads out of banana fiber and helping schoolgirls to get sanitary pads at the affordable price. The budget for the project is unknown. It also didn't include ICT related activities. • U. S. Embassy placed Peace Corps between 2016 and 2017 and English language lab was constructed (including the provision of ICT tools and books). This project also provided ICT tools such as computers. It operated very well, it highly supported students, teachers and the community neighboring IPRC Ngoma. Although it is very useful, its use isn't optimized because of the lack of a person in charge of it with skills in operation.	• Poultry Farming, Training and Innovation Center (PFTIC) will be established by the SEAD Project of the Government of Netherlands. This project will provide hands-on training in poultry farming (Level 3 of RTQF). The trainees will be equipped with hands-on skills in modern poultry and this will bridge the existing gap at the labor market. Making it as a foothold, IPRC Ngoma plans to start a department of animal production in the future.
Karongi	• Capacity Building of Staff has been conducted by Swiss Contact since 2014 till now. For instance, counseling and guidance, leadership management, and training of trainers (CBA and CBT) were conducted. When IPRC Karongi has needs in capacity development, IPRC Karongi submits a request to SWISS CONTACT and receives training from them if they approve the request.	• None
Musanze	• Extension of IPRC Musanze project is going on by the Chinese Government between 2020 and 2021. Project budget is USD 16,000,000 and new infrastructure is constructed, furniture and training equipment (laboratories, workshops are provided. In this project, computer labs and internet network are supported. The progress is 60% of the construction stage.	• None
Huye	• Programme d'appui à la formation Professionnelle au Rwanda (PAFP) was implemented by La coopération Belge (Belgium	• None

IPRC	The past of present support from the development partner	Planned support from the development partner
	Cooperation) between 2012 and 2015. This project supported capacity building of staff, implementation of outreach activities, provision of materials for Civil Engineering lab. Innovation projects to be presented in Expo were financed and IT staff were trained to do the appropriate teaching, however, the project didn't support to upgrade infrastructure.	
Gishari	• None	• None
Kitabi	• None	• None

Source: Interviews with IPRCs

4.4. TVET Cooperation by Other Development Partners

4.4.1. Outline

According to the Education Sector Strategic Plan (2018/19-2023/24)[12], TVET Development Partners (DPs) are working with the Government of Rwanda through TVET Subsector Working Group (SSWG). As of August 2020, the chair of SSWG is WDA and co-chairs are RP and the German Embassy representing development partners. According to the co-chair of DP, TVET SSWG meets quarterly, which tends to be every 4-5 months, and TVET DPs meet twice a year.

The list of TVET DPs shared by MINEDUC shows there are 13 programs/projects which end in 2020 and 3 pipeline programs/projects. Some ongoing projects modified or added components to respond to COVID-19.

The survey team made interviews to DPs from July to August and in October 2020 as shown below.

Table 4-23 DP Interview Schedule

No.	Date	DP	Contact Person
1	July 30	Chamber of Skilled Crafts (CSC) Koblenz	Mr. Matti Tomingas
2	July 31	KOICA TVET Technical Assistance Pool Fund (TAPF)	Ms. Maria Ramos
3	August 3	Swiss Development Cooperation (SDC)	Mr. Peter Lindenmann
4	August 5	"Strengthening Education for Agricultural Development (SEAD) Project"	Mr. Rob Van de Gavel Ms. Priscilla Natukunda
5	August 7	German Embassy	Ms. Inga Kluender-Preuss
6	August 7	USAID	Mr. David Rurangirwa
7	August 12	Sparkassenstifung fur international Kooperation e.V. Savings Banks Foundation for International Cooperation (SBFIC)	Ms. Wiebke Anna Wedekind
8	August 14	Education Development Center (EDC) "Akazi Kanoze/ Huguka Dukore Project" supported by USAID/Mastercard Foundation	Mr. Steve Kamanzi
9	August 20	GIZ "Digital Solutions for Sustainable Development (DSSD) Project"	Mr. Olaf Seidel

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No.	Date	DP	Contact Person
10	October 15	Expertise France "TVET Support Project in Rwanda"	Mr. David Farge

This section summarizes trends and issues of Rwanda TVET shared by the DPs, followed by the impact of COVID-19 and DPs' intervention.

4.4.2. Support to IPRCs

(1) Intervention targeting RP / RTTI / IPRC

The following table summarizes DPs' interventions targeting RP, RTTI, and IPRCs, but categorized in those which support the Advanced Diploma level education and those which support other areas.

Table 4-24 DPs' and Intervention targeting RP/RTTI/IPRCs

Province	RP/RTTI/IPRC	Support to IPRC Advanced Diploma	Other Support to IPRC
Kigali	RP	・ AFD ・ KOICA-TAPF ・ JICA	・ KfW (Level 1、 3-5) ・ USAID（training for TVET schools）
	RTTI	・ KOICA-TAPF(+GIZ)（IPRC trainers）	・ KOICA-TAPF(+GIZ) (TVET School trainers)
	IPRC Kigali (including ICT Department)	・ KOICA-TAPF (including ICT Department)	・ GIZ Eco-Emploi (Certificate of Competence Level 3-7)
Northern	IPRC Tumba (including ICT Department)	・ AFD（Mecatronics Department） ・ JICA（ICT, Electronic Communication、Renewable Energy Department）	-
	IRPC Musanze	・ China Embassy-Cooperation Wing (Jinhua Polytechnic、Zhejiang Province) ・ SEAD Project	・ GIZ Eco-Emploi (Certificate of Competence Level 3-7)
Eastern	IPRC Ngoma (including ICT Department)	・ SEAD Project	・ CSC Koblenz (TVET Certificate 1、2)、 ・ GIZ Refugee Project (Certificate of Competence) ・ GIZ Eco-Emploi (Certificate of Competence Level 3-7)
	IPRC Gishari	・ SEAD Project	・ BiWE (Short term course)
Southern	IPRC Huye (including ICT Department)	・ SEAD Project	・ GIZ Refugee Project (Short term course) ・ GIZ Eco-Emploi (Certificate of Competence Level 3-7)
	IPRC Kitabi	-	-

Province	RP/RTTI/IPRC	Support to IPRC Advanced Diploma	Other Support to IPRC
Western	IPRC Karongi (including ICT Department))	・ SEAD Project	・ SDC PROMOST （TVET Certificate 1） ・ GIZ Eco-Emploi (Certificate of Competence Level 3-7)

Source：DPs list of supports obtained from JICA Rwanda Office and MINEDUC
Note) APEFE supports 2 IPRCs but it is not known which IPRC they are. APEFE supports Certificate of Competence for module of level 3-5.

Following sections of (2) and (3) describe the ongoing cooperation for IPRC Advance Diploma Level by AFD and the Government of Netherlands based on the interview.

（2） AFD's Support to PRC Tumba

Agence Française de Développement (AFD) started TVET Support Project in Rwanda from May 2020 through Expertise France. Its outline is summarized in a table below.

Table 4-25 AFD's support to IPRC Tumba

Name	TVET Support Project in Rwanda
Period	2020 – 2024
Budget	RP：5.8 million Euro (from January 2021) Expertise France：1.7 million Euro Total: 7.5 million Euro
Background and Outline	The project will create Mechatronics Department at IPRC Tumba by building additional floors to the existing school blocks, procurement of equipment, development of curriculum and facilitating internship. It includes capacity building of RP for project management and setting up Smart Classrooms at 4 TVET schools in Rulindo District. The choice of Mechatronics is based on the request by the Government of Rwanda, who aims at establishing production lines by promoting foreign investments in the future.
Implementation Structure	Expertise France will support the project for the first 3 years. A project team is led by Mr. David Farge with 4 national staff. The short-term expert of Mechatronics will join from Europe (he is delayed by COVID-19). The counterpart of the project is RP, and a focal person was assigned in October 2020. Mr. Farge is stationed at RP. When a newly established Single Project Implementation Unit (SPIU) starts functioning, it will handle all the projects under RP including this project. SPIU is planned to employ 27 staff.
Activity	The project will run as an inception stage from June to December 2020. This phase will allow Rwanda Polytechnic, with the support of Expertise France, to: • Define accurately the results to be achieved during the project, and the corresponding indicators; • Design activities of each component, and corresponding means to be mobilized (budget, human resources); • Draft all project documents: document templates, communication tools, procedures manual, monitoring and evaluation plan, financial reporting tools, etc.; • Develop the new mechatronics curriculum; • Set up technical and steering committees. The implementation phase will start on January 1st 2020, to end in 2024. It will consist in 3 components:

	Component 1: Reinforcement of the training offer in IPRC Tumba and TVET around the IPRC: • Activity 1.1: Creation of a new teaching department dedicated to Mechatronics within IPRC Tumba • Activity 1.2: Creation of a language laboratory within IPRC Tumba • Activity 1.3: Strengthening the quality of vocational training provided in the 4 TVET schools and increasing the number of pupils • Activity 1.4: Development of short courses Component 2: Reinforcement and development of schemes to foster professional integration and entrepreneurship in the district • Activity 2.1: Support to TVET students to get internships • Activity 2.2: Support for facilitating entrepreneurship in the district, building on the existing IPRC Tumba Incubator – Business Incubation Center Component 3: Technical assistance to the project management and support to the various actors involved in the territorial scheme • Activity 3.1: Support for the implementation of components 1 and 2 (development of training programs, training of trainers, studies, etc.) • Activity 3.2: Support for the overall implementation of the project: long-term expertise will be positioned within Rwanda Polytechnic (RP) • Activity 3.3: Support for follow-up (specific follow-up on integration, particularly of women) and evaluation of the project • Activity 3.4: Communication

（3） The Netherlands' support to IPRCs in Agriculture Sector

The Government of Netherlands through Nuffic has been supporting IPRC Musanze, Ngoma, Gishari, Huye, and Karongi, together with universities as summarized in the table below.

Table 4-26 The Netherlands' Support to University and IPRC Agriculture Departments

Name	Strengthening Education for Agricultural Development (SEAD) Project
Period and Budget	SEAD (2015-21) :1 million euro per year, East, South, and North Province SEAD-West (2019-21) :2.5 million euro in West Province There is no plan to extend the project beyond 2021.
Background and Outline	Two projects aim to contribute to achieving sustainable food security in Rwanda. The projects are designed to support Rwandan universities and TVET institutions to improve their education and training programs, research and community services in agricultural production, value chain management (potato, dairy, horticulture, poultry, and agro-tourism) as well as land and water management.
Implementation Structure	The Netherlands Ministry of Foreign Affairs, through Nuffic (an NPO advancing internationalization of education) contracts a consortium of Mott MacDonald and Maastricht School of Management, and other players). SEAD West is a part of Nuffic Orange Knowledge Program (OKP). Rwandan CPs are RDB, University of Rwanda (UR), INES-Ruhengeri, RP (IPRC Kigali, IPRC Musanze, IPRC Gishari, IPRC Ngoma, IPRC Huye, IPRC Karongi).
Activity	1) Strengthening the capacity of partner institutions for **demand-led curriculum development/revision and delivery:** the curricula of agricultural diploma of irrigation and agricultural machine and that of bachelor were reviewed and modified to fit to competency-based education. 2) Strengthening **research and innovation capacities** of the partner institutions: it concentrates on applied research and it is expected to benefit

	the community and agricultural problem solution. The project introduced PPP sub-project to develop new products to benefit communities for each value chain. It is designed to build capacity of all the stakeholders. 3) Strengthening the **Community outreach & Extension services** of the partner institutions to respond to the needs of the agricultural community in specific values chains: The activity is designed for universities and TVET institutions to reach out to farmers, cooperatives and communities and strengthen the ties among them. Education should result in the extension service which gives solutions to the problems faced by the farmers, cooperatives and communities. The relevance of the curriculum and research are also proved by mixing with communities. 4) Cross-cutting issues: This is a support cutting across above three areas and it includes career guidance, social inclusiveness, management and leadership for middle management, and Entrepreneurship. 5) Support to operationalize RP Strategic Plan

(4) Comments and information regarding IPRC level education and Information regarding EAC reginal cooperation

Challenges and points for intervention regarding IPRC pointed out by other DPs are summarized in the table below.

Table 4-27 Challenges of IPRC

Challenges	Contents
① Status and Recognition	・ Many DPs mentioned the lower status of TVET in general, and an IPRC Advanced Diploma compared to a university bachelor's degree. It was urged that the government to accelerate the effort to establish a strategic demarcation between IPRC and university, so that both graduates shall have their own strengths and that they play different roles and complement each other in the industry. (This means that IPRC Advanced Diploma should not be looked down upon.)
② Research	・ As research was added to the policy areas of RP Strategic Plan (2019-24), the need for clarifying the difference between the research of IPRC and that of university was pointed out. One assumption is that the IPRC research is of applied research whereas University research is of basic research. ・ IPRC trainers graduate from the University of Rwanda (UR) and possess bachelor or master's degree. Most of them do not have any experience of research, not to mention that of applied research. ・ It is recommended that any DPs who intervene in the research of IPRC define what is research at IPRC.
③ Innovation and Entrepreneurship	・ IPRC students have brilliant ideas about innovation, but currently they are merely treated as a project to be implemented while they are at school. It is recommended that a very strong system needs to be established to promote these ideas and improve them up to commercialization, by systematically identifying the seed, giving technical assistance, encouraging them, financially support them up to commercialization. ・ Some IPRCs have Incubation Centers but they are isolated from the education alongside the curriculum. It is important to link them and clearly define the reason why the Incubation Center is required under

Challenges	Contents
	IPRC, together with the private sector. In order to define how to improve the utilization of the Center, it would be helpful to start from establishing a relationship with alumni. It is a shame to see that different attempts by IPRC tend to be ad hoc and they are not integrated into the whole education. ・ First of all, it needs to be defined what kind of innovation is expected, only after that, we can think about what kind of value can be added by IPRC in that innovation context. For example, if we can say that IPRC graduates have skills in mechatronics and a sensor, or hardware in general, which university graduates do not have, then that is their advantage and they can add value even if they mix with university graduates. Of course, that advantage has to be appealed and recognized by others. Currently the image is that one was not accepted by the university that is why he/she went to IPRC. It is better if we can distinguish this image and instill the positive image such as IPRC is a place for applying science and technology, while university is a place for studying the basics and research science and technology. The image here is not which one is better or higher, but it is just a demarcation or different major. ・ For many people, starting his/her own business is the second option, and a way of making a living up to when he/she finds an employment. It is not the first option and there is no role model. ・ It does not matter if one is a university graduate or not. What matters for successful business is to form a group of heterogeneous people, rather than a homogeneous group, who are from the same department of the same university. The heterogeneous group could have people graduated from different universities and IPRCs, a mixture of people who are good at ICT, accounting, marketing and sales. Innovation can start from such heterogenous gathering and would lead to a success. ・ If one is to develop an IPRC curricula of entrepreneurship, startup, and innovation, it will be ideal to put emphasis not only on IT related subjects but to include business subjects as well, and to provide a learning environment with diverse people.
④ Linkage between government and private sector	・ IPRCs are expected to deepen the relationship with industries and employment market. ・ It is expected that IRPCs shall strengthen the support to lower level TVET schools. Currently lower level TVET schools make visits to IPRCs, which could be conducted more often. ・ In general, TVET should strengthen the linkage with private sector, IPRCs are not the exception. ・ It is important to train a company in-house instructor for a meaningful internship. ・ With COVID-19, digitalization will become the next normal. For IPRC learning process, it has to be fully utilized, in a way that even during the internship period, communication can be maintained between the teachers and students.
⑤ Capacity of the Rwandan counterpart	・ (Good point) The commitment of the government is very firm, and they are responsive and trustworthy. They are easy to work with. ・ (Good point) Head teachers of 8 IPRCs are also members of the management team of RP, so they work close with each other. ・ The competency of RP and IPRC staff needs to be strengthened for realizing their vision.

Challenges	Contents
	・ Some government staff report that they completed their job, when they do not do it by themselves and rely on consultants and foreign experts to draft policy documents. This will not help them. ・ RP does not have adequate staff, compared to all the tasks it has to tackle. RP staff is hard working but even then, the workload goes beyond their capacity. Many DPs want to support RP, but they do not have an enough capacity to respond. It is overheard that RP requested 50 additional staff to the authority. ・ There is a lack of staff at RP and the same for its curriculum development section. Therefore, RP is obliged to rely on DPs and consultants for curriculum development, which does not leave any capacity in RP.

The following table summarizes points from other DPs' cooperation which could be a reference for future IPRC and EAC cooperation by JICA.

Table 4-28 Reference for IPRC Cooperation and EAC Cooperation

Category	Contents
(1) ICT Utilization	SBFIC: • E-learning platform of lectures was already completed and currently the project is working on the digitalization of company in-house training. German Embassy: • The German Government supports an e-learning platform, Atingi was established in the Smart Africa (an initiative led by ministries in charge of digital from 30 African countries), which will provide training materials for free. Through the platform, it is possible to conduct a localization of teaching materials and information exchange. The Rwanda Government is interested in Atingi, and discussion was held as to where to locate the training materials on the network so that the cost of host server and access be cheaper. GIZ DSSD: • The project is working on ICT utilization for education with Rwanda Education Board. Currently the development of a virtual laboratory for the secondary school is underway. • In addition, the Project modified Atingi (https://www.atingi.org/), a digital platform for the use in Rwanda, with the Ministry of ICT. This is a part of GIZ Global Project, AfricaCloud. It is discussed if IPRC can use this platform for their teaching. • One of the examples of Edutech start-up is Genius Panda, which was supported by JICA and 250 start-up, and then Mastercard. USAID: • The youth not in education nor in employment has no ICT skills. Such youth has no ICT skills, so their project give a basic and practical ICT literacy training, such as how to access to a job portal and apply for a job, how to send a job application by e-mail, and how to gather job information through social media.
(2) Innovation and entrepreneurship support	German Embassy: • As ICT/Innovation support, there are two startup projects. One is Digital Solutions for Sustainable Development (DSSD; "DigiCenter"). This works with the Ministry of ICT and RISA and supports business idea with ICT technically. When it takes a form of business, then another project, "Mega IT" will support to start it as a business.

Category	Contents
	SDC PROMOST： • 10 to 15 are selected from the participants as champions and they are provided with business development services to start their own businesses. It is expected that they shall grow and employ other people. • As for innovation support, the project deals with people who are based in the village set-up. So, the project supports them to produce goods which can be sold at local market within the purchasing power of villagers, which are US$30 for men and US$17 for women. One of such cases are environmentally friendly bricks, which are cheap, and demand is big, and affordable to villagers. EDC (Akazi Kanoze / Huguka Dukore Project) • The project developed a module for entrepreneurs: “Be your own boss” for those who want to start business. Most of the youth wanted to attend this module, so the project merged another module of soft skill, Work Ready Now!” and made it to a basic package of 136 hours (2 months) . The youth attend this package start their own business and even they get employed, they continue their business in parallel. So the project started financial access support (establishing savings and credit group introducing the group to financial institutions).
(3) In-house Training	SBFIC • The difference between the internship and the apprentice is not well understood. The latter is an arrangement of employing a future candidate of company staff as a temporary staff and train him/her, so remuneration must be paid. In this way, the accepting company considers the process as that of employing the future staff. • Sometimes there is a conflict between a university graduate apprentice and other staff who have already been working for some time. They suspect that the graduate may have better knowledge than the existing staff. It is because once one starts working for a microfinance institution, there are no training opportunities, and existing staff is starving for an opportunity to update the knowledge and skill. By receiving an apprentice, MFIs will have an advantage to receive a set of most updated microfinance training materials, which can be utilized by in-house trainers and other staff for updating. • For MFIs to receive an apprentice, it is not only in-house trainers but also their personnel manager plays a very important role. The personnel manager is in charge of managing the whole training and make close communication with the apprentice so that he/she should not be head hunt by other MFIs. • To guarantee the quality of Dual Apprentice System training, a stakeholder’s team was formed with AMIR and SBFIC, and the team conducts a supervision visits to the target MFIs and make sure an apprentice is rotated among different sections, no conflict is occurred between the in-house trainer and the apprentice. Conflict management by AMIR and the trainer MFI is also an important element of the training system. For the Dual Apprentice System to function, strong ownership and commitment by AMIR and MFIs themselves are required, which we cannot expect the government institutions to substitute. If this is other industry, they may expect PSF to play the similar role, but for microfinance, it should be played by AMIR, which is consisted by MFIs.

Category	Contents
	EDC (Akazi Kanoze / Huguka Dukore Project) • The project developed a quasi-internship program called "School to Work Transition". This is meant for those who completed "Work Ready Now!". By attending this program, the participants, through job shadowing and OJT, will establish ties with employer and workplace colleagues which are designed to result in employment. The difference from other internship is that this program emphasizes on establishing human relationship and strongly aim for employment, while ordinally internship just send students to companies to spend two months. • The project also conducts a training for company in-house trainers, who can train and coach the youth when they are accepted under the program. The in-house trainer should have a capacity to assess the level of youth received and to instruct them according to their level. German Embassy • Rwanda has a fewer number of companies, and they tend not to see the benefit of receiving TVET trainees. The companies are worried about the cases of trainees breaking the equipment and ending consumables. Thus, it is difficult for TVET to look for a company which can accept the trainees. As a way of solution to this situation, one of the TVET schools made an arrangement with a garage and plumbing company to operate from their campus for rent free and giving access to their equipment, and in turn the company takes charge in practical training.
(4) Public Private Partnership	SEAD • SEAD has a budget of 2.5 million euro which can be used for investment. The project established a Service Training and Innovation Center (STIC) for each of the five value chains supported, and each STIC is asked to develop agricultural products useful for the communities using 0.5 million euro. This STIC project is designed to be managed by the private sector based on the agreement and they jointly work on the business plan which needs approval[13]. Currently the proposals for all the value chains were approved and the procurement of necessary equipment is underway. Actual activities will be started around the end of this year.
(5) Sustainability of TVET	Dual Apprenticeship support by SBFIC • The project seriously aims for the realization of financial sustainability. • The apprentice is paid 100,000 Rwandan francs, which is one third of the average salary and specified by RDB regulation. Usually RDB covers the half for maximum 6 months as a subsidy. SBFIC negotiated with RDB to extend their coverage up to 12 months during the project period, signing MOU. This aims at the penetration of the Dual Apprentice System in the microfinance sector and paving a way for sustainability after the project. • The classroom training is conducted at the Rwanda Institute for Cooperatives, Entrepreneurship and Microfinance (RICEM) Training

13 STIC is expected to work on the development of products based on the formal TVET curriculum and which shall solve community problems. It is expected that the involvement of private sector shall result in making it a profit-making business. The extension service of TVET institution will disseminate the product to the community. The management agreement for each value chain is signed by following stakeholders - Horticulture: IPRC Huye/Gift Rwanda; Dairy: UR-CAVM(College of Agriculture Animal Sciences and Veterinary Medicine/IPRC Musanze/ Alpha Milk Company Ltd; Potato: UR/CAVM/IPRC Musanze/ Horizon-Sopyrwa/Holland Greentech Rwanda; Poultry: IPRC Ngoma/IPRC Gishari/ ABUSOL; Agro-Tourism: IPRC Karongi/ Holland Greentech Rwanda (information source: "Brief on the SEAD Project and Major Activities presented at SMM meeting" by SEAD project).

Category	Contents
	Academy. Currently SBFIC bears the cost for trainers, classroom, lunch for participants. From now on this budget will be cut by digitalizing the classroom lectures. In addition, the lectures will be divided into modules so that even small-scale MFIs can afford to purchase training by module. These strategies will transform the Academy training portion self-sustainable by 2022. Akazi Kanoze / Huguka Dukore Project • As the number of trainers grew bigger, it became difficult for the project to train all the youth in a direct hands-on manner. So the Project introduced a peer to peer support, named "Youth Leadership Program". This is a program where 2 leaders are selected from 20 participants attended the basic package, and they work as a nucleus to enable peer to peer support. This is conducted based on the Personal Development Plan (PDP) submitted by individual youth. • The project has "GROW" program, which train graduates of Akazi Kanoze and Akazi Kanoze 2 projects for 9 months with lectures, coaching and OJT). The participants will be trained for the subjects such as business management and financial management. GROW participants are also expected to employ Huguka Dukore beneficiaries. • Each district was told to form a forum called Youth Development Alliance where all the stakeholders such as companies, chiefs, TVET institutions, NGOs became members. The project selects the target youth through the forum and works on the training design so that it fits to their Personal Development Plan. The project makes sure that the training contents are aligned to District Development Plan by sharing it at the forum. The Alliance will remain even after the project ends. • Akazi Kanoze 2 project trained WDA staff as Master Trainers, but some of them were transferred out after the restructuring. Based on this experience, the project supports an NGO called Akazi Kanoze Access, which was formed by former Akazi Kanoze Youth Livelihood Project, to conduct TOTs using Akazi Kanoze curricula and programs and give quality assurance to them. In this way the project tries to realize sustainability.
(6) EAC Cooperation	Switzerland Embassy • In order to advance what they work on through PROMOST (a support to TVET Certificate 1 in Rwanda, Burundi, and D.R.C.), the Government of Switzerland intends to advance TVET harmonization in EAC region. They agreed with EAC Secretariat to support meeting budget for TVET Technical Committee and hiring a consultant, with USD150, 000 per year for 3 years. They indicated an interest to work with JICA, for any possible cooperation through EAC Secretariat. CSC Koblenz • Their project supports TVET Certificate 1 and 2 levels and currently in Rwanda only. In their next phase, target countries will be extended to Uganda, and either of Kenya or Burundi, to make it 3 countries. Their cooperation does not go through EAC Secretariat, although the idea was shared with EAC Secretariat and it will be aligned to the direction of EAC TVET plan. They indicated an interest to work with JICA in this regard. Expert France • In the course of their development of new curricula for mechatronics department at IPRC, they happened to hear about the similar curricula were developed in Kenya three months ago. The feeling is that it would

Category	Contents
	be ideal if such information can be shared in a systematic manner in the EAC region. Currently they are considering working with African Continental Qualification Framework Capacity Development Project (ACQF; EU-AU cooperation) and EASTRIP.

4.4.3. Issues, Trends and COVID-19 Response of TVET Sector

In this section, other information and comments obtained from DPs, such as issues and trends of overall TVET, the impact of COVID-19 and the DPs' response to it, and EAC labor movement information are summarized.

(1) Trends and Issues of Rwanda TVET

The trends and issues of overall TVET pointed out are summarized in the table below.

Table 4-29 Trends and Issues of Overall TVET

Category	Contents
① Overall Trend	・ More DPs are entering TVET sector and it is getting congested. ・ The major areas of support are a dual vocational training system and a competency-based training.
② TVET Policy	・ The Government of Rwanda aims that 60% of the secondary school graduates be absorbed by TVET by 2024, the gap of skills required by large, medium, small and micro enterprises be filled by TVET. This seems to be quite ambitious, seeing that currently the absorption rate is 30%.
③ Budget and Finance	・ Rwanda is a land-locked country and thus, disadvantaged for industrial development and it is not easy to invite investment for education sector. ・ Lack of funding is an overall issue. Salary for trainers is paid but budget for internship and school consumables are not covered. ・ Many TVET schools do not have enough equipment, although government schools are a bit better than private ones. ・ TVET is expensive for those who want to start a school from private sector, because it requires facility buildings, equipment, and consumables. As a result, most of them are owned by the government. School fee for private TVET schools are also expensive and most of the parents cannot afford it. ・ TVET service provision relies on government budget and private TVET schools are not fostered. ・ TVET tax has not been realized. TVET tax has been discussed for a long time, but every time it was concluded that companies cannot be overburdened with additional tax. ・ At the beginning of this year, there was a proposal to establish a fund pooled by both students and private companies. This may take a long time, and with COVID-19, it may take even longer to materialize. ・ It is not realistic for DPs to support all TVET schools, so it would be better for DPs to choose one or two schools for each industry sector as a center of excellence and support them.

Category	Contents
④ Recognition and Social Status of TVET	・ The status of TVET is low. People prefer themselves and their children to study at university. There is a survey which indicates that: only 60% of companies are satisfied with TVET graduates, and that 50% and less of TVET graduates is not satisfied with skills development at TVET institutions[14]. But the strength of TVET is a practical training, while university education only covers theories. ・ TVET costs more for practical training, and in terms of degree, it ends at Advanced Diploma. Parents believe that having bachelor's degree will lead to a better job and it is a last option for them to send their child to TVET. ・ Only 60% of university graduates get jobs. PROMOST would like to prove that there is a better chance to get a job if one goes to TVET. ・ It is an issue that the image of TVET (its quality, its attractiveness to and benefits for companies) is low. Capacity building for TVET service providers (curricula development, quality assurance, financial sustainability, and management improvement) and awareness raising activity for companies are necessary.
⑤ Effectiveness of TVET and PPP	・ The curricula should be modified to respond to the demand of labor market. ・ The pedagogy still relies on teaching theories at classroom. Trainers joined teaching right after graduating from university and they do not have working experience nor any practical experience at private sector. ・ The skills of TVET trainers need to be strengthened. Firstly, TOT should be supported and then supporting the skill's transfer from trainers to students.

(2) DPs' Pipeline Projects

As of August 2020, the pipeline projects by DPs are as follows:

- The German Embassy considers a support to RP for topping up the salaries of some staff for SPIU through KfW.
- The World Bank is about to start a grant program of TVET. The concept paper was circulated among DPs for comments.
- EU will start TVET cooperation for Tourism and Hospitality Industry. It is similar to the project implemented by Mastercard Foundation and GIZ, but EU will target higher end Tourism.

(3) Impact of COVID-19

Impact on overall TVET

As of August 2020, the following impact was pointed out:

- At the beginning of the COVID crisis, private TVET schools lost their income and could not pay salaries to trainers.
- Everything has ceased. Schools remain closed but companies are operating, so the project is

[14] National Skills Development and Employment Promotion Strategy 2019-2024

concentrating on the activities with companies. There is a rumor that the reopening of the school would be delayed to September.

- The Government is trying to increase school blocks, toilets, handwashing facilities and trainers to maintain the social distance. But this will take time. It is not clear if it will be done by September.
- Usually schools start in September. This year, even if they restart in September, it is said that they will first presume the school year which was ceased in March, and then, from December they will start the new school year.
- The government is very carefully but with strong leadership, coping with COVID-19, trying to balance avoiding infection and promoting economic activity.
- The demand for e-learning is increasing. But 90% of the students do not have access to internet and laptops. It is difficult to reach students under the circumstances.
- The positive change is that people realized an importance of ICT. But many households do not have computers, so primary and secondary school students study using a radio and TV. If they have smartphones, they can use YouTube, but such households are limited. Some DPs develop video contents for TVET, but it may be difficult to disseminate them through ICT. It is realistic to broadcast them through TV and YouTube. Although YouTube can reach a limited number of learners, due to the internet accessibility, and it requires distributing portable devices. In case of TVET practical learning, without necessary tools at home, it is difficult to be taught.

Impact on the DPs' Projects

The impact on the DPs' projects mentioned as of August 2020 is as below:

- PROMOST : The project advances Dual Education System, so it plans to send students for learning practical subjects at companies while schools are closed. It was originally planned to start from June, but with COVID there has been a delay and currently it is planned to start in August. The project is carefully assessing the situation because with the COVID-19, stay home order from 9 pm hit the economy and companies so that they lost their work.
- PROMOST : It is easy to say be flexible to e-learning under the situation, but some places do not have a very good internet environment, and students of public schools do not have computers. The practice of masonry and carpentry is difficult to be taught by distance learning. They still need to be taught hands-on at companies.
- KOICA : Schools are closed and teachers now have time. This is a good environment for implementing TOT.
- SEAD : The project is shifting to e-learning. The impact is not big enough yet to review the bottlenecks.
- Akazi Kanoze/ Huguka Dukore Project : The target youth of the project could not run their business due to the lockdown from COVID. As a result, they are forced to use their savings to

support their lives, which they amassed from their business for business expansion. The target number of youths to be trained by the project is 40,000, and currently it trained about 35,000. The remaining 5,000 need to be trained by 2021, before the project ends.

- GIZ DSSD：There is not much impact. Their digital technical assistance can be provided online. The users used to come to the DigiCenter, but now they switched to work at home online. AR and VR lab were transformed for remote use. They install the necessary software on their device and log in from home.

（4） COVID-19 Response

As of August 2020, COVID-19 response supports of DPs are as follows:

- CSC Koblenz: Making of teaching materials, such as movie and video which were supported. But video is not enough to teach the practical details. With COVID-19, a need for digitalization has increased, so it will be considered if the project can collaboration with the German Digitalization Center.
- KOICA: It was found that participants of the Senior TVET Trainer Certificate Program had more knowledge of e-leaning than expected, so they embarked on e-learning contents development for TVET 3-4-5 years, with the request of the Government. This is a part of the practical training of curriculum development module and ICT module of the program. The developers are not only the Senior TVET Trainers who attend the current course but the graduates who are in the better IT environment are also mobilized. The development work is in progress in a manner that TVET-TAPF trainer directly trains 21 Senior TVET Trainers, who them train 100 graduates scattered all over Rwanda.
- German Embassy：Digitalization of education as a response to COVID is being discussed with RP and MINEDUC, which include smart classroom, e-learning, remote lab, equipment for e-learning, and investment for stable internet provision. Support for e-learning teaching materials is also experiencing a big demand. Existing e-learning materials treats equipment which are not used in Rwanda, so trainers want to customize the materials to fit the Rwandan situation.
- Akazi Kanoze/ Huguka Dukore Project: The activity of lectures and training at companies has ceased. So, the project developed 14 episodes both in English and Rwandan language for audio lessons using the methodology of Interactive Module Instruction which was developed by EDC for Latin America. These can be broadcast through internet to mobile phones (not smart phones) using a technology called bit hub. The lessons will be broadcast through radio as well.

（5） Labor Movement in EAC Region

Some DPs shared the view on labor movement among EAC countries as follows:

- Free labor movement within EAC Region is theoretically guaranteed, but in reality, it is not yet

totally free. This is due to the fact that the mutual recognition of qualifications has not been realized yet, and for example, there is a case of Uganda, where the political confrontation ended in sending back Rwandans who were working there.

- Kenyans are working as managers in Rwanda tourism industry, and this is thanks to their English ability. Many DRC nationals run garage and barber shops in Rwanda. TVET in DRC from late 1960s to early 1980s was better than that of Rwanda and Rwandans used to go there to study and Congolese came to Rwanda to start their business. Once the education level in Burundi was better than Rwanda, and Rwandans also used to study there.
- It seems that the opportunity for Rwandans working in other EAC countries is not that big, compared to that for Kenyans and Ugandans, due to the education level. On the other hand, Kenyans and Ugandans come to Rwanda to work in tourism and construction industries.
- Rwandan Diplomas are not deemed higher than English ability in terms of job access.

4.5. Global and Regional Trend of TVET

4.5.1. TVET Policy

（1） TVET and SDGs

As shown in the table below, TVET contributes to Goal 4 and 8 of SDGs.

Table 4-30 SDGs and TVET

Goal 4	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
Targets related to TVET	
4.3	By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university
4.4	By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship 【Indicator 4.4.1: Proportion of youth/adults with information and communications technology (ICT) skills by type of skill】
4.5	By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations.
4.7	By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development.
4.b	By 2020, substantially expand globally the number of scholarships available to developing countries, in particular least developed countries, small island developing States and African countries, for enrolment in higher education, including vocational training and information

	and communications technology, technical, engineering and scientific programmes, in developed countries and other developing countries
Goal 8	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
Targets related to TVET	
8.5	By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value
8.6	By 2020, substantially reduce the proportion of youth not in employment, education or training

Source : https://www.un.org/sustainabledevelopment/

TVET in SDGs are led by UNESCO and ILO. In the Recommendation of UNESCO in 2015, TVET is defined broadly to include education and training and skills, lifeline learning and TVET, TVET policy and planning, TVET institution management, the linkage with private sector, investment, and quality assurance, entrepreneurship.[15]

Table 4-31 UNESCO Recommendation Regarding TVET (2015)

Recommendation concerning technical and vocational education and training (TVET)

- At the General Conference of the United Nations Educational, Scientific and Cultural Organization (UNESCO), meeting in Paris from 3 to18 November 2015, at its 38th session
- It is important for the overall reform of TVET to be based on the political evidence and experiences, and to consider all the issues found in developing countries, and to include lifelong learning. In order to realize the reform, policy formulation, participation of private sector and stakeholders, and necessary investment should be achieved. And it is important that the quality and relevance to be achieved.
- TVET is understood as comprising education, training and skills development relating to a wide range of occupational fields, production, services and livelihoods. In addition, green skill, problem solving, and critical thinking abilities, entrepreneurship, and competency are embraced. TVET is implementable at all levels of secondary, post-secondary, and higher education. In addition, work-based learning, continuous training, and professional vocational ability development are also included. The output of such study and learning is certificates and licenses which will stabilize employment and income. In addition, learning to learn and the development of literacy and numeracy skills, transversal skills and citizenship skills are integral components of TVET.

Source: http://portal.unesco.org/en/ev.php-URL_ID=49355&URL_DO=DO_TOPIC&URL_SECTION=201.html

ILO is the only “tripartite” United Nations agency in that it brings together representatives of governments, employers and workers to jointly shape policies and programs. ILO is devoted to advancing opportunities for women and men to obtain decent and productive work in conditions of freedom, equity, security and human dignity. Its main aims are to encourage decent employment opportunities, enhance social protection, strengthen dialogue in handling work-related issues, and to promote rights at work. ILO mainly focuses on SDG Goal 8.

[15] https://www.mext.go.jp/unesco/009/1387293.htm

（2） TVET Strategy for Africa

African Union (AU) emphasizes the employment of youth, considering the reality of a big population of youth[16]. "AU Vision 2063 and Agenda 2063（2013-2063）" declares the skills reform of education and promotes science and technology research and innovation. "AU Continental TVET Strategy to foster Youth Employment（2018）" works as a guide to indicate how TVET ecosystem should be built at national, regional, continent level. On the other hand, "Plan of Action for the African Decade for Technical, Professional, Entrepreneurial Training and Youth Employment (2019-2028)" has the following focus areas (FAs).

Table 4-32 TVET Focus Areas of AU

FA1:	Strengthening Labor Market Information, Skills Forecasting/Anticipation System, Quality of Employment Services, and Career Guidance
FA2:	Improving Quality and Relevance of TVET in Africa for an Ever-Changing World of Work
FA3:	Enhancing Equitable Access of TVET for All
FA4:	Promoting Digital, Blue and Green Skills in African TVET Systems
FA5:	Fostering Innovation and Entrepreneurship in Africa
FA6:	Strengthening Governance, Leadership and Management Capacities at All Levels
FA7:	Image Building, Advocacy and Social Mobilization for TVET
FA8:	Ensuring Sustainable TVET Financing Mechanisms
FA9:	Monitoring and Evaluation System for TVET

Source: AU (2019) "Plan of Action for the African Decade for Technical, Professional, Entrepreneurial Training and Youth Employment (2019-2028)"

4.5.2. Global Trend of TVET

The following sections summarize the global trend of TVET in the area of promoting ICT utilization and innovation. As for advancing innovation, UNESCO set up TVET portal for information sharing and discussion. The World Bank formulated a strategy for digital work and skill[17].

（1） UNESCO

UNESCO focuses on the following three areas in order for member states to disseminate quality TVET based on the UNESCO TVET Strategy (2016-2021): (i) Necessary advice for policy formulation for skills development (including a support to developing countries to review their TVET policy), (ii) clarifying the concept of skills development and improving monitoring, and (iii) act as an information center and information provision for worldwide TVET discussion.

UNESCO established UNESCO International Project on Technical and Vocational Education (UNEVOC) in Bonn as an international TVET platform. UNEVOC has been establishing its centers in over 165 countries, and through virtual network such as UNEVOC Network Portal and UNEVOC

[16] AU (2019) Continental Strategy for Technical and Vocational Educational and Training (TVET) to Foster Youth Employment. October 22, 2018. AU's Youth Empowerment Initiatives include: African Youth Charter (2006), African Youth Decade (2009-2018) Plan of Action, The Malabo Declaration and Decision of Youth Empowerment (2011), Year of the Youth (2017) under the theme "Harnessing the Demographic Dividend through investment in Youth"

[17] World Bank (2019) The Future of Work in Africa; Harnessing the Potential of Digital Technologies for All

TVeT-Forum it provides a precious network where members can share experiences and discuss important TVET agenda across the border.

Promoting Innovation: iHUB Initiative[18]

UNESCO-UNEVOC is implementing Skills for Innovation Hubs (i-hub) Initiative with the Beijing Caofeidian International Vocational Education City (BCSC). The Initiative is a part of the broader project of "Developing TVET institutions for entrepreneurship, innovation and sustainability", and have a contribution from the German Federal Ministry of Education and Research (BMBF) and the Federal Ministry for Economic Cooperation and Development (BMZ). The project period is for 18 months from October 2018 to March 2020, and consisted of planning and preparation phases, innovation framework implementation phase, and review phase.

The Project has the overall goal to ensure that TVET Institutions remain relevant as drivers of employability, economic growth and inclusive social development, while being in step with the fast-paced changes happening in economy and society. These include, in particular, the combined effects of climate change, digitalization and new emerging forms of entrepreneurship.

i-hubs Initiative is working with 10 TVET institutions in Africa, Asia, and Europe to develop and try innovation framework. The purpose is to assess institutions' innovation capacity, to identify strengths, challenges and opportunities for partnerships with relevant actors, as well as to share and learn about innovation across the broad community of TVET.

The defining characteristic of an i-hub is its capacity to:

- Lead, embed, act and communicate sustainable institution-wide culture and capacity for innovation;
- Engage strategically and actively with key stakeholders and assets from its skills and innovation ecosystem addressing the needs and opportunities for the institution to contribute to innovation;
- Empower teachers and trainers to develop and deliver innovative training and learning products and processes;
- Apply innovative ideas and products in the institution and in the skills and innovation ecosystem;
- Draw on state of the art approaches to skills needs and innovation from an international network of i-hubs.

The advantage of the i-hub Initiative is that it assumes TVET as not only providing skills but it embraces business, community, and schools as innovation promoters. This will change the attitude of traditional TVET institutions and will help creating TVET ecosystem. 10 pilot institutions[19] are

[18] https://unevoc.unesco.org/i-hubs/

19 **KENYA** Rift Valley Technical Training Institute (RVTTI), **SEYCHELLES** Seychelles Institute of Technology (SIT), **NIGERIA** Yaba College of Technology (YCT), **CHINA** Shenzhen Polytechnic (SZPT) 深圳职业技术学院,

expected to work for innovation, in particular in the fields of entrepreneurship, digitalization and/or greening

ICT Utilization

One of the Thematic Areas of UNEVOC is TVET in a Digital World, and it published reports and guidelines related to the area as discussed below.

Table 4-33 UNEVOC's Publication Regarding ICT Utilization in TVET

Publish Year	Title
2018	ICT Competency Framework for Teachers' Harnessing Open Educational Resources (OER)
2019	UNESCO-UNEVOC virtual conference: Artificial Intelligence in education and training
2019	Digital skills and competence, and digital and online learning
2019	The changing nature of work and skills in the digital age
2019	Artificial intelligence in education: challenges and opportunities for sustainable development
2019	I'd blush if I could: Closing gender divides in digital skills through education
2018	UNESCO ICT Competency Framework for Teachers (ICT-CFT)
2018	Digital credentialing: Implications for the recognition of learning across borders
2018	Skills for a connected world: Report of the UNESCO Mobile Learning Week 2018, 26-30 March 2018
2018	Building tomorrow's digital skills: What conclusions can we draw from international comparative indicators?
2018	OER in TVET – Handbook: Open Educational Resources for skills development
2017	Beyond Access: ICT-enhanced Innovative Pedagogy in TVET in the Asia-Pacific
2017	Using ICTs and Blended Learning in Transforming TVET

Source：https://unevoc.unesco.org/home/ICT+in+TVET

Support to Africa

UNESCO-UNEVOC implements "Better Education for Africa's Rise (BEAR) Project" with a contribution from Korea Government. BEAR Phase 1 was implemented in Southern Africa from 2011 to 2016. After the success of Phase 1, Phase 2 is being implemented from 2017 to 2021 in Eastern Africa in Ethiopia, Kenya, Uganda, Tanzania, and Madagascar.

PHILIPPINES Technical Education and Skills Development Authority (TESDA), **SRI LANKA** University of Vocational Technology (UNIVOTEC), **FINLAND** Omnia - The Joint Authority of Education in the Espoo Region, **MALTA** Malta College of Arts, Science and Technology (MCAST), **SPAIN** TKNIKA – Basque Country, **GERMANY** BKAL - Berufskolleg an der Lindenstraße

(2) The World Bank

The World Bank supported the formulation of AU's "Digital Transformation Strategy for Africa". The Strategy include Digital Skills and Human Capacity, and Digital Innovation and Entrepreneurship as a part of foundation pillars. (See Figure 4-4). It aims at education 300 million people by 2025 by strengthening comprehensive digital skill and human capacity, and by providing security and privacy as basic knowledge, and e-skill development program. It plans to strengthen digital skill by establishing a platform of African Alliance for Digital Skills and Jobs, and by involving public private and academics, and multi-stakeholders.

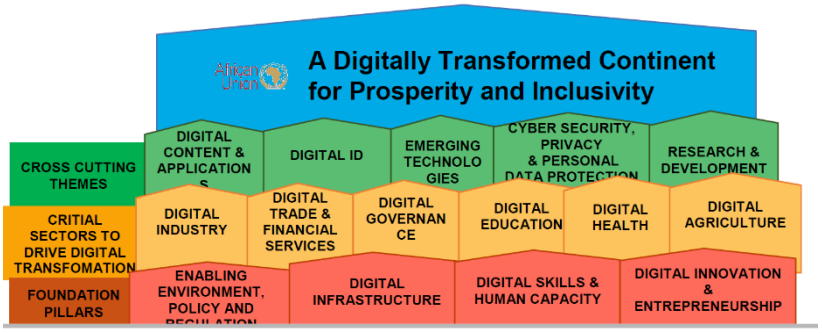


Figure 4-4 Pathways to Transformation

Source：AU (2020) Digital Transformation Strategy for Africa

The World Bank is advancing The Digital Economy for Africa Initiative (DE4A), aiming to ensure that every individual, business, and government in Africa will be digitally enabled by 2030. It provides Digital Economy Diagnostics Tool, which can be used to provide a snapshot of the state of the digital economy in a given country for each of the five pillars of the DE4A initiative (digital infrastructure, digital public platforms, digital financial services, digital businesses, and digital skills). The result of diagnostics will help map the strengths and weaknesses of a country's digital economy and identifies challenges and opportunities for future growth. DE4A supports summarizing the results into Country Diagnostics Report in 12 countries. The diagnostics include digital skills and for human resource development, DE4A set objectives of (i) all the students who are 15 years and above shall obtain basic digital skill, and (ii) every year 100,000 shall graduate advanced digital skill program. "Partnership for skills in Applied Sciences, Engineering and Technology (PASET)[20]" supports drafting Digital Skills County Action Plan of African countries, and Rwanda is one of them.

(3) COVID-19 Response

ILO conducted worldwide online survey regarding the impact of COVID-19, and summarized the results in the reports of "Online survey for TVET providers, policy-makers and social partners on

[20] The main activities are capacity building of universities and research and TVET institutions of applied science and technology area which started after 2013, and ICT is included in the area. The target is Ethiopia, Kenya, Rwanda, Senegal, and Cote D'ivoire. Technical support for Digital Skills Country Action Plan will be provided to 16 countries and the first of them are Rwanda and Mozambique. In May 2019, 21 countries attended the PASET Forum and they were assisted for drafting the Action Plan in a day.

addressing the COVID-19 pandemic" and "Policy Brief: Distance and Online Learning during the time of COVID -19" (both published in May 2020).

Chapter 5. TVET Program of East African Community Secretariat

According to the purpose of this survey, information was collected related to the possibility of TVET cooperation from Rwanda to extend to EAC countries, EAC Center of Excellence program, and other DPs program through internet and interview to TVET Section of EAC Secretariat.

5.1. Institutional Set-Up

The organizational chart of EAC is as shown below. The highest authority is a summit constituted of heads of state of partner countries, which decides overall direction of EAC, and the current chair is Rwanda president. The Council is consisted of ministers in charge of EAC such as Minister of Foreign Affairs, and it is held twice a year as a central decision-making organ. Its current chair is Rwanda Minister of Foreign Affairs and International Cooperation. Under the Council is Coordination Committee, which is constituted by principal secretaries of ministries in charge of EAC. The Committee coordinates cooperation in the region and activities of sectoral committees and it is held twice a year and may have extraordinary meetings.

There is the Sectoral Council on Education, Science and Technology, Culture and Sports（SCESTCS）under the Coordination Committee, which is an organ of policy formulation and decision making for education sector. SCESTCS is also in charge of program formulation and implementation monitoring of the programs so it is held at necessary frequencies. As for TVET subsector, currently there is Technical Committee (TECHCOM) on the Harmonization of Technical and Vocational Education and Training (TVET) and its roles are coordination of (i) TVET curriculum, structure, policy and framework, (ii) TVET certification framework and setting competencies for each level, (iii) TVET institutions and governance structure, (iv) TVET quality assurance system, (v) TVET trainer and instructor development program, (vi) definition of research and development capacity of TVET institution, (vii) TVET harmonization and the development of sustainable financing model, (viii) cooperation modality for industrial training, (ix) establishment of TVET information system for information exchange and experience sharing in the region, (x) development of the modality of TVET program for the disabled, (xi) Promotion of PPP, and (xii) development of student teacher exchange program. The members of TECHCOM are: (i) ministry in charge of education and TVET, (ii) ministry in charge of EAC, (iii) TVET curriculum authority, (iv) Authority of TVET quality assurance and examination, (v) TVET Center of Excellence, (vi) representatives from industry and private sector, (vii) The Inter-University Council for East Africa (IUCEA), and (viii) TVET experts.

The Secretariat supports the activities of above organs, and the Department of Education, Culture, Sports, Science and Technology under the Director of Social Sector is responsible for TVET (as shown by an arrow in the below figure, and its roles are resource mobilization, activity coordination, and

mobility support across partner states. Dr. James Otieno Jowi, Principal Education Officer, and his staff are in charge of education sector including TVET, and soon one more staff will join with an contribution by Swiss Government for TVET harmonization. Although the number of officials seem to be small, they are very motivated, and it is deemed as satisfactory level to play a coordination role within the current EAC budget[21]. It is however, desired that to actively support the implementation of each TVET program, focal persons shall be assigned in each partner states who can closely communicate with the Secretariat.

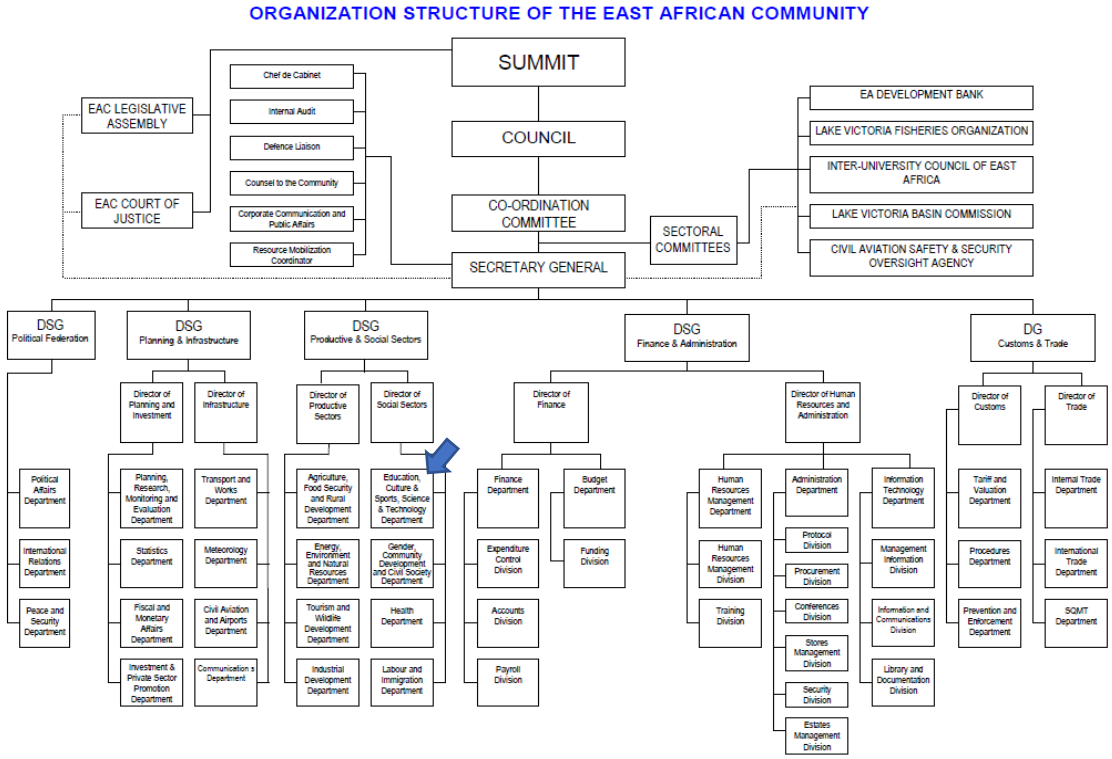


Figure 5-1 EAC Organizational Chart

Source：Dr. James Otieno Jowi (2020) "Developments in TVET in the EAC" a presentation material a Nairobi, Kenya on 12th March 2020

5.2. Budget

The budget of EAC Development Strategy (2016/17-2020/21) amounts to USD 985 million for five years, which translates to USD197 million per year on average. On the other hand, EAC budget of the past three years were: USD 110 million for FY2017/18, USD99 million for FY2018/19, and USD111 million for FY2019/20, which is approximately a half of what the estimated budget in the Strategy.

The revenue of EAC is an equal contribution by partner states and the support by DPs each constitutes 50%. The commitment of the former has not been increased and the remittance from South Sudan and

21 Interview to Mr. Peter Lindenmann of Swiss Embassy on 3 August 2020 and Dr. Jowi of EAC on 13 October.

Burundi tend to be delayed.[22] The remittance rate against the commitment of the partner states dropped from 94% of FY2013/14 to 59% of FY2018/19.

Budget formulation theme for FY2019/20 was "Transforming lives through Industrialization and Job Creation for shared prosperity". Priority interventions are: (i) Single Customs Territory and promotion of intra and extra EAC trade and export competitiveness, (ii) development of regional infrastructure, (iii) effective implementation of the Common Market Protocol, (iv) enhancement of regional industrial development, (v) implementation of the roadmap towards the EAC Monetary Union, (vi) institutional transformation focusing on implementation of the institutional review recommendations and improvement of performance management at the EAC Organs and institutions, (v) Promotion of peace, security and good governance, and (vi) the constitution making process for the EAC Political Confederation.

The breakdown of the total expenditure of USD 111 million is: the Secretariat USD53 million (out of which TVET is USD350,000), EAC Legislative Assembly USD19 million, EAC Court of Justice USD4 million, and the remaining budget is allocated to EAC organizations such as Lake Victoria Basin Commission USD13 million, IUCEA USD9 million. The revenue breakdown is: Partner State contributions through the Ministries of EAC Affairs USD 50 million; Ministries responsible for Education USD4 million; Ministries responsible for Fisheries USD2 million; Development Partners USD 54 million; Member Universities USD 0.5 million; the miscellaneous revenue USD0.3 million; and the General Reserve USD 0.4 million.

The Secretariat has been running on zero increase budget for the past few years and all the TVET budget is for recurrent budget. It has to rely on DPs for development budget. Currently there is one regional project run by the World Bank, which is East Africa Skills for Transformation and Regional Integration Project (EASTRIP), although it targets Kenya, Tanzania, and Ethiopia (non-EAC partner country). Swiss Government agreed to support the Secretariat in 2020 for TVET harmonization and they agreed to support costs of TECHCOM, coordination and one official for three years with USD150,000 per year.[23]

This year most of the planned regional meetings had to be cancelled due to COVID-19, although a part of them were switched to online, but the remaining ones were cancelled. The unused EAC budget

22 "EAC partner states face suit over defaults" - The East African dated 21 September 2019, interview to German Embassy in Tanzania on 7 August 2020. An interview to Dr. Jowi on 13 October 2020 proved that the contribution amount is equal for all the partner states regardless of their economic status and there is a case of two years delay in observing the commitment.

23 Interview to Mr. Peter Lindenmann of Swiss Embassy on 3 August 2020. They saw the importance of TVET harmonization for youth graduating TVET to move freely to other partner countries for better employment condition. SDC supports Rwanda and Burundi which are smaller countries and job opportunities are limited, so the need for supporting TVET harmonization was felt.

from this cancellation will be sent to the reserve and not to be passed over to the next fiscal year, according to the regulation.

5.3. TVET Program

The five-year budget for education sector in EAC Development Strategy (2016/17-2020/21) is divided as follows: (i) education system and curriculum harmonization USD1.25 million, (ii) Center of Excellence (CoE) program USD0.35 million, e-learning education reform USD0.5 million, (iii) essay contest for secondary and higher education USD0.76 million, (iv) coordination of Mutual Recognition Agreements for qualifications in EAC common market n Agreements USD0.25 million, (vi) enhancement of cooperation with regional and international institutions USD0.06 million. Out of these, (i), (ii), and (v) are related to TVET subsector.

The outline of the past three meetings are summarized in the table below.

Table 5-1 Outline of the Recent EAC TVET Meetings

The 1st EAC TVET Technical Committee	
Date	10-11 May 2017
Participants	・ Ministry in charge of TVET from partner states ・ Representatives of private sector ・ Swiss Agency for Development and Cooperation（SDC）, GIZ Rwanda and GIZ DRC ・ EAC Secretariat
Objectives	・ To operationalize TECHCOM towards TVET sector harmonization
Agenda	（1） Outline and progress of education system and curriculum harmonization in each partner state （2） Operation procedure of TECHCOM （3） TORs of TECHCOM （4） Comments for Draft TVET Harmonization Strategy
EAC AU TVET DIALOGUE FORUM	
Date	28-30 August 2019
Participants	・ Ministry in charge of EAC and TVET, representatives from EAC TVET Center of Excellence, TVET Quality Assurance and Examination Authority from partner states (chaired by Rwandan Ministry of Foreign Affairs) ・ TVET Experts ・ Representatives of Private Sector ・ SDC, JICA, UNESCO, African Development Bank (AfDB) ・ IUCEA ・ Representatives from AU ・ EAC Secretariat
Objectives	・ To discuss how the EAC could strengthen and harness its TVET potential for the socio-economic development of Community ・ To consider the progress in harmonizing the EAC TVET sector, pending actions to be taken by the EAC TVET TECHCOM in operationalizing the EAC TVET harmonization strategy
Agenda	（1） Sharing the progress of TVET harmonization （2） Presentation of AU TVET Continental Strategy

	(3) Progress reporting by partner states24 (4) Regional Curriculum Framework and Examination/Assessment Standards for TVET (5) Inputs for Teacher Development for a Regional (Harmonized) TVET Sector (6) Inputs for the Role of TVET in Employment Creation, Entrepreneurship and Industry Link (7) TVET Centers of Excellence: Operationalization of Roles and Mandates ➢ Introduction of Rift Valley Technical Training Institute (RVTTI) of Kenya ➢ Introduction of Uganda Technical College ➢ Introduction of World Bank EASTRIP (Capacity building of CoEs, EAC TVET harmonization process led by IUCEA, strengthening EAC TVET Harmonization process based on EASTRIP experience) ➢ Discussion on the role and authority of CoE program ・ EAC Secretariat should play more roles in supporting and coordination of CoE program. ・ The Secretariat should facilitate high level trainings in the specific area ・ The Secretariat should play a central role in harmonization process ・ TVET reform and outputs to be presented at African regional fora ・ Establishing a cooperation between TVET institutions and international partners ・ Selection of new CoEs (8) Sharing progress of Quality Assurance and Qualifications Framework for TVET of partner states and recommendations (9) Presentation of IUCEA (10) Presentation of cooperation of UNESCO, SDC, JICA, and AfDB (11) Recommendations: ➢ The Secretariat shall ・ support the establishment of regional TVET coordination institution ・ review the TORs of TECHCOM ・ finalize TVET Harmonization Strategy with partner states ・ integrate ICT into the implementation of TVET Harmonization Strategy ・ set up regional TVET stakeholders forum ・ coordinate DP support so that there should not be any duplication but they complement each other ➢ IUCEA shall support the Secretariat with regard to TVET system harmonization
Regional TVET Authorities Meeting (EASTRIP meeting)	
Date	11-13 March 2020
Participants	・ EASTRIP Secretariat: IUCEA ・ EASTRIP management team ・ Ministries in charge of TVET and target TVET institutions from EASTRIP target countries of Kenya, Tanzania, and Ethiopia ・ TVET experts

24 Reporting by Rwanda: formulation of TVET Policy, Rwanda TVET Qualifications Framework (RTQF), and Rwanda Education Qualifications Framework (REQF), establishment of WDA and Rwanda Polytechnic Higher Learning Institution, and implementation of Competency based Training and assessment.

	・ EAC Secretariat
Objectives	・ Presentation of TVET harmonization progress in EASTRIP target countries ・ Presentation of EAC TVET program ・ Discussion on actions towards TVET harmonization (Details will be confirmed)

Source：EAC Secretariat (2017) "1st meeting on the Technical Committee on the Harmonization of TVET in the EAC: Report of the Meeting"; EAC Secretariat (2019) "EAC-AU TVET Dialogue Forum: Report of the Meeting", and https://www.eastrip.iucea.org/publications-resources/?wpdmc=regional-tvet-authorities-meeting-11th-to-13th-march-2020-nairobi-kenya

5.4. TVET Harmonization Strategy

The EAC Draft TVET Systems Harmonization Strategy was drafted in 2013 and it has not been finalized yet. The Strategy was drafted with reference to the Regional Report on the Harmonization of the East African Education Systems and Training Curricula: PRHESTC (only its school-based TVET part) and it covers areas of (i) definition of TVET in partner states, (ii) current status of TVET in partner states, (iii) issues of TVET to be tackled in the Strategy, (iv) contents of the Strategy, (v) TVET action plan and its roadmap, (v) TVET Results Framework (as shown in the table below).

Currently harmonization strategy of other subsectors of education sector was finalized and they are on working on the mutual recognition. The remaining subsector to finalize the harmonization strategy is TVET. The schedule for finalization is that in November 2020, partner states will update and comment the Draft Strategy and in February 2021, the TECHCOM will be called for validation of the final draft, which shall be followed by the endorsement by Sectoral Council on Education, Science and Technology, Culture and Sports.

Table 5-2 TVET Results Framework

Hierarchy of Strategies	Expected Results	MoV	Assumptions+
Vision A Competitive Regional Technical and Vocational Education and Training for Sustainable	Improved Performance of TVET outputs in the labor market.	TVET Graduates Performance Reports	Commitment of EAC Partner States. Availability of Resources.
Mission: To provide quality Technical and Vocational Education and Training responsive to the social, political and economic needs of the Citizens of the EAC partner	Increased access to quality and equitable TVET	Annual TVET Performance Reports	
Strategy outcomes:			
1.0 Review the definitions of TVET among Partner States based on UNESCO recommendations and ILO.	Reviewed and agreed TVET definition for use in the region	TVET documents and reports	Commitment of Partner States. Availability of Resources.
2.0 Establish a regional Technical Vocational Education and Training qualifications	An established regional TVET qualification framework	The Qualifications Framework document.	Commitment of Partner States Availability of
3.0 Harmonize TVET Instructor, Tutor, Lecturer and Teacher training among Partner States.	Harmonized TVET instructors, tutor, lecturer and teacher training framework	Training Report document.	Commitment of Partner States Availability of Resources
4.0 Establish National TVET Regulatory Bodies	National TVET Regulatory Bodies Established.	Regulatory Establishments Documents	Commitment of Partner States Availability of

Hierarchy of Strategies	Expected Results	MoV	Assumptions+
			Resources.
5.0 Establish a TVET intergovernmental body to handle TVET issues in the region.	Established Intergovernmental Body	Regional TVET Regulatory Body Documents.	Commitment of Partner States. Availability of Resources.
6.0 Upgrade the TVET sub sectors to directorate status in the EAC Partner States.	Upgraded TVET sub sector to Directorate.	National TVET structure Documents.	Commitment of Partner States Availability of Resources.
7.0 Provide training in Knowledge, Skills and Pedagogy for TVET Managers, Instructors and Trainers	Trained TVET Managers, Instructors and Trainers in Knowledge, Skills and Pedagogy	Training reports	Commitment of Partner States Availability of resources.
8.0 Create and strengthen linkages between TVET Institutions, Industries and other Enterprises.	Improved relevance of TVET graduates to Industries and other Enterprises.	Reports on linkages between Institutions, Industries, and other enterprises.	Commitment of Partner States Availability of Resources.
9.0 Strengthen recruitment and retention of TVET teachers/trainers	Increased recruitment and improved retention of TVET teachers/trainers. Recruited	Recruitment and retention reports	Commitment of Partner States Availability of Resources.
10.0 Address crosscutting issues in TVET including HIV and AIDS, special needs, gender, environment, nomadic People and other marginalized groups.	TVET Education System and Curricula inclusive of HIV and AIDS, special needs, gender, environment, nomadic People and other marginalized groups issues.	Curricula documents.	Commitment of Partner States Availability of Resources.
11.0 Build and Strengthen Public Private Partnership in TVET to promote access, quality and equity.	Increased Public, Private Partnership Investments in TVET.	TVET Private Public Partnership Investment Reports. Partnership Reports.	Commitment of Partner States. Availability of Resources.
12.0 Harmonize TVET Curriculum Development including examination, assessment and certification	Harmonized TVET Curriculum Development.	Harmonized TVET Curriculum Documents	Commitment of Partner States Availability of Resources.
13.0 Harmonize and Strengthen Policies guiding the financing of TVET	Increased financial resource base for TVET	TVET financing reports	Commitment of Partner States and the relevant Ministries, Departments and Agencies.

Source: EAC (2013) The EAC Draft Technical and Vocational Education and Training Systems Harmonization Strategy

EAC confirmed to cooperate with the World Bank EASTRIP (2018-2024) for standardization and harmonization of TVET qualification. EASTRIP has three components of improving access and quality of TVET, capacity building of 16 Regional Flagship TVET Institutes (RFTIs, similar to CoE) and regional integration in their target countries of Kenya, Tanzania, and Ethiopia. It is managed by IUCEA, one of the EAC organizations. EASTRIP participated in EAC-AU TVET Dialogue Forum in August 2019 and presented their project outline. And EAC was invited to EASTRIP Regional TVET Authorities meeting held in March 2020, where EAC presented EAC TVET Harmonization Strategy.

Currently EAC holds discussion with educational foundation based in Brussel regarding mutual recognition of education qualifications.

5.5. TVET Center of Excellence Program

Center of Excellence (CoE) program is managed by EAC Secretariat and ministry of education in partner states. The present CoEs were selected from 2017 to 2019, and it was planned that the funds for maintaining CoE be mobilized from 2017 to 2020, and annual audit for quality assurance was planned from 2017 to 2021.

During the previous EAC Development Strategy (2011-2016), 19 education institutions were selected as CoEs. TVET COEs are IPRC Tumba of Rwanda, Rift Valley Technical Training Institute of Kenya, National Institute of Public Health in Burundi. Their status of CoE was given not to the whole institution but to the department of specific areas, in case of IPRC Tumba, CoE is assigned to ICT Department.

When the TVET institution is assigned as CoE from EAC, they became responsible for maintaining CoE status, and necessary resource mobilization and carrying out such activities. The Secretariat also supports resource mobilization, but its main role is to support mobilities across boarder of students, teachers, trainers, goods and capital for the improvement of infrastructure. As mentioned earlier, EAC budget is only adequate to cover its recurrent transactions and development budget has to be mobilized from DPs. Therefore, the maintenance and strengthening of CoE status also rely on partner states and DPs.

The CoE program is planned to be activated as it is deemed as a necessary enabler in the education sector to achieve the targets of EAC Vision 2050. It was confirmed that the selection of new TVET CoEs will not be stopped, since CoEs for important industry sector for EAC such as tourism, mining, oil and gas have not been selected. However, for the time being EAC may prioritize the activities of present CoEs[25]. There were three CoE meetings planed in the EAC Calendar from January to June 2020, but they were not held due to the ban of cross border movement after COVID-19.

Because of COVID-19, schools were closed in partner states and each state advanced e-learning. As EAC it is also high time to work on e-learning strategy[26]. In terms of ICT area, Nelson Mandela University in Tanzania is implementing Digital Acceleration Project supported by the German Government. The project gives ICT training to university graduates who stay without jobs. The participants can choose online and offline participation, and currently most of them chose online.

25 According to the interview with Dr. Jowi, EAC Principal Education Officer on 13 October 2020

26 （According to the same interview as above） there is a Draft EAC Strategy for Integrating ICT to Teaching and Learning in Education Sector, which exists for at least three years but it is not operational up to date.

5.6. Expectation for IPRC Tumba as CoE

EAC official shared his view of expectation for DP's support to strengthen IPRC Tumba as CoE as follows:

- ICT technology transfer for IPRC Tumba to aim high as ICT CoE. It could be in the form of short and long-term expert dispatchment and PPP.
- Exchange of trainers between IPRC Tumba and TVET institutions in DP state (eg. Japan)
- Assistance for IPRC to receive students and teachers from partner states. There could be summer courses or short courses, not limited to a whole year course. A short course can be organized at the timing of visit by a short-term expert. The Secretariat can support the mobility of students and teachers. With the COVID-19, a new possibility of running a course online has emerged.
- Support for networking: one is a network of ICT TVET institutions and IPRC Tumba to act as a hub, and another network is that of CoEs of different areas and IPRC Tumba is expected to participate actively.
- Assistance for the internationalization of IPRC Tumba
- Assistance for cross border internship implementation
- Assistance for assigning EAC TVET focal points at IPRC Tumba and Rwandan Ministry of Education. The focal person can be performed by the existing officials.

5.7. Labor Movement in EAC

Regarding the labor movement, EAC official confirmed as follows[27]:

- Application fee for work permit is exempted in other partner states.
- Those who are self-employed can operate in any partner states.
- Students and teachers can move freely within EAC.
- Work permit should be applied through an employer.
- Professionals are also allowed to work in any partner states. However, in reality, it is difficult for them to work in other partner states when the qualifications are not harmonized.

Workers are guaranteed to have an equal right as the nationals of that EAC partner state such as employment conditions, environment, social security, and collective negotiation rights[28].

[27] According to International Migration Organization (2018) Comparative Study on the Free Movement of Workers in Select EAC Countries: Burundi, Kenya, Rwanda, and the United Republic of Tanzania, EAC partner states agreed on the treaty which ensures free movement of people including labors, but laws and regulations of each partner state has not yet been amended accordingly.

[28] https://www.eac.int/working-in-east-africa

Chapter 6. Past Cooperation by JICA

6.1. Secondary Technical School Construction Plan

The construction of the secondary school was carried out as a grant based on the basic design study done in 1988. The technical cooperation project described in the next section was carried out later on for Tumba College of Technology.

At that time, the Rwandan government was attempting to modernize agriculture as well as develop the industrial sector, and in 1987, it formulated the fourth five-year plan, which focused on the development of small and medium-sized enterprises. For the development of the industrial sector, it is necessary to train professional and mid-level engineers. In Rwanda, the training was carried out in secondary technical schools. There were only three secondary technical schools, Kichukiro, Kanombe in Kigali, and Sabe in Butare, and the number of graduates was only 6% of the total secondary school graduates. Due to the lack of facilities, no girls were accepted. In addition, the main fields of study were civil engineering and construction, electricity and machinery, and woodworking, but no education in the fields of electronics and machinery maintenance, which were in increasing demand. Against this background, the Rwandan government planned to establish a co-educational secondary school consisting of an electronics and mechanics course and requested the Japanese government for grant aid to implement the plan. Based on the Rwandan plan to establish one school in each province, Tumba in Byumba (now Rurindo) District was selected as the construction site.

The basic design and the educational curriculum were developed by this design study. These are outlined below.

（1） Departments and enrollment capacity

6 courses in 2 departments: Electronics (Electronic Device Course, Telecommunications Course, and Computer Course) and Machine Maintenance (Automobile Maintenance Course, Machine Tool Maintenance Course, and Industrial Machinery Maintenance Course). Each course has a maximum of 10 students per year, and the duration of both departments is 6 years (A2 level: Professional Certificate of Secondary Education), with a total of 360 students. 120 of whom are boarding students and 240 are commuting students. There are 56 faculty members (including 40 instructors).

（2） Curriculum

The curriculum was designed to provide basic education in the first four years of schooling by means of specialized common subjects, and then, in the following two years, students are divided into specialized courses for the purpose of training practical engineers. In the fifth and sixth grades, two groups of four to five students in each course are expected to work on the practical skills from the viewpoint of effective use of the equipment and educational effects.

（3） Construction site

It is located on a hilltop in the suburb of Tumba, 65 km north of Kigali. The area of the site is approximately 42,000 square meters.

（4） Facility

Administration Building, Electronics Classroom and Training Building, Machine Maintenance Classroom and Training Building, Common Training Building, Cafeteria and Auditorium, Boarding House, Residences for Invited Professors and Principals, Guard Station, etc.

（5） Equipment

Equipment for electronics course, equipment for mechanics course, equipment for specialized subjects common to both courses, audio-visual equipment for lectures

（6） Project cost

Total 1.667 billion yen (Japan's portion, 1.646 billion yen; Rwanda's portion, 0.021 billion yen) (estimate)

（7） Project duration

After the signing of the E/N between the two governments, it will be carried out in three phases, scheduled to last 38 months.

The recommendations are; 1) development of educational curricula, lecture materials, and practical training programs, preparation of mock exercises, 2) recruitment and training of instructors, 3) securing a budget for maintenance and operation, and 4) active use of facilities and equipment. In addition, since this is the first time for the electronics and mechanics departments to be established in Rwanda, and there are no experienced Rwandan instructors, the Rwandan side requested the appointment of a Japanese principal and technical instructors. In view of this, it was recommended that technical cooperation is necessary to increase the effectiveness of the grant aid.

6.2. Project for Strengthening the Capacity of Tumba College of Technology Phase-1

In the National Development Plan (Vision 2020) announced in 2000, Rwanda has been working on the development of human resources, mainly in the field of science and technology, with the aim of creating a knowledge-based economy. Due to the serious shortage of mid-career and practical engineers, the Education Sector Strategic Plan (2006-2010) placed emphasis on strengthening science and technical education, as well as expanding basic education from 8 years to 9 years.

As a part of this initiative, the government of Rwanda has decided to establish technical colleges for higher technical education (A1 level: diploma level), and opened the Tumba College of Technology (TCT) in 2007, using the facilities built in the secondary technical school construction project mentioned in 6.1. Based on the government's policy priorities, TCT has established three departments: Information Technology, Communication Technology and Alternative Energy. This technical cooperation project was implemented to address issues such as overall development planning, curriculum development, staff development, the establishment of a sustainable school management system and employment support system [国際協力機構, 2007].

The project consisted of the first stage with long-term experts from July 2007 to September 2008 and the second stage with a team of short-term experts from September 2008 to July 2012, for a total of five years. A summary of the cooperation is as follows.

Table 6-1 Summary of the Project for Strengthening the Capacity of Tumba College of Technology Phase 1

Purpose/Output	Achievement
Overall goal	
Human resource development in science, technology and innovation in Rwanda is promoted through the capacity development of TCT.	Regarding indicator 1, "Number of graduates TCT produces each year reaches at least 300 by 2015," the number of graduates will reach 300 or more by the end of 2013, as TCT has been accepting more than 300 students since the 6th batch (enrolled in November 2011). Indicator 2, "More than 80% of graduates are employed, running a business or continuing study in a relevant field by 2017," was not achieved, as 63.3% of the seventh graduates (graduated in September 2014) and 48.5% of the eighth graduates (graduated in September 2015) were surveyed in the 2017 Graduate Tracer Survey conducted in Phase 2. Indicator 3, "At least 85% of employers who have employed TCT graduates for more than six months evaluate their practical abilities as satisfactory." was achieved with 95% of employers who are satisfied with the skills and 98% of the overall satisfaction in the 2017 Employer Satisfaction Survey.
Project Purpose	
TCT becomes an effective A1 level institution that provides practical technical education and training relevant to industrial and social needs.	The project purpose has virtually been achieved. Regarding indicator 1 “More than 75% of graduates are employed, entrepreneurs, or continue study in the relevant field within 12 months of graduation.”, The percentage of graduates employed, having started a business or continuing study was 77.5%. (Tracer Survey 2012) Regarding indicator 2 “TCT staff can prepare, conduct, and evaluate courses by themselves.”, TCT staff are preparing and conducting the three courses without a major problem, but the capability of evaluation is unknown. Regarding indicator 3 “TCT Graduates are satisfied with working in related fields.”, the Tracer Survey 2012 shows that 73.5% of TCT graduates are satisfied with their experience at TCT. Indicator 4, "Employers are satisfied with TCT graduates," was also high in the 2011 Employer Satisfaction Survey, with 97.4% of employers who employed TCT graduates, which is higher than the result of 71.6% in a similar survey of other TVET institutions conducted by WDA. However, the sustainability

Purpose/Output	Achievement
	of the project is unclear because 63% of the graduates are employed in the education sector, the number of graduates working in the industrial sector is limited, and there is a high dependence on JICA experts for some activities.
Output	
1）The basic management system of TCT is established.	Completely achieved in the 1st stage.
2）A course management cycle is established.	The framework for departmental management, curriculum, syllabus development, and equipment necessary for departmental management was developed, and a practical management system was established. A total of 586 students for 6 batches were enrolled during the project period, and a total of 586 graduates for 4 batches were produced.
3）Technical, pedagogical and managerial skills of TCT staff (teaching and administrative staff) are improved.	The technical, teaching and administrative skills of the teaching staff have been improved through technical transfer by experts and training in Rwanda and abroad. However, there was still a need to strengthen the capacity of the administrative staff, create an appropriate school management system, and establish an appropriate staff evaluation and improvement system.
4）The managerial capacity including employment promotion and income generation activities of TCT is enhanced.	Achieved. Collaboration with industry, income generation activities, the establishment of a comprehensive employment support system, and public relations have been strengthened. TCT's second five-year mid-term strategic plan for 2012-2017 was formulated and a memorandum of understanding was signed with Kigali University of Science and Technology, Ministry of Infrastructure, Electronic Engineering Polytechnic Institute of Surabaya, Indonesia, and others. In collaboration with industry, industrial attachment program for students was implemented every year, entrepreneurship guidelines were prepared, and graduate tracer surveys were conducted twice. As for the industrial attachment program and the tracer survey, WDA showed interest in spreading them to other TVET institutions as a good model. The TCT website was set up to raise its recognition and contribute to support employment and entrepreneurship. As for income generation activities, the ICT Center was established in Kigali, where short-term training courses were conducted, and six consultancy projects were awarded to the Ministry of Infrastructure, which resulted in a stable income.

Source：Survey Team based on [国際協力機構, 2012] [国際協力機構, 2012] [Japan International Cooperation Agency, 2018]

Recommendations for the school management system, departmental management, and industrial collaboration were made. The details of each are shown in Table 6-2.

Table 6-2 Recommendations in Project for the Strengthening the Capacity of Tumba College of Technology Phase-1

Category	Recommendations
School management system	Early assignment of vice-principals, increased awareness of the A1 qualification, increased publicity, efforts to reduce turnover, and building an appropriate equipment maintenance system
Department management	Effective use and sharing of lesson plans, research and development

Category	Recommendations
Collaboration with industry	Establishment of a section in charge of industrial collaboration, the continuous implementation of various surveys, and establishment of a project unit

Source: Survey Team based on [国際協力機構, 2012]

In addition, although the capacity of teachers was strengthened, the location of TCT and low salaries led to a high turnover rate among teachers. Therefore, it was recommended that the government of Rwanda improve the turnover rate by paving the access road between TCT and the main road and increasing salaries through income-generating activities at TCT after the project was completed.

The input in the second stage is as follows;

- Japanese side

  Expert：227.28MM（Japanese expert: 128.33MM）

  Local consultant：USD84,100

  Equipment and material：JPY255million

  Local cost：JPY4.767million

  Training in Japan and third countries：Total 67 people

- Rwandan side

  Counterpart：72

  Local cost：RWF2.2billion（Approx. JPY296million）

  Infrastructure improvement：RWF1.5billion（Counterpart fund from the non-project grant aid）（Approx. JPY204.7million）

6.3. Project for Strengthening the Capacity of Tumba College of Technology Phase 2

This project was implemented for five and a half years from February 2013 to August 2018, following the Phase 1, with the aim of creating a mechanism for reinforcing TCT through strengthening teachers' capacity and school management. An overview of the cooperation is as follows.

Table 6-3 Summary of the Project for Strengthening the Capacity of Tumba College of Technology Phase 2

Purpose/Output	Achievement
Overall goal	
TCT’s good practices are applied to other TVET institutions in Rwanda.	Expected to be achieved. Other TVET institutions are facing similar challenges as TCT and it is expected that the good practices of TCT will be used to solve them. It was also committed at the August 2018 JCC that TCT will work with the Ministry of Education and Rwanda Polytechnic to disseminate its good practices to other TVET institutions and local communities.

Purpose/Output	Achievement
Project purpose	
TCT becomes a model institution that provides the Government of Rwanda with effective approaches for improving TVET sector.	Almost all the indicators except Indicator 3 were achieved. Regarding Indicator 1, "IPRC Tumba's good practices are implemented independently by IPRC Tumba as its regular activities", several good practices such as industrial attachment program and tracer survey were implemented as regular activities. Regarding indicator 2, "IPRC Tumba's good practices are shared with a national body for dissemination", the good practices were compiled as documents and shared with national institutions such as WDA and Rwanda Polytechnic. Indicator 3, "Employment rate after two years of graduation: more than 75%", has not been achieved, with 63.3% of 7th-batch students (graduated in September 2014) and 48.5% of 8th-batch students (graduated in September 2015) in the 2017 graduate tracer survey. Indicator 4, "Employer's satisfaction rate of IPRC Tumba graduates over one year of employment: more than 85%" was achieved with an overall satisfaction rating of 98.1% in the Employers Satisfaction Survey conducted in March 2017.
Output	
1) Continuous capacity development system is established in TCT for the provision of practical technical education.	Almost achieved. Research, Development and Production Unit (RDPU) was established, management guidelines were developed, and 91% of academic staff conducted more than 60 RDPU activities in accordance with the guidelines. The teachers' technical skills were improved through this activity. In addition, the marketing strategy of RDPU was developed and marketing activities were conducted based on the strategy, and some of the products have reached a market-accepted level of quality and functionality.
2) Improvement mechanism of school management is established in TCT	Partially achieved. The PDCA cycle was implemented as planned, and the School Management Effectiveness Survey (once a year), the Graduate Tracer Survey (once a year), and the Employers Satisfaction Survey (once every three years) were carried out as planned. Software and manuals for the Asset Management System have been developed and introduced, and the staff in charge has made effective use of them. On the other hand, although the Incubation and Career Support Center was established and started its operation, the launch of a new business was not realized during the project period. According to the 2012-2017 School Management Effectiveness Survey, the level of satisfaction of the TCT staff members with the school management was about 80%, which did not reach the target of 85%. Furthermore, the TCT's strategic plan was not formulated because the strategy of its higher-level body, Rwanda Polytechnic, was not developed.
3) TCT shares its good practices with other TVET institutions	Achieved. A total of 13 good practices were documented and shared with Rwanda Polytechnic and also shared with other TVET institutions at 8 events.

Source：Survey team base on [国際協力機構, 2018], [国際協力機構, 2017]

Recommendations for TCT to ensure sustainability from the project include 1) Strengthening RDPU activities, 2) continuous utilization and improvement of developed software, 3) continuation of community outreach activities, 4) school management according to the PDCA cycle, 5) conducting various surveys, 6) enhancement of Incubation & Career Support Center, 7) early utilization of Musanze Satellite Center, 8) dissemination of the good practices in collaboration with the Ministry of

Education and RP, and the recommendations for RP include 1) promotion of dissemination of the good practices, 2) formulation of a strategic plan of RP, and 3) adequate budgetary support for TCT.

In addition, the following lessons learned were addressed: 1) to respond to the situation where good practices could not be shared because the timing of the transition to the Rwanda Polytechnic was not fixed, the sharing of good practices was extended to other TVET institutions, 2) to incorporate activities across outputs to achieve synergy3) The approach to enhance technical skills through the RDPU, rather than the traditional training, was thoroughly discussed with counterparts, and understanding of this approach was gained by building a trusting relationship.

The input is as follows;

- Japanese side

  Expert：185.69MM（Japanese expert: 171.69MM）

  Local consultant：USD71,700

  Equipment and materials：JPY6.07million

  Local cost: JPY148million

  Training in Japan and third country: in total 196 people (6 in Japan, 7 in third countries, 2 studied in Japan at graduate school)

  Training in Rwanda: 181 people

- Rwandan side

  Counterpart: 77

  Facility: project office, accommodation for experts

6.4. Follow-up Cooperation for the Project for Strengthening the Capacity of Tumba College of Technology Phase 2

This cooperation is a follow up of the Project for Strengthening the Capacity of Tumba College of Technology Phase 2. It is scheduled to run from April 2019 to January 2021 by a local consultant hired by the JICA Rwanda Office. The objectives of this cooperation are to 1) strengthen the production and incubation capacities in IPRC Tumba and 2) explore possible support by JICA for the dissemination of the good practices accumulated in IPRC Tumba to other IPRCs and TVET institutions in EAC member countries. The activities and progress of this cooperation are shown in Table 6-4.

Table 6-4 Outline of the Follow-up Cooperation for the Project for Strengthening the Capacity of Tumba College of Technology Phase 2

Activity	Progress
1. Revisions of RDPU Operations Manual for wider dissemination	An updated manual has been adopted by Rwanda Polytechnic for use by IPRCs other than Tumba. Finalization and validation were not completed as of the end of June 2020.
2. Regional benchmarking for improved R&D and incubation activities	Selected members of IPRC Tumba and Rwanda Polytechnic were supposed to visit TVET institutions in other EAC countries that have been successful in R&D and incubation activities, but it was cancelled due to the escalating impact of COVID-19. As of the end of June 2020, it is expected to be replaced by other activities.
3. Innovation Challenge	It is a short-term incubation program organized and implemented by IPRC Tumba. Proposals are called from students for innovation proposals that contribute to solving development problems, and the selected students are provided with goods, software training, mentorship and other necessary services. Events, multimedia software training (Admi), and so on have been held. After the students return in September 2020, JICA will review the proposals scrutinized by IPRC Tumba and the timing will be adjusted for implementation.

Source： [Japan International Cooperation Agency, 2019] and interview to JICA Rwanda Office (23 June 2020)

6.5. Current Status of IPRC Tumba

In terms of the sustainability of each of the activities resulting from the Project of Strengthening the Capacity of Tumba College of Technology Phase 2, out of the 12 main activities, 9 are continued (one of which is continued on a simplified form). Each situation is described in table 65. Some of the activities were shifted to the RP level; however, some activities were no longer continued after the project support was withdrawn, and it is advisable to review whether the activities are unnecessary for the school, or whether the school wants to implement them but cannot continue them due to budget and staffing capacity, and to follow up as necessary.

Table 6-5 State of Continuity of the Achievements of the Project for Strengthening the Capacity of Tumba College of Technology Phase 2

Activity	Status	Detail
1. Industrial Attachment Program（IAP）	○	Implemented in 2019, but no unified report has been created after the IAP; an IAP implementation plan for 2020 has been developed.
2. Graduate Tracer Survey	○	The survey was conducted in 2019 and a report summarizing the results has been prepared; a plan for 2020 has not yet been prepared.
3. Employers Satisfaction Survey	×	The last one was conducted in 2017. It was decided that the RP would conduct a unified employer satisfaction survey for all IPRCs, as it would bother companies to have separate inquiries from different IPRCs.
4. Asset & Consumable Management System	○	It is still being used in conjunction with the government's asset management system. But not all assets and consumable items are coded. The reason is that the codes were not durable enough to last long enough. There are plans of engraving of codes and the use of ICT technology (QR codes and bar codes) that can be tracked. There are no

Activity	Status	Detail
		customers with an Asset & Consumable Management System in place.
5. PDCA cycle for school management	△	Quarterly review meetings have not been held since 2018 due to budget constraints. However, a Planning Officer visits each department to monitor the progress and reports at the bi-weekly management meetings. The results of the meetings are reflected in the school management plan. Specifically, the progress of the activities planned for the month is checked and the problems and solutions are evaluated and reflected in the school management plan.
6. School Management Effectiveness Survey	×	It has not been implemented since the end of JICA's support and there are no plans to implement it in the future.
7. Incubation and Career Support Center	○	Activities are ongoing. Forty-three projects were proposed by the students and teachers during the year 2019-2020. There are currently 10 projects supported by the Incubation Center. The entrepreneurs, including the winners of the Youth Competition Challenge, are receiving technical advice from IPRC Musanze and mentors. Many of the projects are at the prototype stage, but one project (an ICT-based educational platform) is in production and on sale.
8. Alumni association	○	Activities are ongoing. An alumni member attended the 2019 open class as a lecturer and also provided technical advice on campus-visits. The Alumni Association has not created a plan of activities for 2020, but alumni representatives are coordinating the activities.
9. Entrepreneurship manuals for Trainees and Trainers at RTQF Level 6 and 7	○	Student manuals for Business management (Level 6) and Business monitoring, evaluation and auditing (Level 7) were distributed to first-year students. On the other hand, teachers' manuals are not distributed to each teacher, and those who teach entrepreneurship have to borrow them from the library for the preparation of teaching materials. Classes using these manuals were conducted in 2019 for first-year students, but due to time constraints, only some of the Level 7 exercises were conducted (all Level 6 contents were covered).
10. RDPU activity	○	As mentioned in 4.3, the RDPU activities carried out in 2019 were Student clearance system, Girinka monitoring system (Department of IT), Potato seed sprouting machine, Banana ripening machine (Department of ET), Analysis of local stove performance conducted jointly with Energy Development Corporation Limited, a system that incorporates power from the Solar Power Plant into the national high voltage grid (Department of RE). The RDPU action plan for 2020 has already been prepared.
11. Musanze Satellite Center	○	In 2019, the Musanze Satellite carried out the following activities. 1) National Employment Program training on local electrical, biomass and PC maintenance 2) Repair and maintenance of Positivo (a Brazilian manufacturer's PC) (the Musanze satellite is the center of this initiative in the Northern Province)

Activity	Status	Detail
		3) A programming boot camp for kids on how to use JavaScript, conducted by Progate, a Japanese company Activity plan for 2020 has already been developed.
12. Technical Advisory Group (TAG)	×	The reasons for not continuing are budget constraints and the planned TAG at RP level. The industry is involved in the ongoing curriculum development by RP.

Source: Interview to IPRC Tumba (20 August 2020)

Chapter 7. ICT Utilization in Technical Education and the Possibility of Promoting Innovation

7.1. Background

In order to examine the possibility of promoting ICT utilization and innovation in technical education, the key policy documents related to ICT human resource development and innovation promotion policies were reviewed. The policy documents covered are shown in the table below.

Table 7-1 Key Policy Documents

#	Title	Overview
1	National Skills Development and Employment Promotion Strategy 2019-2024 (by Rwanda Development Board)	Based on the National Employment Program (NEP), it consists of three strategies aimed at creating 5,000,000 quality jobs by 2050: ①Skill development、②Employment promotion、③Matching
2	Education Sector Strategic Plan 2018-2024 (by Ministry of Education)	It is the education sectoral strategy targeting the following three goals: ① Promoting access to education at all levels, ②improving the quality of education and training, ③ strengthening the relevance of education and training
3	2018/2019 Backward-looking Joint Review of the Education Sector (JRES)（by Ministry of Education）	Results of the Joint Review conducted in October 2019 confirming the progress of the education sector in achieving its development goals and policy actions in the 2018/2019 period
4	ICT in Education Policy (by Ministry of Education)	Complementary to the SMART Rwanda Strategy and related to the implementation of the SMART Education policy
5	Rwanda Polytechnic Strategic Plan (Draft) (by USAID/Rwanda Polytechnic)	Plan to provide quality TVET education for the development of the country and provide a foundation for modernizing the technical workforce
6	National Strategy for Transformation 2017-2024 (Gov. of Rwanda)	A seven-year strategy to drive economic growth towards achieving Vision 2050 through economic, social and governance structural change. It is a high-level document covering the direction of change and the steps to be taken in areas that require comprehensive structural change.
7	SMART Rwanda Master Plan 2016-2020 (by MYICT)	A master plan outlining each of the previous relevant policies on ICT sector
8	ICT Hub Strategy 2019-2024 (by MITEC)	Rwanda's strategy to become an ICT Hub with three strategic themes: 1. Build a critical mass of educated and IT skilled workforce 2. Foster a national innovative culture 3. Develop advanced technological capabilities in selected niche areas
9	ICT Sector Strategic Plan 2018-2024 (by MITEC)	The successor to the SMART Rwanda Master Plan 2016-2020, the ICT Sector Strategy, which provides a rich analysis of the current situation and challenges in the ICT sector.

#	Title	Overview
10	Digital Talent Policy 2016 (by MYICT)	Policies to bridge the gap between Skill Demand and Supply in industry (the ICT sector and the sectors using ICT) for a wide range of audiences including the general public, government, business, universities and students
11	Made in Rwanda Policy 2017	Industrial promotion policy (covering Agro-processing, Construction materials, light manufacturing, horticulture, knowledge-based service (such as finance, ICT and BPO), logistics and transport)

Source: Survey team

In this report, we examine the contents of the two categories, "ICT human resource development policies" and "innovation promotion policies", but the two categories are not treated separately but together in this report. While the innovation promotion policies include growing high-skilled ICT human resource and improving citizen's digital literacy (to increase users of digital services) as one of the themes, ICT human resource development policies also focus on the development of ICT human resources to meet the needs of the private sector and to prepare students for their future careers after graduation. In order to secure employment, efforts related to promoting innovation, such as partnerships with the private sector and support for entrepreneurship, are also recommended by ICT human resource development policies.

Looking over the ICT human resource development policies and innovation promotion policies, all of them aim at achieving a knowledge-based economy and knowledge-based society based on the policies that seek to transform (principally those advocated in the Smart Rwanda Master Plan 2016-2020), in line with the three transformation pillars in the government's National Strategy for Transformation 2017-2024, making Rwanda a knowledge-based economy. The overview can be illustrated on the table below.

Table 7-2 Overview of the Polices on ICT Human Resource Development and Innovation Promotion

	Contribution to achieving Knowledge-based economy	Contribution to achieving Knowledge-based society
ICT human resource development policies	Policies related to the development of professional ICT human resources (e.g., promotion of advanced ICT education and R&D) as advanced industrial human resources Policies to promote the use of ICT in education	Policies related to improving basic digital literacy in order to use digital technologies as users (basic ICT education) Policies to promote the use of ICT in education
Innovation promotion policies	Policies related to the development of basic ICT infrastructure and legislation Policies related to the establishment of the Innovation Center, etc. Policies to support the private sector, such as support for entrepreneurs and start-ups	Policies related to the development of basic ICT infrastructure and legislation Policies for improving digital literacy for the ordinary citizen

Source: Survey team

With regard to policies aimed at a knowledge-based society, there are areas such as improving the digital literacy of the ordinary citizens. Therefore, for the purpose of this study, this paper focuses on policies to promote innovation and ICT human resource development that contribute to the knowledge-based economy.

7.1.1. National Skills Development and Employment Promotion Strategy 2019-2024

Before considering innovation promotion policies and ICT human resource development policies, it is important to understand the approaches to achieve a knowledge-based economy. To this end, we begin with the following excerpts of key points from the NSDEPS 2019-2024.

According to NSDEPS 2019-2024, Rwanda aims to become an upper-middle income country by 2035 and a high-income country by 2050, with the goal of creating 5,000,000 quality jobs by 2050. For this goal, NSDEP consists of the following three pillars. This section focuses on Pillar 1 and Pillar 2, which are highly relevant to this study.

(1) Pillar 1: Skill development

(2) Pillar 2: Employment promotion

(3) Pillar 3: Matching

【Pillar 1: Skill development】

In terms of skill development, the policy targets TVET and higher education institutions. Specifically, specific measures include improving the quality of education and collaborating with the private sector (curriculum development and Identifying the skills gap between the graduates from TVET and higher education institutions and the needs from the private sector).

Figure 11: Strategic Framework for Pillar 1 on Skills Development

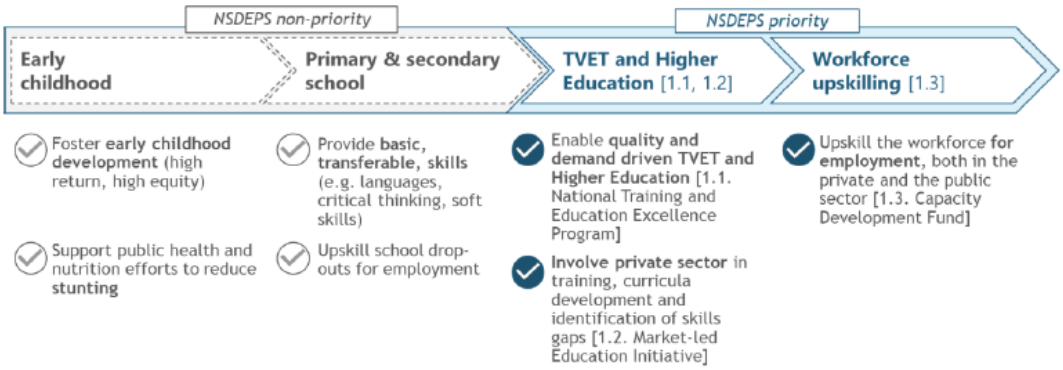


Figure 7-1 Strategic Framework for Skills Development

Source: NSDEPS 2019-2024

As important future competencies (21st century skills), it mentions the importance of the skills such as critical and problem-solving skills; creativity and innovation; research; communication in official languages; cooperation; inter-personal management and life skills; and lifelong learning. Especially, ICT, leadership, and Languages and soft skills are clearly regarded as more critical skills. Then, ICT skills are classified into following four categories;

(1) Digital Literacy

(2) Content Processing

(3) Hardware Management

(4) Content Creation and Management

ICT skills are expected to be widely used, not only in the ICT sector but others, and the number of jobs created using ICT skills is expected to grow from 1,000,000 in 2016 to approximately 3,000,000 by 2030. (The breakdown is shown in the table below）

Table 7-3 Number of Jobs with ICT Skills

Types of ICT skills	Number of employees	
	As of 2016	By 2030
Digital Literacy	400,000	More than 1,000,000
Content Processing	350,000	More than 1,000,000
Hardware Management	300,000	More than 700,000
Content Creation and Management	15,000	More than 60,000
Total	1,065,000	More than 2,760,000

Source: NSDEPS 2019-2024

On the other hand, only 20 percent of TVET graduates can find permanent work, which is a challenge, and one of the reasons for the high unemployment rate among mid-skilled workers (those with an upper secondary education) is the poor quality or market relevance of secondary and vocational education. In fact, the satisfaction level of employers with TVET graduates is not high at 60%. In addition, the unemployment rate for TVET graduates in 2018 is high, ranging from 17 to 50 percent, and 40 percent of higher education graduates are not satisfied with their own skill development maturity.

As a background to this, the lack of private sector input to TVET and higher education institutions has been pointed out, and the following three issues have been identified

(1) inadequate framework of curriculum design for private sector participation

(2) limited exposure of students to private sector throughout their studies

(3) missing feedback loops between private sector and training to on-going refinements in the implementation of curriculum.

The NSDEPS 2019-2024 sets out the following policies to improve the quality of education in TVET and higher education institutions to address these challenges.

(1) Stronger involvement of private sector development in curriculum design

(2) Improved Governance of TVET and University systems

(3) Improved content of training and quality of delivery, including an increased exposure of teachers and students to the world of work throughout their studies

In particular, there has been an emphasis on strengthening links with the private sector to improve the situation, for example, with the Sector Skills Councils (SSCs) established in 2012 to advise on the curriculum and use effective internships, and implementing the Private Sector Development and Youth Employment Strategy 2018 .

【Pillar 2: Employment promotion】

Pillar 2: The direction of employment promotion is focused on support for entrepreneurial and start-ups (Business Development Support).

Figure 13: Strategic Framework for Pillar 2 on Employment promotion through business development support

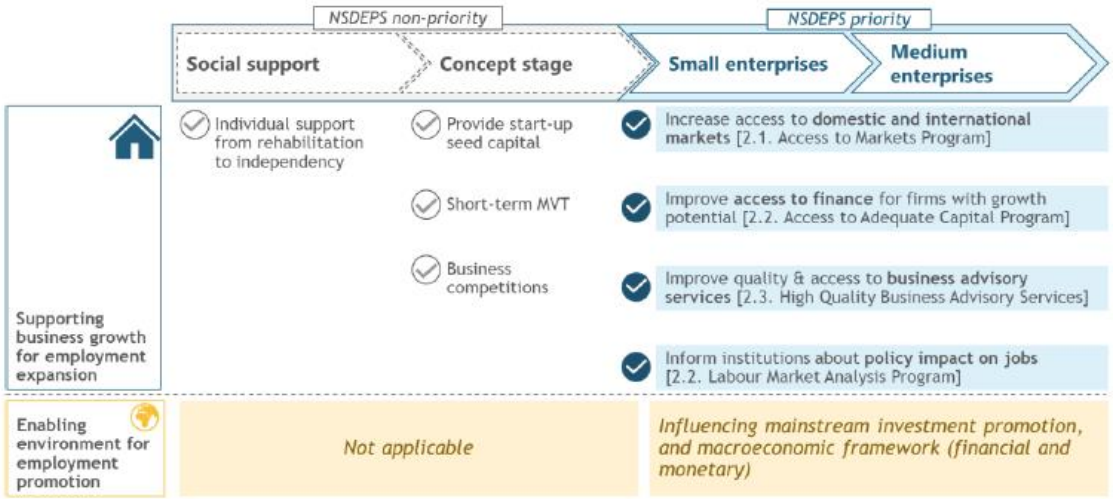


Figure 7-2 Strategic Framework for Employment Promotion

Source: NSDEPS 2019-2024

Though Producing people with skills that match the needs of the private sector will enable the private sector to grow sustainably, 90% of Rwandan companies are micro-enterprises with less than 4 employees. More than half of the workers are engaged in simple work and the wage for simple work is 1, 000 RWF (less than 100 USD) per hour. In light of this situation, in addition to expanding employment by micro-enterprises, there is a need for encouragement of entrepreneurship and support for start-ups at the same time. Indeed, the NSDEPS 2019-2024 shows the expectations of the

entrepreneurship development and start-up support initiated by the Sector Development Strategy, the SME Policy and the Made in Rwanda Policy.

As mentioned above, in light of NSDEPS 2019-2024, there is a need for collaboration between the private sector and educational institutions to develop ICT human resources in line with the needs of the private sector, as well as entrepreneurial training and start-up support for job creation for graduates. The related policies to promote innovation and ICT human resource development also follow this direction.

7.2. ICT Human Resource Development Policies

7.2.1. Summary of ICT Human Resource Development Policies

The importance of ICT education and the use of ICT in education is evident in all the policies for ICT human resource development. The problems and countermeasures identified in most policies are largely the same and can be summarized as the following figure.

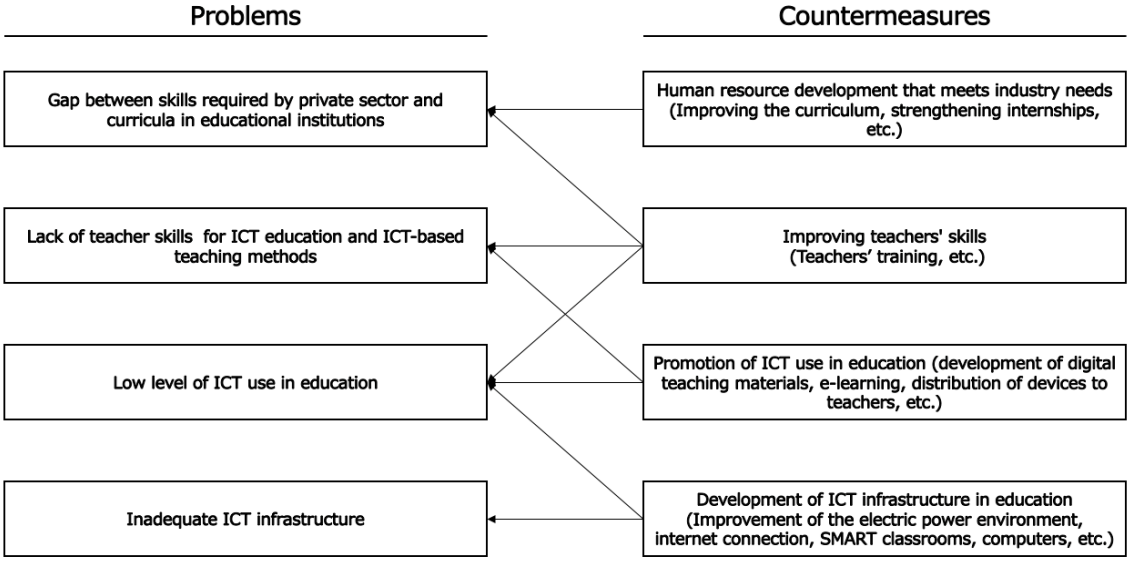


Figure 7-3 Problems and Countermeasures in ICT Human Resource Development

Source: JICA Survey Team

Considering the result of the policy review in the next section, the most specific ICT human resource development policy in IPRC/TVET is the Rwanda Polytechnic Strategic Plan 2019-2024 (Draft) (by USAID/Rwanda Polytechnic), which states as follows.

- The Rwanda Polytechnic Strategic Plan 2019-2024 is the foundation for Rwanda Polytechnic to carry out its mission of providing quality TVET education and modernizing the technical workforce for the development of the country.
- The TVET sector is a priority area for the transition to a knowledge-based economy with the capacity to create 214,000 productive jobs per year, in line with the policy objectives of Rwanda

Vision 2050.

- This Strategic Plan consists of 12 Strategic Areas and Objectives, of which the following is an excerpt of items related to ICT utilization, ICT education and innovation promotion.

Table 7-4 Excerpt from Rwanda Polytechnic Strategic Plan 2019-2024

Strategic Area	Outcome	Remark
1. Legislative, Regulatory and Policy Framework	1.4 Develop and approve a Rwanda polytechnic ICT policy by 2020	
	1.8 Implement Existing Workplace Based Learning Policy and Guidelines by 2024	
2. Oversight and Governance	2.4 Develop and approve policy directives for TVET institutions information technology systems by 2022	It seems to be an operational management system (student and teacher information management), but details are needed to see if it is also relevant to the content of this study.
3. Curriculum	3.1 Review and update existing Competency - Based Curricula development and procedures and guidelines (CBC Framework) by 2021	Result of "Activity 3.1.5 Create and conduct a tracer survey to ensure competency-based training by 2020" should be confirmed.
	3.2 Review and update existing competency-based curricula by 2024	Activity includes "Review and update existing curricula to ensure work readiness、 entrepreneurial、 as well as technical relevance by 2022"
4. Teaching and Learning	4.1 Develop and approve a process for improved teaching and research capacity at universities for teacher education in all fields by 2024	The result of the goal of 2019 "Perform national audit to assess teacher competencies on ICT skills" should be confirmed.
	4.3 Equip classroom with ICT tools for quality teaching and learning by 2024	Be sure to check what ICT tools you have in place.
5. Student Support	5.2 Develop and approve student academic support guidelines by 2024	Details of "Activity 5.2.2 Develop and improve ICT tools for student support services by 2022" should be confirmed.
6. Infrastructure and Resources	6.5 Improve and Provide appropriate ICT to TVET institutions by 2024	Smart classrooms, internet connectivity, digital teaching materials development, device maintenance, etc.
8. Applied Research and Innovation	8.1 Develop an applied research, innovation, and entrepreneurship by 2020	Strategic Area8 is considered to be the most related strategy with innovation.
	8.2 Build capacity of TVET staff to conduct research, innovation, and entrepreneurship by 2021	
	8.3 Conduct research into community issues by 2021	
	8.4 Implement new innovative projects and engage the private sector for commercialization of developed innovation products by 2024	It includes "Activity 8.4.6 Participate in the Africa Skills Competition by 2022".

Strategic Area	Outcome	Remark
10. Management Information and Statistics	10.1 Design and approve a management information system for TVET institutions by 2022	It includes activities such as "2019: Develop an ICT policy for IPRC institutions" and "2020: ICT policy approved, and ICT system implemented in 4 IPRC TVET institutions"
	10.2 Design and approve a reliable capacity building and support system for TVET staff responsible of the ICT system by 2023	

Source: JICA Survey Team based on Rwanda Polytechnic Strategic Plan 2019-2024 (Draft)

Based on the recognition of these issues, the IPRC/TVET has planned various activities, but the actual progress, challenges in implementation, and the gap between the plan and the reality are matters for future investigation.

7.2.2. Review of ICT Human Resource Development Policies

Information from the key policies reviewed is described below in order to provide input to this study.

（1） Education Sector Strategic Plan 2018-2024 (by Ministry of Education)

From the Rwandan Education Sector Policy (MINEDUC, 2003), which forms the basis of this ESSP, ICT has been one of the objectives of the education sector. The fourth of the nine pillars of this ESSP is "Enhanced use of Information and Communication Technology (ICT) to transform teaching and learning and support the improvement of quality across all levels of education in Rwanda" and STI, ICT, Innovation, Innovation and Research and Development are among the 17 areas of focus that will deliver results. While STEM and ICT are core government priorities for improving the relevance of education, the following challenges have been identified.

- ✓ There is a lack of sufficient qualified teachers and instructors as well as insufficient laboratory equipment and materials in primary and secondary schools, TVET and higher education institutions.
- ✓ Based on the ICT in Education Policy adopted in 2016, activities such as development of digital content in line with the curriculum, promotion of ICT education and ICT use through Smart Classroom, leadership development and launching training courses for teachers using ICT are implemented. Despite efforts to enhance teaching, learning and research using ICT, only 32% of primary schools and 51% of secondary schools are connected to the electricity grid, and only 13% of secondary schools are connected to the Internet.

In spite of the above challenges, the following three activities have been identified as part of this ESSP's Outcome 4.1: ICT strengthened across all levels of education.

① Introduction of smart classrooms in primary and secondary schools, TVET and higher education institutions

As of 2016, smart classrooms were installed in 21% of primary schools, 17.8% of secondary schools and 22.9% of TVETs.

② Improving teachers' skills in the use of ICT

Teaching skills are needed to make teaching more student-centered through the use of ICT as a tool as well as PC operation skills. Training for teachers in primary and secondary schools, TVET and higher education institutions are provided including how to use multimedia materials and online learning.

③ Development of digital educational content

Digitized content is developed to improve the quality of education. Reduction of paper textbooks in primary and secondary education and digitization of education courses available to learners across the country will accelerate the growth of TVET, and higher education institutions are also expected to expand online and distance learning opportunities.

Although not directly related to ICT human resource development, income-generation activities in TVET and higher education institutions are mentioned as an additional form of funding, and the possibility of collaboration with local communities and private companies is also included in the report.

（2） 2018/2019 Backward-looking Joint Review of the Education Sector (JRES) （by Ministry of Education）

Progress in achieving development goals and policy actions in the education sector in the 2018/2019 fiscal year was confirmed by the Joint Review (JRES) conducted in October 2019.

For TVET, the progress against the NST 1 outcome is reviewed as follows, (1) the employment rate of TVET graduates within 6 months has not been met (68% compared to the 2018/2019 target of 74.6%), (2) the number of students enrolled in TVET relative to the overall student population has not been met (33.1% compared to the 2018/2019 target of 39.4%), while (3) the overall of student enrollment in STEM-related courses to the number of students, exceeding the 51.1% target of 72% (probably a result of the enhanced STEM fields in the TVET curriculum).

As for future actions, for example, with regard to (1), policy actions include the introduction of industry-related training and necessary technical equipment, mapping the availability of internships and trainees in local companies, creating a competitive environment for each school by ranking them through visiting and monitoring TVET schools, and building a database of graduates. Regarding point (2), the construction of TVET buildings and incubation centers, provision of school-related facilities,

and strengthening of cooperation with private TVET are mentioned. Through these measures, it is believed that the project will continue to improve the underachievement situation.

（3） ICT in Education Policy (by Ministry of Education)

This policy complements the SMART Rwanda Strategy and the vision of the SMART Education policy is to achieve the following missions as outlined in the ESSP.

“to transform the Rwandan citizen into skilled human capital for the socio-economic development of the country by ensuring equitable access to quality education focusing on combating illiteracy, promotion of science and technology, critical thinking, and positive values” (ESSP, 2013)

More specifically, the goal is to provide all citizens with education in line with the needs of the labor market by promoting the use of ICT in education, and to provide quality education. The key word is "universal access and quality education for all" and the four Strategic Objectives of the policy are as follows.

① Strategic Objective 1: Develop a competent & relevant ICT professional base to meet industry needs

Activity: Promoting the use of ICTs by teachers and students as part of the educational process, digital educational content and curriculum based on practices and projects that make full use of ICTs and the transition from printing to digitalization, such as e-textbooks, and the development of infrastructure.

② Strategic Objective 2: Increase ICT penetration and usage at all educational levels

Activity: Development of ICT infrastructure such as interactive whiteboards, servers, LANs, cloud services, broadband, electrical equipment and devices with embedded educational software.

③ Strategic Objective 3: Develop Education leadership and teachers’ capacity and capability in and through ICT

Activity: In order to develop leaders in the use of ICT in schools and classrooms (leadership development and transition to learner-centered education through the use of ICT, requiring teachers to receive a minimum number of training hours for ICT-related teaching practice and distributing laptops to all teachers)

④ Strategic Objective 4: Enhance teaching、 learning & research through ICT integration in HLIs

Activity: Facilitating research and innovation in higher education institutions and preparing the devices, online courses and connectivity needed to do so

The short-, medium- and long-term goals and plans for the implementation of the phased policies are described below, while the plans are very ambitious, for example with 100% use of digital materials in HLI by 2018/2019.

Table 7-5 ICT in Education Policy Implementation Plan

Phase 1 (FY 2015-2016)	**Phase 2**(FY 2016-2017)	**Phase 3**(FY 2017-2018)	**Phase 4**(FY 2018-2019)
ICT in Education policy approved	Smart Classrooms and new curriculum integrated for P1, P2 P4, P5, S1, S2, S4 and S5	Smart Classrooms and new curriculum integrated for all grades.	
Student purchase programs initiated	30% of schools equipped with Smart Classrooms and power (grid, solar or petro generator).	70% of schools equipped with Smart Classrooms and power (grid, solar or petro generator).	100% of schools equipped with Smart Classrooms.
Awareness campaigns to students, schools, parents, teachers about	HLI will deliver 50% of the teaching using digital courses and online resources.	HLI will deliver 80% of the teaching using digital courses and online resources.	HLI will deliver 100% of the teaching using digital courses and online resources.
	Open Distance Education University will be up and running.		
	Teacher professional development and online community established.	Online teachers' community scaled nationally.	Most teachers actively participate in online teachers' community.

Source: ICT in Education Policy

It is also characterized by the fact that the main focus is not on ICT education (e.g., training advanced IT technicians), but on the use of ICT in education. For this reason, the main purpose of the capacity building referred to in this policy is to develop human resources (both teachers and students) who can use ICT, rather than human resources who can implement systems development and programming.

（4） ICT in Education Policy (by Ministry of Education)

As mentioned above, this policy most specifically sets out the ICT human resource development policy in IPRC/TVET aligned with each of the above policies (see 7.2.1).

7.3. Innovation Promotion Policies

7.3.1. Summary of Innovation Promotion Policies

Although there are several policies related to ICT and innovation, the following chart from the ICT Hub Strategy 2019-2024 is useful to understand the position of the various policies. To realize the top-level National Strategy for Transformation 1, there are from the SMART Rwanda Master Plan 2016-2020 to the ICT Sector Strategic Plan 2018-2024, and the various ICT sub-strategies are also developed. The ICT Sector Strategic Plan 2018-2024 is regarded as the successor policy to the SMART Rwanda Master Plan 2016-2020.

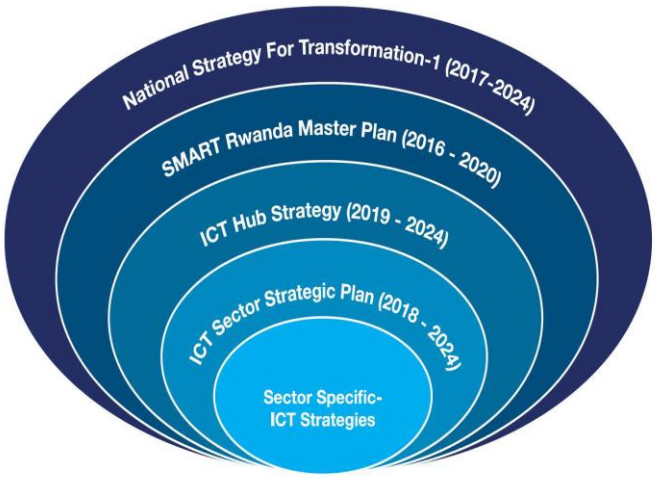


Figure 14: Positioning the ICT Hub Strategy in context of National Strategies

Figure 7-4 Position of the Various Policies

Source: ICT Hub Strategy

（1） Direction

As mentioned above, the main direction is the realization of the knowledge-based economy and the knowledge-based society, and the content of several policies is based on this. For example, in the National Strategy for Transformation 2017-2024, one of the priority initiatives to create a total of 1,500,000 disciplined and productive jobs (214,000 per year) is to expand knowledge-based services and therefore increase the number of outstanding TVET graduates commensurate with the demands of the labor market. The SMART Rwanda Master Plan 2016-2020 identifies the education sector as a key area for realizing the knowledge-based economy and the knowledge-based society, with two key objectives: “2.2 Objective #2. Utilize ICT for Education as a tool to enhance teaching and learning” and “2.6 Objective #6. Improve and expand access to ICT skills and innovation capacity”. In particular, the former includes e-learning, digital educational content, building inter-institutional networks, open and distance education, and student and teacher data management. The latter includes establishment

of the national innovation center and establishment of an ICT and R&D center in collaboration with international ICT companies.

(2) Prioritized Sector

Areas where innovation and ICT use are expected to lead to a knowledge-based economy and a knowledge-based society are described in several policies. First of all, the SMART Rwanda Master Plan 2016-2020 identifies seven priority areas for ICT-enabled economic development: Health, Finance, Business and Industry, Agriculture, Education, Governance and Cities. Health, Finance, Business and Industry, and Agriculture are more closely related to the knowledge-based economy, while Education, Governance, and Cities are considered to be more closely related to the knowledge-based society. Secondly, while the promotion of innovation is often mentioned in each policy and is grossly overblown, the ICT Hub Strategy 2019-2024, which sets out a relatively clear direction, lays out a strategy to become Africa's ICT Hub by providing leadership in the following four niche areas.

- Empowering data-driven farming (Agritech)
- Health informatics using the data, information, and knowledge to both improve the delivery of healthcare services and improve patient outcomes (Healthtech)
- e-Government services (e-government)
- Digital finance solutions（Fintech）

Thirdly, the Kigali Innovation City (KIC), which is also a core part of the ICT Hub strategy, aims to create jobs through startups, high-tech industries and foreign companies, with KIC's focus on the following areas: fintech, smart energy, bio-medical engineering, cybersecurity, data and analytics, agritech and smart logistics.

Additionally, in the Made in Rwanda Policy 2017, which is slightly outside the context of the Knowledge-based economy but is highly relevant to the employment opportunities of IPRC/TVET graduates, the target areas are agro-processing, construction materials, light manufacturing, horticulture, tourism, knowledge-based service (such as finance, ICT and BPO), logistics and transport.

(3) Required Skill Level

Increasing the number of good TVET graduates commensurate with the demands of the labour market and creating curricula that meet industry needs are mentioned in several policies, but what is the specific level of skills required? The SMART Rwanda Master Plan 2016-2020 states that a framework for ICT skills and competencies will be developed but does not mention about specific skill levels. It only recommends to defines ICT skills, to develop relevant legislation and ICT infrastructure, and to use ICT in education (It's a high-level policy called the Master Plan, so that seems to be the norm.). In fact, there are no other policies that are specifically and clearly described. For example, if we look at the Digital Talent Policy 2016, which seems appropriate for defining skill levels, we find that it takes

a broad view of its target audience, including the general public, government, business, and college students, and begins by defining "Digital Literacy" and "Digital Skills" as follows. A more important skill in the knowledge-based economy is considered to be digital skills.

Table 7-6 Definition of Digital Literacy and Digital Skills

Digital Literacy	The ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills at a basic level.
Digital Skills	Advanced level of digital proficiency that allows an individual to perform specialized and complex functions in Information and Communication Technology and related fields.

Source: Digital Talent Policy 2016

According to the Digital Talent Policy 2016, a total of 13,323 ICT technicians are needed in 2013-2018 to make the EDPRS a reality, broken down as follows

① Associate level: 5,126 technicians

② Professional level: 1,681 technicians

③ Expert level: 6,716 technicians

In contrast to the above, the following personnel were actually trained in 2015-18 while the amount of Associate level talent is adequate, the problem of lack of high level is noted.

① 12,466 skills units with diploma or advanced diploma and secondary school certificates,

② 3,245 skills units at bachelor's degree level

③ 487 at Master level and 16 Skills Units at PhD level.

However, there is no concrete description of clear skill level for Associate, Professional and Expert, while explained only relating to the degree level. As a result of interviews with RISA and ICT Chamber regarding the level of IPRC/TVET in particular, RISA responded that they require the Professional level for IPRC graduates, whereas ICT Chamber require the Associate level for IPCR graduates (both institutions indicated that they require the Associate level for Technical Secondary Schools). In addition, in both periods, respondents did not define a framework for skill sets or skill standards related to the ICT workforce to promote innovation. Regarding the four ICT skills listed in NSDEPS 2019-2024 (Digital Literacy, Content Processing, Hardware Management and Content Creation and Management), RISA and ICT Chamber has different exception for IPCR graduates. When asked about the level of skills they were looking for (low, medium or high), the ICT Chamber answered "high" for all four skills, while RISA answered "medium" for Digital Literacy and Content Processing and "high" for the remaining two. This suggests that there are no clear indicators of specific skill levels at the policy level.

Meanwhile, regarding the question about the role of IPRC graduates compared to university graduates in promoting innovation in Rwanda to both institutions and incubators (5 institutions), nearly all institutions answered that technical skills (hands-on skills, operational skills) are expected for IPRC graduate (while R&D and overall business and project management skills are for university graduates). Thus, skill levels can only be defined in vague terms such as "appropriate to the demands of the labor market" and "appropriate to the needs of the industry," but the skill areas expected for TVET/IPRC are technical skills (hands-on skills and operational skills).

7.3.2. Review of Innovation Promotion Policies

The following is a list of key policies related to innovation promotion policies that provide input to this study.

（1） National Strategy for Transformation 2017-2024 (Government of Rwanda)

NST1 is a seven-year strategy to promote economic growth towards achieving Vision 2050 through economic, social and governance structural change, and covers the direction of change and the steps to be taken in areas that require comprehensive structural change. The reference to the section on human resource development is limited, but contents about the ICT human resources and TVET are not different from those covered in many other policy documents. The main contents are as follows.

Table 7-7 Related Contents of NST1

Priority Areas of NST1
Economic Transformation
Create 1,500,000 (214,000 annually) decent and productive jobs (*see Priority Initiative 1 below) Establish Rwanda as a globally competitive knowledge-based economy (*See Priority Approach 3 below) Promote industrialization and attain a structural shift in the export base to high-value goods and services with the aim of growing exports by 17% annually. (*See Priority 4 below). Increase domestic savings and position Rwanda as a hub for financial services to promote investments. (*See Priority Approach 5 below)
Priority Area 1: Create 1,500,000 (over 214,000 annually) decent and productive jobs for economic development Key strategic interventions (related to this survey): 1. Develop and support priority sub-sectors with high potential for growth and employment (in other words, expansion of knowledge-based services) 4. Scale up the number of TVE T graduates with skills relevant to the labor market.
Priority Area 3: Establish Rwanda as a Globally Competitive Knowledge-based Economy Key strategic interventions (related to this survey): 12. Develop and operationalize a thriving skills ecosystem for attracting and nurturing local and international talent around the Kigali Innovation City (KIC) model. 13. Operationalize the innovation fund 14. Ensure digital literacy for all youth (16 to 30 years) by 2024 15. Support the establishment and operationalization of new and existing Centers of Excellence with a focus on science, technology and innovation
Priority Area 4: Promote industrialization and attain a structural shift in the export base to High-value goods and services with the aim of growing exports by 17% annually. Key strategic interventions (related to this survey):

19. Identify and develop priority value chains（including Knowledge-based services） 20. A big shift in Rwanda's export outlook will be oriented towards services export, including in high-tech areas such as Financial Services/Fin-tech/epayment, BPOs, Legal, Security services, and other professional services
Priority Area 5: Increase domestic savings and position Rwanda as a hub for financial services to promote investments Key strategic interventions (related to this survey): 28. Develop Rwanda into a financial services center（including development of specialized skills and establishment of incentive mechanisms to attract investors in the financial sector）
Social Transformation
Enhance the Demographic Dividend through Improved access to quality education. Focus will be on strategic investments in all levels of education (pre-primary, basic and tertiary), and improved teachers' welfare.
Priority Area 4: Enhancing the demographic dividend through improved access to quality education 64. Increase the use of ICT in teaching and learning 66. Technical and Vocational Education and Training (TVE T) will further be promoted. In this regard the proportion of students pursuing TVET will increase from 31.1% in (2017) to 60% by 2024 to address the challenge of mismatch in labor market demand. 67. Science, Technology, Engineering and Mathematics (STEM) across all levels of education will be promoted at all levels (This will be done through identification and attraction of the most excellent and suitable students for STEM, increasing the capacity of STEM research centers and science schools. As a result, STEM students enrolling in higher education and TVET courses will increase from 59.3% in 2017 to 80% by 2024)
Cross-Cutting Areas
Capacity Building
5.3. To achieve NST1 targets, a competent and skilled workforce with capable and performing organizations will be required (The National Capacity Development Policy, Strategy and Implementation Plan approved by Cabinet in 2016 will provide the framework and act as the main reference for guiding capacity development interventions) 5.5. The focus for Capacity Development under NST1 will be on current and emerging sectors that are key economic drivers with the potential to contribute significantly to job creation and productive employment (Priority sectors include ICT)

Source: JICA Survey Team based on National Strategy for Transformation 2017-2024

（2） SMART Rwanda Master Plan 2016-2020 (by MYICT)

The SMART Rwanda Master Plan 2016-2020 is positioned as a master plan that brings together all relevant policies. The policy itinerary for the ICT sector is as follows.

Table 7-8 Policy Itinerary for the ICT Sector

Year	Title	Focus
2000-2005	National Information and Communication Infrastructure plan (NICI-I)	Setting a vision and developing a legal and regulatory framework
2005-2010	NICI-II	Infrastructure construction
2010-2015	Third NICI	Promoting the use of ICT infrastructure (including services and private sector development)
2015-2020	Smart Rwanda Master Plan (SRMP) (4th NICI)	Transformation to the Knowledge-based Economy

Source: JICA Survey Team

In this Master Plan, the status of ICT-related development (Maturity Level) is assessed using the following indicators.

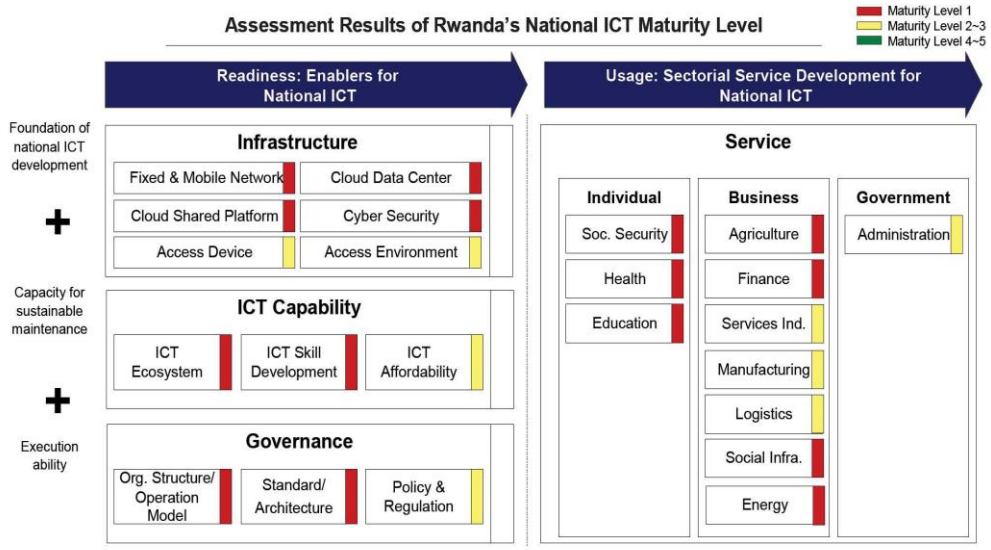


Figure 11: Overview of Maturity Level Assessment

Figure 7-5 Overview of Maturity Level Assessment

Source: SMART Rwanda Master Plan 2016-2020

According to the results of the above evaluation, most of the items are in the early stages of the Maturity Level (Level 1: Red), which means that although a foothold for ICT-related development has been established, continued government investment and collaboration with the private sector (including PPPs) are needed. The strategy states that Rwanda is currently in a "seed" phase, and that in order for the country to continue to grow and develop, it is necessary to introduce rigorous management of development progress using checklists and other tools to ensure effective and impactful investments. As a Master Plan, the document analyzes and consolidates other policies and identifies seven priority areas for economic development using ICT, including the current state of ICT, its potential, and the government's vision for economic and social development using ICT, as mentioned in other policies (However, perhaps because it is a Master Plan, there are no specific outcomes, outcome materials, or achievement plans for the strategic goals set forth in the seven areas). Compared to other policies, the linkages with the private sector in achieving the strategic objectives are mentioned with greater emphasis, and PPPs in particular are described in detail. In addition, a conceptual diagram organizing ICT skills and competencies, policies and educational programs is presented below, which states that a framework for ICT skills and competencies will be developed (without specific plans or content for development).As it mentions both "Create and disseminate high-quality research" and "ICT training to the citizens of Rwanda", it is designed to develop both high-end ICT human resources for advanced industries and improve the digital literacy of the general public.

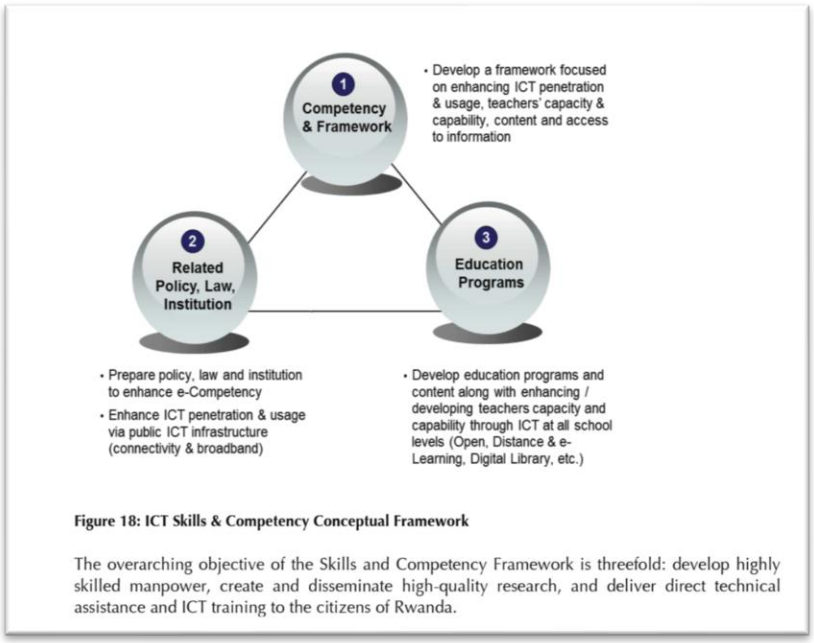


Figure 7-6 Conceptual Diagram Organizing ICT Skills and Competencies, Policies and Educational Programs

Source: SMART Rwanda Master Plan 2016-2020

(3) ICT Hub Strategy 2019-2024 (by MITEC)

Though the promotion of innovation is often mentioned in many policies, the ICT Hub Strategy 2019-2024 sets out the following directions relatively clearly, and the three strategic themes related to the establishment of the ICT Hub listed as follows.

① Build a critical mass of educated and skilled IT literate workforce

Strategic Goal:

Build a critical mass of well-educated and IT-savvy human resources through collaboration between business, academia and government in order to increase student enrolment in courses that will promote employment in the ICT sector, campaign for employment attractiveness, attract international students to the ICT education sector, and achieve a high number of student jobs in the ICT sector

Strategic Objectives:

- Ensuring direct involvement of sectoral companies (local and multinational) in education and the implementation of partnerships between government and educational institutions to prevent skills mismatch and meet the human resource needs of companies
- Developing a workforce with professional-level skills (skills to drive innovation and lead the digital society and infrastructure) and general skills (general proficiency in digital technologies), as well as soft skills (leadership, communication, teamwork, etc.) that complement the ICT skills

② Foster a national innovative culture

Strategic Goal:

To foster a national innovative culture by improving the skills, knowledge and awareness among the population, to support a knowledge-based economy and society

Strategic Objectives:

- Improving consistency by organizing and prioritizing various innovation and entrepreneurship programs and then improving duplication
- Developing a draft plan for strategic investments and the progress of each program
- Strategic allocation and utilization of resources by organizing the roles and plans of national innovation promotion agencies in Rwanda

③ Develop advanced technological capability and expertise in selected niche areas

Strategic Goal:

To attain a position of continental leadership in certain identified niche areas of ICT in particular and emerge as a leading hub of ICT expertise in Africa

Strategic Objectives:

- Providing opportunities for demonstration experiments of new technologies
- Developing and deploying demand-driven ICT solutions in Rwanda

（4） ICT Sector Strategic Plan 2018-2024 (by MITEC)

The ICT Sector Strategic Plan 2018-2024 summarizes the individual strategies and plans of the ICT sector towards the realization of the seven-year government plan, National Strategy for Transformation (NST 1). After summarizing the situation of the ICT sector, the efforts and challenges to date, specific strategies and activities are described. the ICT sector development priorities (main and underlying priorities) of this strategic plan are as follows.

Key areas and foundations:

To help Rwanda’s Economic transformation, Social transformation, and transformational Governance while becoming the “Leading ICT Hub in Africa” by 2024 through implementing the followings;

① Universal broadband usage by all

② Creative and innovative ICT sector

③ Sustainable Development through Smart Cities

④ National Digital Transformation

⑤ Advanced Technology skills and capacity development

In particular, with regard to human resource development, there is an emphasis on high-end advanced human resource development, such as the target of training 12,000 Elite IT Professionals by 2023/24 (although there is no mention of anything directly related to TVET).

In addition, only some of the issues that are relevant to this study are excerpted.

- ✓ Low broadband internet penetration (Usage): Internet usage is 39.76% of the total population as of May 2017 and is highly unevenly distributed geographically. Factors include high internet access costs, lack of public awareness, lack of local content and lack of provision in local languages, lack of infrastructure construction in suburban (village) areas, and limited number of citizens who can use internet access.
- ✓ High attrition rate of SMEs start-up: The private sector in Rwanda, which is 97.8% owned by SMEs, continues to have a high business failure rate. This is due to internal factors such as lack of management experience, lack of business, marketing and R&D skills and knowledge, and poor customer relations, while external factors include lack of finance functions, a fiercely competitive environment and high business implementation costs.
- ✓ Low device penetration (smart phones, tablets and PCs): Smartphone, tablet and PC penetration rates are still low. There are plans to increase device penetration in the future through cooperation with vendors and production of POSITIVO (Brazilian PC manufacturer) PCs in Rwanda.
- ✓ Low electricity penetration: The low electricity penetration rate, which stands at 27% of the total, is one of the factors hindering the spread of ICT.

(5) Digital Talent Policy 2016 (by MYICT)

This policy aims to bridge the gap between skill demand and supply in the industry (both ICT sector and ICT-enabled sectors) and contribute to the realization of Vision 2020, SDG, Smart Africa Initiative, Smart Rwanda Master Plan (2015-2020) and Regional Integration. It is somewhat outdated as it is intended to achieve EDPRS II (2013-18), but according to information from the ICT Sector Strategic Plan 2018-2024 progress-sharing meeting (from JICA Rwanda Office), an updated version is planned to be produced. The policy also points out that the content of education does not meet the skills needs of industry, and the gap between skill demand and supply is analyzed as particularly acute at master's and doctoral levels. Considering the statement such as "for Rwanda to become an ICT Hub" and "exporter of ICT skills in the region by 2020", its target can be high-level ICT human resources and workforce. Although the ICT Sector skills Council is supposed to approve the Professional Certification, there is no description of specific skills and levels. The skills are explained such as skills about Software Development, Network and Cloud Computing, Hardware Services and Infrastructure, Cyber Security, Web and Mobile etc. On the other hand, it has been pointed out that the lag in ICT

utilization is due to the lack of digital literacy among the population, and one of the strategic objectives is to increase the ratio of digitally literate citizens (from 8.4% to 20% by 2020).

（6） Made in Rwanda Policy 2017

This is an industrial promotion policy covering agro-processing, construction materials, light manufacturing, horticulture, tourism, knowledge-based service (such as finance, ICT and BPO), logistics and transport.

The recognized challenges about productivity include a lack of skilled labor and appropriate technology as the following figure shows. In addition, the importance of investing in TVET and higher education institutions and human resource development in collaboration with private sector are pointed out as other policies also mention.

Table 7-9 Reason of Low Productivity

Table 1: Reasons for capacity under-utilisation

Primary reason for capacity under-utilisation	Share of respondents
Lack of sufficient raw materials	27%
Lack of sufficient working capital	32%
Limited market	22%
Lack of skilled labour	6%
Lack of appropriate technology	10%
Other	2%

Source: Made in Rwanda Policy 2017

7.4. Initiatives by Government and Development Partners

7.4.1. Initiatives by Government

The ICT Sector Strategic Plan 2018-2024 provides detailed and comprehensive summary of initiatives in ICT sector in its ANNEX1. The following is a selection of initiatives that are relevant to this study.

Table 7-10 Initiatives by Government

#	Title	Overview
26	Smart Classroom Program	In 2016, the deployment of computers in school classrooms, the use of basic software, and internet access for the use of ICT in education has been implemented。
27	Digital Ambassador Program	Launched in 2016 by the government with development partners to improve the digital literacy of citizens; over five years (~2022), 500 Digital Ambassadors will train 5 million citizens and develop social entrepreneurs and sole traders in the digital economy.
28	Establishment of center of excellence	1. Carnegie Mellon University Africa (2012) 2. Africa Institute of Mathematical Sciences – Pan African Center of Excellence (AIMS) (2016) 3. Africa Center of Excellence for Data Sciences in

#	Title	Overview
		University of Rwanda (2016) 4. Center of Excellence in Internet of Things (IoT) in University of Rwanda (2016) 5. An Information Access Center by assistance from KOICA – NIA (2017) 6. Center of Excellence for Biomedical Sciences and e-Health in University of Rwanda (planned) 7. ITU Cyber Security Center of Excellence (planned)
29	Girls in ICT Initiative & He for She campaign	Supporting women entrepreneurs with ICT such as Ms. Geek Competition, Tech-Kobwa Camps, Tech Innovation Challenges, Rugori Fund and other digital financial inclusion programs
30	Kigali Innovation City（KIC）	The Kigali Innovation City (KIC), a core part of the ICT Hub strategy, aims to create jobs through startups, high-tech industries and foreign companies, focusing on areas such as fin-tech, smart energy, biomedical engineering and It is considered cybersecurity, data and analytics, agri-tech and smart logistics.
31	Rwanda Innovation Fund	Fund (USD 1 million) as venture capital for African ICT entrepreneurs. Once launched, the Fund will develop a financing model and provide support from inception to IPO, to strengthen the innovation ecosystem by strengthening the start-up support for technology start-ups by expanding the number of investors based in the country.
33	ICT companies introduced	To date, more than 68 ICT companies have grown to a market capitalization of USD 350,000 and created about 4997 jobs.
34	kLab & FabLab	ICT Chamber established the Innovation Center kLab with support from JICA (2011) and ICT Chamber also established FabLab with support from JICA, MIT and SolidWorks (2016).
36	The Smart Africa Alliance	The Smart Africa Alliance headquarters was established in Kigali (2015). Launch of Smart Africa, a framework for collaboration to promote investment in smart cityisation to promote socio-economic development (2017).
37	Guiding Policies	− Smart Rwanda Master Plan − Broadband Policy − Cyber Security Policy − Data Revolution Policy − Digital Talent Policy − E-Waste Policy − ICT4AG Strategy − ICT4ED Strategy − Other strategies for women's empowerment, e-commerce, etc.

Source: JICA Survey Team based on ICT Sector Strategic Plan 2019-2024

7.4.2. Initiatives by Development Partners

The following is a selection of initiatives that are highly relevant to this study from the results of the interview with RISA and the initiatives described in the National Skills Development and Employment Promotion Strategy 2019-2024.

Table 7-11 Initiative by Development Partners

#	Initiative	Overview
1	DSSD (Digital Solution for Sustainable Development) (considered as a good practice by RISA)	GIZ implemented with the Ministry of ICT and Innovation and RISA as a counterpart (initially planned for July 2017-June 2020) to promote innovation by managing an incubation center where several events (e.g. hackathons etc.) are held. Capacity building for RISA is one of the components.
2	Expansion of Tech Innovation Hub in Rubavu, Muhanga, Nyagatare and Rusizi (considered as a good practice by RISA)	EU supports to promote digital employment through incubation hubs: four incubation hubs will be established in four cities to support 200 start-ups. The plan is for 2020-2024, although it has not started yet.
3	The ICT Innovation Ecosystem Strengthening Project. (considered as a good practice by RISA)	Start-up support implemented by JICA (November 2017-November 2020). So far, about 40 startups have been fostered and business matching with Japanese companies has been carried out.
4	USAID-funded Akazi Kanoze Program	Soft skills training was targeted. This initiative was so successful that it was also integrated into the TVET training system.
5	Mastercard Foundation's Hanga Ahazaza programme	The MasterCard Foundation's entrepreneurship support program mainly for the tourism sector.
6	Digital Ambassadors Programme (DAP)	Launched by the World Economic Forum and Ministry of ICT and Innovation in 2017 to provide digital literacy training to a total of 27,000 people in 12 states. However, the activities are more like advocacy rather than job skill improvement.

Source: JICA Survey Team

Chapter 8. Collaboration Possibilities with Academic Institutions and Companies in Japan

8.1. Information from National Institute of Technology

This section describes the results of interviews conducted at two schools in Japan which have international cooperation experiences in Rwanda, namely National Institute of Technology (KOSEN) Nagaoka College (hereinafter, Nagaoka Kosen) and Kitakyushu College (hereinafter, Kitakyushu Kosen). The interviews were conducted online.

8.1.1. Overview of Two Kosens Targeted for Interview

Nagaoka Kosen has five departments: Mechanical Engineering, Electrical and Electronic Systems Engineering, Electronic Control Engineering, Materials Engineering, and Civil Engineering for the purpose of producing human resources who contribute to the development of local industries through consistent practical technical education over five years. In order to nurture engineers with high research and development ability, the students can go on to an advanced course for another two years after five years of consistent education. There are three major areas in the advanced courses: Electrical and Mechanical Systems Engineering, Materials Engineering, and Civil Engineering, and after graduating from advanced courses the degree of Bachelor of Engineering is awarded and it is possible to go on to graduate school. There is an international exchange promotion center on campus, and exchanges with overseas partnering schools are also active.

As a characteristic of the region, Nagaoka City is focusing on human resource development and industrial promotion, NaDeC BASE[29] with co-working space, open collaboration space, and manufacturing workshop is set up in the city. In addition, there is a city subsidy system for industrial-academic joint cooperation research projects and the collaboration between Nagaoka Activation Zone (NAZE)[30] which was established mainly by industry and higher education institutions including Nagaoka Kosen are active. These show the manufacturing with the cooperation among government, industry and academia is promoted in Nagaoka City.

Kitakyushu Kosen has the Department of Creative Engineering and from the third year, and there are five specialized courses: Machine Systems Engineering Course, Robotics and Mechatronics Course, Electrical and Electronic Engineering Course, The Information and Systems Engineering Course, and

[29] The project jointly operated by Nagaoka University of Technology, Nagaoka Institute of Design, Nagaoka Univiersity, Nagaoka Kosen, Nagaoka Sutoku Univiersity, Nagaoka Chamber of Commerce and Industry, and the city Government with the objectives of integrating the characteristics of 4 universities and 1 Kosen in the city, expertise and entrepreneurial technology, and free thinking. (https://www.nadec-base.jp/nadec-base%e3%81%a8%e3%81%af/)

[30] An organization established mainly by industry associations in 2005 and supported as members by higher education institutions such as universities, financial institutions, etc. for the purpose of revitalizing the manufacturing industry in the Nagaoka region. (http://www.naze.biz/about/outline/)

Materials Chemistry Course. After 5 years of consistent education, the students can go on to a major course for another 2 years, and after graduating from the major course, a bachelor's degree in Engineering is awarded to go on to graduate school. The college has the International Exchange Promotion Center, which promotes exchanging activities with affiliated colleges and has a workshop being used for practical training and an on-campus venture company called "Next Technology."

8.1.2. Contents of Activities and Implementation Structure in Rwanda

Both Kosen have participated in the JICA Open Innovation Challenge for African Development[31], which has been implemented since 2019, and participated in the "JICA-Kosen Innovation Platform" established in the same year. Nagaoka Kosen conducted a prototype production and experimental demonstration at the Kosen Open Innovation Challenge in Kenya in 2019. As a specific activity in collaboration with a local startup company in Kenya, Nagaoka Kosen created a prototype machine that automatically separates larva of Hermetia Illucens (Phoenix worms) used as agricultural fertilizers and feeds. In addition to this effort, as reverse innovation in 2020, Nagaoka Kosen is implementing an open innovation with IPRC Tumba in Rwanda. Specifically, in collaboration with IPRC Tumba, Nagaoka Kosen is creating a device that can measure and disinfect the temperature to check the infection status of COVID-19 installed at the entrance of the school building. At the Kosen Open Innovation Challenge in 2019, Kitakyushu Kosen collaborated with JICA's "Project for Strengthening Coffee Value Chain in Rwanda" and developed smartphone's applications and devices that measure the sugar content of coffee beans, and a measuring device that uses an odor sensor to detect the potatoes-odor of coffee.

8.1.3. Advantages and Attractiveness of Collaborative Activities in Rwanda

Both Kosens answered that they obtained higher educational effects for students because they are working with great motivation. Nagaoka Kosen replied that IPRC students in Rwanda are so fluent in English and use it on a daily basis, so it was a great advantage for Kosen students to communicate with Rwandan students and teachers in English to solve the problems for the long-term such as six months or one year. In addition, although there were differences in technical skills between IPRCs and Kosen, Nagaoka Kosen commented that it was also attractive for Japanese students to gain valuable experience by teaching the Rwandan students. Kitakyushu Kosen mentioned that originally, there was an on-campus venture company called Next Technology and had a mechanism for internships on campus through this company. However, participation in the Open Innovation Challenge provided students with opportunities to practice what they learned at school, and to make presentations on ideas which meet the needs in the target countries. Kitakyushu Kosen expressed that it was a very good experience for the next generation to upgrade their qualities.

[31] https://www.jica.go.jp/openinnovation/index.html

8.1.4. Challenges of Collaboration Activities in Rwanda

Table 8-1 shows the main issues and challenges raised by both Kosens. The details will be described for each issue.

Table 8-1 Challenges of Collaboration Activities in Rwanda

Challenges	Contents
Regional issues	・ Concerns in safety ・ Considering the financial burden on Kosen students, Africa is not included in the target of international exchange program. ・ Students have low interest and awareness in Africa
Teacher's burden	・ Responding to technical consultations from students and work related to international cooperation program tend to be concentrated in the same faculty members and departments. ・ Heavy burden on teachers. Excessive works including adjusting logistics in English, making appointments with other institutions and schools, and leading students.
System	・ There is less incentive for faculty members because they are evaluated not by international cooperation activities but by research achievements. ・ Coordination within campus is also difficult to handle.

Source: Developed by JICA Survey Team based on interviews with Nagaoka Kosen (December 9, 2020) and Kitakyushu Kosen (December 11, 2020)

Regional Issues

Nagaoka Kosen usually implements cooperation activity after concluding a MoU. Therefore, if IPRCs want to carry out full-scale cooperation program or dispatch students, they had to sign up a MoU with targeted organization as one of the overseas dispatch training destinations; however, there were concerns about the safety in African countries. The National Institute of Technology (KOSEN) as a joint organization of its colleges (Kosen) has a condition to allow teachers and students to travel to other countries. According to that condition, neither teachers nor students are able to travel unless the risk level 1 of the overseas safety information announced by the Ministry of Foreign Affairs. In that case, it is difficult to dispatch teachers and students to African countries. Kitakyushu Kosen actively participated in the Kosen open innovation challenge so far since one of the recently retired teachers had been actively involved in promoting international exchange program responsibly. However, after his retirement, it is unclear for Kitakyushu Kosen to continue the work in African countries like before. Kitakyushu Kosen has a strategy of targeting neighboring Asian countries for international exchange, and most Kosen students do not have interests nor recognition in Africa. Kitakyushu Kosen commented that they hold an international exchange briefing seminar every spring and conducts a questionnaire survey to students on the degree of interests in foreign countries. According to the results of this survey, Europe and the United States are the most popular followed by South Korea, Singapore, Taiwan, etc. Depending on the future activities in Africa, Africa might be included in the students' choice, but it is still under discussion in Kitakyushu Kosen whether institutional activities can be done in Africa or not.

Teacher's Burden

Nagaoka Kosen also pointed out it is a heavy burden for a small number of faculty members to do logistic arrangements in English related to study tours and site visits, such as making appointments with other technical colleges, leading students etc.

Kitakyushu Kosen pointed out that one of the issues when participating in the Kosen Open Innovation Challenge was that technical consultations from students tended to be concentrated on one particular teacher or department. In the case of Kitakyushu Kosen, it was possible to deal with the above issue because there was a foundation that students can consult with the Manufacturing Center and Next Technology, however it may be difficult for other Kosens to promote the program. It was also stated that the students can come up with ideas, but they do not have the skills to turn these ideas into products, so it is necessary to connect with the school staff and private companies to support the students.

System

According to Nagaoka Kosen, the faculty members are evaluated by their research achievements but not by their international cooperation activities, therefore, it would be difficult as the entire school to work for the international cooperation activities or to get interests and involvement in the school. Regarding the system, as previously mentioned in the above "Teacher's burden", it seems that some faculty members take charge of the international cooperation work rather Kosens systematically implement the program as the whole school. Therefore, it is necessary to plan collaborative activities by considering and understanding these issues (There was comment from Nagaoka Kosen that outside consultants made logistic arrangements at Kosen Open Innovation Challenge, therefore, it was easier to participate in the program).

8.1.5. Other International Activities

Table 8-2 summarizes the status of international activities at both Kosens. The details of each activity are described below.

Table 8-2 Other International Activities

Activities	Contents
Exchange with affiliated overseas schools	・ Invitation of students from affiliated overseas schools, dispatch of Kosen students to overseas affiliated schools ・ Training for teachers at overseas affiliated schools ・ Production of robots using Lego ・ Joint projects for solving overseas issues (Prevention graffiti on the walls of the World Heritage city, examination of efficient rainwater storage equipment, etc.)
Participation in JICA projects	・ Participation in the Kosen Open Innovation Challenge ・ Accepting JICA trainees from overseas

Activities	Contents
Planning and implementation of events	・ Planning and implementation of ideathons[32] and hackathons[33] in which overseas students also can participate
Research by teachers	・ Joint research with overseas affiliated schools ・ Half-year or one-year of sabbatical research at overseas

Source: Developed by JICA Survey Team based on interviews with Nagaoka Kosen (December 9, 2020) and Kitakyushu Kosen (December 11, 2020)

Exchange with Affiliated Overseas Schools

Nagaoka Kosen has an international exchange promotion center which promotes international exchange programs on campus and cooperates with educational institutions in other countries such as Mexico, Thailand, Malaysia, Vietnam, Singapore, Mongolia, Finland, and France. The center is engaged in activities such as inviting students from these overseas affiliated schools and dispatching their own students to overseas affiliated schools. Since National Institute of Technology (KOSEN) itself exports a package of their education system to Mongolia and Thailand, Nagaoka Kosen is also involved in conducting training for teachers of overseas affiliated schools. In addition, Nagaoka Kosen produced robots using Lego with overseas affiliated schools and jointly discussed how to deal with regional issues of affiliated schools such as examination of measures to prevent graffiti on the walls of the World Heritage city, and examination of equipment for efficiently storing rainwater, etc.)

In Kitakyushu Kosen, international exchange committee dealt with international exchange programs so far, but global promotion center (provisional name) will be established in FY 2021 for the promotion of more proactive international exchange. Kitakyushu Kosen has partner schools in Taiwan, China, Singapore, Malaysia, Thailand, Indonesia, the United States, Mongolia, Finland, Vietnam, South Korea, and Germany and exchanges academic programs. Students mainly interact each other through internships and short-term study programs in abroad for about two weeks. Besides, Kitakyushu Kosen dispatches teachers to overseas affiliated schools which National Institute of Technology (KOSEN) established. In addition to studying abroad at affiliated schools, Kitakyushu Kosen mentioned that there were several students studying abroad using "Tobitate! (Leap for Tomorrow)" program (Study abroad program organized by Ministry of Education, Culture, Sports, Science and Technology) for half a year.

Participation in JICA Projects

As mentioned above, both Kosens participate in the JICA's Kosen Open Innovation Challenge program and work to solve problems in African countries in collaboration with overseas higher education institutions and private companies. In addition, Kitakyushu Kosen also receives JICA trainees' visits.

[32] Ideathon is a coined term of 'idea' and 'marathon'. It is an event of creating ideas by group on the set theme and competing for results. It is held from several hours to several days.

[33] Hackathon is a coined term of 'hack' and 'marathon'. It is an event for software developers to develop a program or service with other participants from a day to one week and compete on the outputs.

Planning and Implementation of Events

Kitakyushu Kosen held various activities such as the ITS Ideathon for about a week inviting overseas students to Kitakyushu-city and the International Hackathon for Human Resource Development program for the next generation.

Research by Teachers

At Kitakyushu Kosen, there are some faculty members who are individually conducting joint research with educational institutions in foreign countries, and there are also one or two faculty members who are doing researches at overseas for half a year or a year.

Activities Cannot be Implemented

According to Nagaoka Kosen, technical cooperation (implementation of joint research/ projects, data sharing and trial production with 3D printers, etc.) is not implemented due to differences in technical level and it is desired that this issue will be eventually solved. Therefore, it is expected the technical capabilities of technical college-level educational institutions overseas is improved. In addition, Nagaoka Kosen indicated that it produced a lot of online teaching material and contents, but due to the issues of copy right and high usage fees, they are not used in other countries.

8.1.6. Possibility of Cooperation with IPRC

Nagaoka Kosen is very active in collaboration with IPRC and has already started building an ecosystem by incorporating IPRC. On the other hand, Kitakyushu Kosen mentioned that National Institute of Technology (KOSEN) proactively exports KOSEN education to other countries, therefore, to promote the participation of Kosen in JICA projects, it is better to discuss with KOSEN, not individual Kosen (college). According to Kitakyushu Kosen, since there is anxiety in expanding the activities in Africa with each Kosen's (college's) resources, it is recommended to approach KOSEN. In Table 8-3, possible implementation methods of cooperation between Japanese Kosens and IPRCs in Rwanda are proposed based on the background heard from Kosens.

Table 8-3 Possible Implementation Methods of Cooperation with Kosen and IPRC

Possible implementation method of cooperation	Background
1. Formulation of students and industry platform system	For faculty members of Kosen, cooperation with developing countries has little merit. Therefore, it will work better to build students and industry platform system. Also, it can be a sustainable initiative if it is designed well, such as making a system which can make benefits by operationalization of ideas and getting sponsorship fees. Along with the corporation from KDDI, JICA, and Prossell Inc.[34], Nagaoka Kosen is planning to launch an ecosystem in 2021. In that system, JICA will provide the issues in developing

[34] https://prtimes.jp/main/html/rd/p/000000004.000059560.html

Possible implementation method of cooperation	Background
	countries, Nagaoka Kosen will share these issues with Kosen students nationwide, students will try to solve them online, then if there are any ideas which could be a business, Nagaoka Activation Zone of Energy will support the commercialization.
2. Collaboration with IPRCs and internship programs organized by JICA projects	There are many Kosen students who are interested in foreign countries, so it will be very attractive if internship programs are organized by JICA. In addition, if the burden on staff of Kosen is reduced by deploying a person in charge of coordination (such as consultants), it will be easier for Kosen to cooperate with.
3. Formulation of a system inside Kosen for accrediting international cooperation programs as a part of internship credits	At Nagaoka Kosen, internship programs are included in the academic curriculum, and there is a system for accrediting international cooperation programs as internship credits. Therefore, much more Nagaoka Kosen's students participated in Kosen Open Innovation Challenge than those of other Kosens, and as the school, there is a tendency to actively promote students' participation in such opportunities. If this system is introduced to other Kosens, students' participation and interests in international cooperation activities would increase.
4. Formulation of detailed rules for safety management by National Institute of Technology (KOSEN), and individual college (Kosen)	By reducing safety concerns of the faculty members, it will be easier for Kosen to cooperate with international cooperation activities.
5. Introduction and dissemination of local situation to students	Kitakyushu Kosen holds an international exchange briefing seminar every spring and implements a questionnaire survey on the students' interests in overseas countries. However, students feel familiar to Europe, the United States and Asia, but not in Africa. Since students have only the image that Africa is a place to go for assistance such as Japan Overseas Cooperation Volunteers, it is quite effective to let the students know about the local situation on education and development.

Source: Developed by JICA Survey Team based on interviews with Nagaoka Kosen (December 9, 2020) and Kitakyushu Kosen (December 11, 2020)

Considering the above results, the possible contents of cooperation can be considered; 1) projects such as the ongoing Kosen Open Innovation Challenge, 2) establishment of an ecosystem in which JICA, IPRCs, Kosens, and Japanese companies are planning to implement in collaboration with Nagaoka Kosen, 3) accreditation of joint research activities on solving issues by IPRC and Kosen students as a credit of internship program, and 4) training and study of IPRC students and faculty members at Kosen within the framework of JICA projects.

8.2. Information from Private Companies

This section describes the results of interviews conducted with 11 Japanese private companies. They were conducted online as well. The companies targeted for the interviews were mainly those already visited Rwanda and performed some business; however, there was one company which had not yet entered in the market but showed interests in developing business in Rwanda. In addition, since there

is a possibility to access the company's confidentiality and important matters during the interview, the name of company and their products are not disclosed in this report and results are written within the range which does not have negative impact to their business.

8.2.1. Field of Work of the Companies

Most companies interviewed consisted of ICT including hardware, software, and related products manufacturers. Their work covers a wide range of fields including online sales, construction of financial payment systems that applied blockchain technology, development of application of information collection in the agricultural field using drones and smartphones, development of GIS applications that also use GPS, development of educational software and contents using ICT equipment, and the development of parts that connect to a switchboard to provide a stable supply of electricity.

8.2.2. Contents of Activities and Implementation Structure in Rwanda

Regarding the companies which already implemented activities in Rwanda, the contents of activities and implementation structure are summarized in Table 8-4 and Table 8-5. Regarding fields of activities, there are more activities in education and application development, but it can be seen that the companies cover a wide range from agriculture to consulting services. (See Table 8-4)

In terms of the implementation structure, 9 out of 10 companies which invested in Rwanda have already made partnerships with local companies and universities or signed MoUs with ministries and governmental agencies or established local affiliated companies and schools. In addition, many companies which cooperate with multiple institutions (local companies + local universities + ministries, etc.) were confirmed. (See Table 8-5).

Table 8-4 Fields and Contents of Activities in Rwanda

Fields	Contents of Activities
Education	・ AI training courses for beginners using online ・ Installation of small footprint computers (single board PC) in the local programming schools ・ Lecture on IoT at IPRC ・ Distance lectures on blockchain, building up of a business model, cyber security, etc. at universities such as the African Institute for Mathematical Sciences (AIMS) and Carnegie Mellon University (CMU) ・ Training of engineers at programming schools, job placement of graduates in local companies, and in-house employment
Application development	・ Sales of information gathering applications of road damages ・ Development of web applications such as evaluation questionnaires and smartphone applications ・ Development of an application to ensure traceability of coffee beans using blockchain
Agriculture	・ Transportation of agricultural products and data analysis ・ Management of coffee plantations by IoT
Insurance	・ Demonstration and commercialization of insurance business using blockchain

Fields	Contents of Activities
Lightning hazard countermeasures	・ Installation and networking of lightning detection devices with sensors, development of lightning rods in Rwanda, survey and examination for implementation of maintenance and support management
Communication	・ Selling in-house developed smartphones to local companies
Security	・ Delivery of biometric authentication system to the Kigali Airport Authority
Consulting	・ Consulting and business matching services for Japanese companies interested in expanding business into African countries including Rwanda.

Source: Developed by JICA Survey Team based on interviews with each company held on December 2020.

Table 8-5 Business Implementation Structure in Rwanda

Implementation Structure	Details
Collaboration activities with Rwandan companies	・ Singed up MoUs with Rwandan companies. Japanese company is in charge of application development and Rwandan company is embedding it in their own products and selling the products. ・ Implementing joint projects with local companies ・ Providing in-house products (teaching materials) to local companies ・ Partnership agreement with a local recruitment agency ・ Startup of a business in Rwanda by ex-interns of Japanese company, and cooperation as a local agency (technical front company in Rwanda). ・ Singed up MoUs with local companies. Japanese company sells in-house developed products to local companies. Local companies carry out sales and providing installation guidance to end users.
Collaboration with universities and IPRCs in Rwanda	・ Recruitment of students by African Centers of Excellence in Data Science (ACE-DS) and African Centers of Excellence in IoT (ACE-IoT), and accepting internships from AIMS ・ Signed up partnership agreement with AIMS, CMU, and the University of Rwanda ・ Offering MOU to IPRC Karongi (not concluded yet)
Collaboration with ministries and governmental agencies of Rwanda	・ Signed up MoU with the Ministry of ICT ・ Received consent of cooperation from ICT Chamber (2 respondents)
Establishment of affiliates in Rwanda	・ Establishing a group company in Rwanda and collaboration in offshore development ・ Opening computer programming schools in Rwanda
Cooperation with other Japanese companies	・ Conducted joint activities with other Japanese companies, local universities, and local companies.

Source: Developed by JICA Survey Team based on interviews with each company held on December 2020.

8.2.3. Advantages and Attractiveness of Doing Business in Rwanda

The following were pointed out as the advantages and attractiveness of doing business in Rwanda (Table 8-6). In addition, it was commented that there is a horizontal linkage among Japanese companies operating in Rwanda, so doing business is easier.

Table 8-6 Attractiveness of Doing Business in Rwanda

Attractiveness	Details
Human resources in Rwanda	・ Many students with great ideas that lead to the solution of local problems and issues (3 respondents) ・ Very valuable because many human resources are fluent in both English and French (2 respondents) ・ Rwandan people are serious, diligent and hardworking and their way of

Attractiveness	Details
	communication is similar to Japanese so it is easy to work with (2 respondents) ・ Positive about introduction of the latest ICT-related technology (2 respondents) ・ There are universities such as AIMS and CMU with outstanding students. These universities respond quickly with highly technical skills and trustful as partners.
Business environment	・ As a country, the IT business environment is well prepared. ・ The communication environment is well established in urban areas. ・ Easy to do business since the country is physically small and industrial bases are concentrated in some areas
Existence of issues for which in-house products and own skills are likely to be useful.	・ Issues remain in the data communication environment especially in rural areas and between rural areas and cities. ・ The country has many challenges for improvement of farmers' income, and it can be considered as the business potential. ・ Since there are still non-electrified areas, there is business potential for the delivery of fuel cells and storage batteries.
Overall cost	・ Cheaper than Asian countries.
Security	・ Safe and stable (2 respondents)

Source: Developed by JICA Survey Team based on interviews with each company held on December 2020.

8.2.4. Challenges in Doing Business in Rwanda

Regarding the challenges in implementing business in Rwanda, the followings were mainly pointed out (Table 8-7). The most common issue is challenges of human resources followed by the difficulty of making the business profitable.

Table 8-7 Challenges in Doing Business in Rwanda

Challenges	Details
Human resources in Rwanda	・ There are few highly skilled human resources in the filed of ICT ・ There are many poaching and job hopping among employees. ・ Lack of opportunities to gain practical experiences as an engineer. Normally engineers need to gain experience for 3-4 years after graduation under seniors in the same companies, but there is a definite lack of such opportunities in Rwanda. Opportunities of internships for students are also limited. ・ With the exception of some universities such as AIMS and CMU, there are concerns about the technical level among teachers at higher educational institutions. ・ There are few human resources who have a business perspective on whether the proposed idea can be realized as a business. ・ Business skills and customs such as verbalization of required items for development and the process of "Ho-Ren-So [35] " (Reporting - Having communications - Receiving counseling) are not accustomed to Rwanda employees yet.

[35] "Ho" stands for "Hokoku (report)", "Ren" for "Renraku (communicate), "So" for "Sodan (consult)" in Japanese.

Challenges	Details
Overall cost	・ Resources cannot be borne by my company due to the size of my company. Impossible to carry out or continue the business in Rwanda unless the remuneration for the burden which is the same level as in Japan is obtained. ・ Commercialization is difficult without higher profitability than developing other products and obtaining merits that lead to the next business opportunities. ・ Because of the insufficient infrastructure, heavy investment for infrastructure is necessary. ・ Low chance to establish as business since the user's (customers') income is too low
Business operation	・ Communication in English and cultural differences are burdens for my company ・ Burden in operation is heavy. ・ Difficult to lead in face-to-face opportunities
Size of the market	・ The market size is not big. (2 respondents) ・ From the business side of view, there is a conceptual aspect that the market is divided for each country, and Africa is not composed in the form of one market.

Source: Developed by JICA Survey Team based on interviews with each company held on December 2020.

8.2.5. Current Status of Other International Activities

The Survey Team conducted interviews to the companies about their activities in the foreign countries other than Rwanda and their activities targeting overseas human resources in Japan. The outline of main activities is the following (Table 8-8). Most of the companies were expanding their business to overseas including African countries. In addition, six companies accepted international students from Rwanda and other countries as internships under the ABE initiative program.

Table 8-8 Status of International Activities

Implementing Area	Activities
African countries	・ By setting branch offices in Johannesburg covering the market in South Africa, Lagos covering West Africa, Lusaka covering Central Africa, and Nairobi covering East Africa, the company is expanding their business in the fields of public safety, telecommunication, and smart energy. ・ Implementing business matching with Japanese companies interested in expanding their market into Africa and local companies, and conducting consulting services for their market expansion ・ Supporting Tanzanian local company which works on electrification in non-electrified areas. ・ Implementing educational tours in computer programming education in East Africa including Rwanda, Kenya, and Tanzania. ・ Implementing computer programming schools and workshops in Tanzania and Kenya ・ Implementing projects in Mozambique ・ Observation of technology exhibitions and industry in Egypt ・ Business Model Formulation Survey in Senegal ・ Implementation of engineer courses in machine learning in West African countries (under planning) ・ Demonstration experiments in Uganda and Malawi ・ Sales of anti-counterfeit paper to the Democratic Republic of Congo
Asian countries	・ Offshore development in India ・ Offshore development in Sri Lanka ・ Observation of technology exhibitions and industry in China and Myanmar ・ Demonstration experiments in India, Indonesia, and Myanmar
Others	・ Observation of technology exhibitions and industry in Dubai and the U.S.A.

Implementing Area	Activities
Japan	・ Accepting international internship students as the ABE Initiative program (6 respondents) ・ Accepting company visits by JICA trainees

Source: Developed by JICA Survey Team based on interviews with each company held on December 2020.

8.2.6. Possibility of Cooperation with IPRCs

Regarding the possibility of cooperation with IPRCs, the following ideas were suggested (Table 8-9). The most common was "manufacturing of in-house products at IPRC" and "formation of platform (by Rwandan and Japanese companies and educational institutions), and joint development and business matching". In addition, there were a wide range of suggestions such as "sales of in-house products and utilization in IPRCs", "acceptance of internships from IPRCs", and "maintenance of in-house products by IPRCs".

However, many companies replied that it would be difficult to accept interns. Specifically, because the number of students to accept is limited, IPRC students cannot be selected when they are compared with other university students due to the lower technical skills, and the burden is heavy for companies to look after them. Also, regarding the employment of IPRC graduates, one company mentioned that they do not meet the company's recruitment criteria unless they have a four-year university degree. Another company mentioned, basically, only four-year university graduates are hired, but there is a possibility of employment if IPRC graduates have technical skills equivalent to four-year university graduates, however, if they cannot obtain engineer visas, recruitment is difficult. In addition, it was mentioned since the Rwandan side partners with which the company has a MoU are the MINICT or the ICT Chamber, there is no connection to the line of the MINEDUC. There were some opinions commenting that there is a possibility of cooperation if inter-ministerial collaboration is carried out.

Table 8-9 Possible Collaborative Activities with IPRCs

Type of Activities	Contents of Activities
1. Manufacturing of in-house products at IPRCs	・ Provision of technical guidance to IPRC teachers and staff of Production Unit, production localized products, and utilization in class ・ Provision of technical transfer and guidance to IPRCs on production of localized products if being able to obtain a large scale of contract from the Ministry of Agriculture, Agricultural Cooperatives, etc. ・ Provision of guidance on production of local lightning protection equipment, ordering installation of the products to IPRCs
2. Formation of a platform, joint development and matching	・ Formulation of a platform between IPRCs and Japanese companies, proposals from IPRCs, and joint development (hackathon) (3 respondents) ・ Formation of a platform and matching among Japanese companies wishing to expand their business into Rwanda and local companies as well educational institutions including IPRCs ・ Holding a contest to let students develop applications that run

Type of Activities	Contents of Activities
	on particular company's OS which contribute to solve their local social issues.
3. Sales of in-house products and utilization in IPRCs	・ Preparation of the environment for distance learning and online training by installing an ultra-compact microwave communication system ・ Purchase and utilization of in-house products such as AI-related educational contents, small footprint computer teaching materials, and educational contents for programming, by the MINEDUC and IPRCs
4. Accept internship students from IPRCs	・ Accepting internships jointly with affiliated local companies ・ Accepting internships in affiliated local companies
5. Maintenance of in-house products	・ Ordering the maintenance work of in-house products to IPRCs because it is not cost-effective in case Japanese companies do by themselves. ・ IPRC and a local affiliated company jointly develop an IT system for recording and managing after-sales service and maintenance information after installation of the products.
6. Lectures to IPRCs	・ Provision of remote IT and IoT related lectures to IPRCs (3 respondents)
7. Product development using facilities and equipment of IPRCs	・ Joint product development between IPRC and students of in-house programming school using IPRCs' Production Unit.
8. Collaborative work for demonstration experiment	・ Involvement of IPRCs in demonstration experiment which is conducted by Japanese company with other organizations and provision of technical transfer
9. Participation in technical cooperation projects targeting IPRCs	・ Participation in the project as a member and sharing knowledge and experience

Source: Developed by JICA Survey Team based on interviews with each company held on December 2020.

8.2.7. Advice from the Japanese Companies to IPRCs

Table 8-10 shows the main advice given to IPRCs by the Japanese companies which already expanded their business in Rwanda. Three major points were raised: to develop technical skills, to have a mindset to keep improving oneself, and to gain experiences. Advice on technical skills and the mind set will be reflected to the curriculum, practical training, and students' guidance by RP and IPRCs. On the other hand, with regard to gain experience, it cannot be achieved only by efforts of IPRCs and private companies, so governmental support is highly needed. For example, it can be considered to set up the system of internship in which IPRC graduates can work as interns at companies related to their specialty for a period of time (such as one year) to gain experience and at the same time, certain incentives are provided to these companies.

Table 8-10 Advice from the Japanese Companies to IPRCs

Category	Details
Technical skills	・ Various ways of collaborations are possible as long as the technical skill levels are similar to those of universities such as CMU and AIMS. ・ It seemed like that practical work was not done so much. It seemed that the equipment was good quality and carefully handled, but the number of equipment was not enough for each student to operate one by one. It is important for each student to have a chance to operate the equipment in practical lessons.

Category	Details
A mindset that keeps improving oneself through self-study etc.	・ Technology continues developing day by day. A growing engineer is a person who acquires the attitude and mindset to learn new technology based on the learnt skills and embody it rather than firmly acquiring the skills learnt at school. So that at IPRCs, it is important not only to focus on skills, but to nurture human resources who can acquire such mindset and continue improving by themselves. ・ Taking exams or self-studying by watching Youtube about AI etc., are also good for upgrading and strengthening their own skills.
Experience	・ It is not limited only to IPRC Tumba, but engineers must improve their technical skills and gain more experience under their seniors for three to four years after graduation from the school. There are few new graduates who are ready to work with enough practical skills. In Rwanda, there is a definite lack of opportunities to gain such experience. One of the opportunities to acquire technical skills is the internship programs at companies, but they cannot accept a large number of students, so that the companies will receive students from excellent universities such as CMU, and IPRC students cannot be selected.

Source: Developed by JICA Survey Team based on interviews with each company held on December 2020.

Chapter 9. Conclusions and Recommendations

9.1. Conclusions

The current courses and education contents offered at IPRCs are consistent with the Rwandan government's policy of promoting tourism, manufacturing, ICT, agriculture and finance. Interviews with companies have confirmed that IPRC graduates have high marks for their ICT skills (especially networking) and human skills such as time management and a sense of responsibility. IPRC students can acquire human skills such as leadership, time management, a sense of responsibility, and communication skills with colleagues and supervisors through workshops in the campus, IAP and incubation activities for starting their business. This could be the reason of IPRC students' high reputation from employers. On the other hand, IPRC graduates' evaluation of business skills such as marketing, sales, and business planning was relatively low, so it is necessary to understand the needs of the industry and reflect them in the curriculum.

In terms of ICT in education, IPRCs have been training on distance learning methods and are working on the implementation of distance learning even under the influence of COVID-19. This is due to the strong support of the RP, who have been providing the training and uploading the contents of the distance learning to the online platform. However, ICT environment at IPRCs are not sufficient, therefore, IPRCs stated they need support on internet access and computer devices that enable each school to use ICT, technical training for teachers (including remote teaching), and a curriculum that takes ICT technology into account. Besides, it is expected that challenges, such as some contents are difficult to teach in remote education, will emerge in the promotion of remote education.

Regarding ICT education, the RP is in the process of unifying the curriculum, and the RP is paying attention to the practical content of the curriculum based on industrial needs with the cooperation of industry but is it not clear to which extent the content of the curriculum takes ICT into account. On the other hand, even though contents of ICT education are updated by the curriculum revision, it is difficult to incorporate the latest technologies into the curriculum since the programming language, system development methods and communication infrastructure standards constantly advance. Also, AI and IoT are already included in IPRCs' IT and ICT departments' syllabus, however, the contents which are taught in IPRCs are basic since teachers are not active engineers. Moreover, based on the interview results of IT companies in Japan, the engineers' skill which is expected by the industry is not individual skills such as a particular programming language but a self-improving mind. Actually, hardware, software and programming languages are frequently upgraded, so engineers have to keep collecting the latest technical information and improving their own skills after employment. Therefore, they are required to acquire the skills and mindset of which they identify what they do not know and solve by themselves through internet search etc. Thus, it is more important to include pedagogical

methods which nurture self-improving mind in all subjects rather than to incorporate the latest technical skills in compulsory subjects by the curriculum revision.

In addition, IPRC schools are actively developing their production units, and although many practical ideas that respond to the needs of daily life have been produced, they tend to be ad hoc due to the lack of a coherent strategy and a plan as schools or RP. This point was also pointed out by other development partners.

Due to the recent organizational restructuring, there is some confusion in the scope of responsibilities of each institution for various activities. In particular, there are many IPRCs that do not conduct graduates' tracer survey or employers' satisfaction survey, and RP is not aware of this situation. This is an issue in the aspect of not confirming the evaluation of labor market to IPRCs' education.

Although TVET support in Rwanda is currently provided by many development partners such as Korea, Germany, Switzerland, France, and the Netherlands, there has been no harmonization of curricula and qualifications within the EAC region, nor has there been cooperation among the TVET institutions in other countries[36]. The emphasis is also more on supporting RTQF level 1-5 schools and the upper-level institutions of the IPRC such as RP and RTTI. It is considered that the IPRCs have benefited from the support to the RPs and RTTIs, through curriculum development and training of teachers and staff. On the other hand, IPRCs have individual needs in terms of infrastructure development and training of teachers and staff (especially in technical training and ICT-applied teaching methods), and it would be important to find ways to meet these needs.

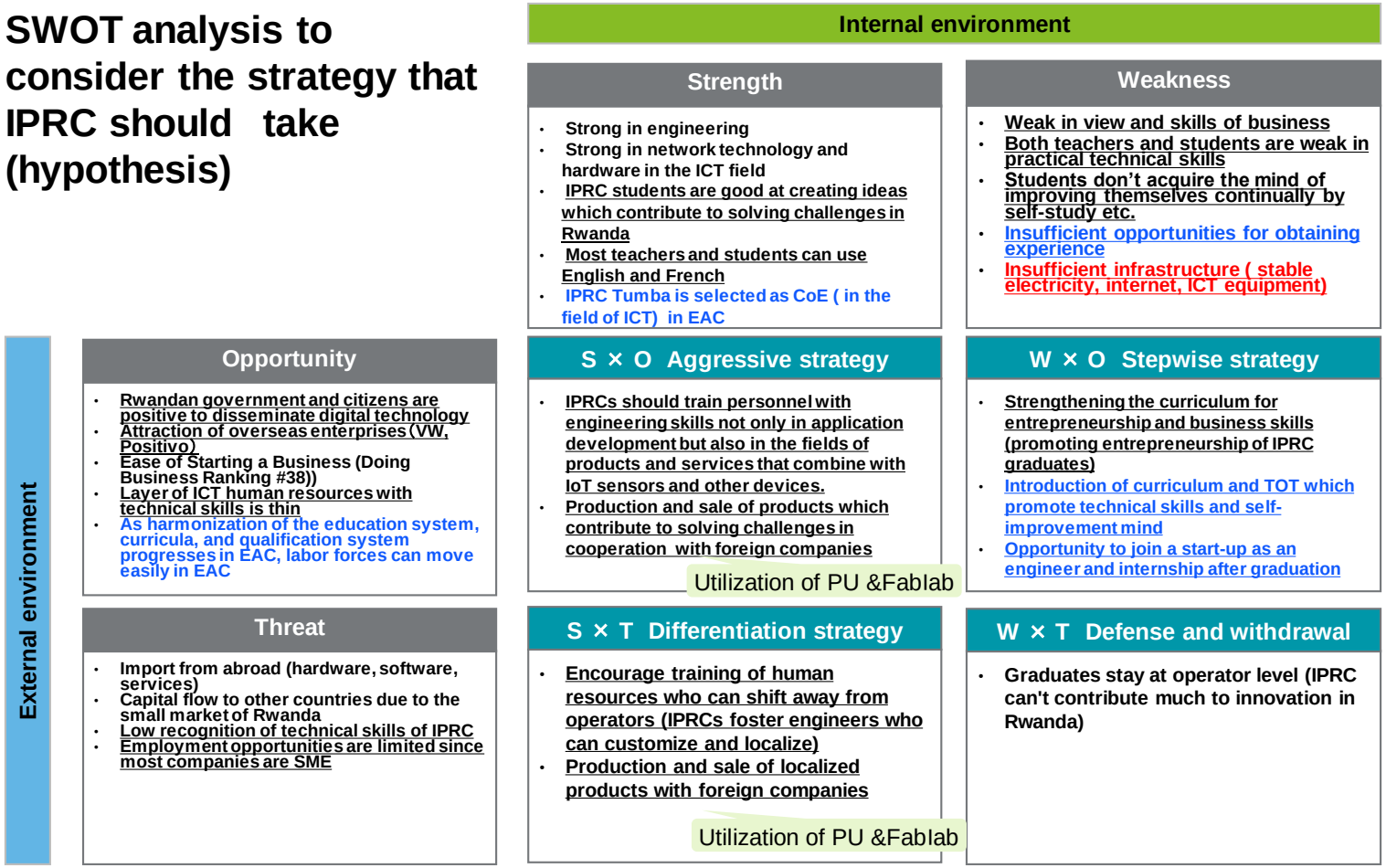
It was pointed out by Kosens and Japanese companies that there is a technical level difference with IPRCs. It does not necessarily mean there is a barrier against collaboration, but the needs to strengthen the hands-on skills are implied. Regarding the collaboration between Kosens and IPRCs, challenges on the region, teachers' burden and Kosen's system were pointed out and it became clear that planning the program which can overcome such challenges is necessary if collaboration with Kosen is anticipated. Besides, Japanese companies suggested IPRC students need to strengthen their technical skills, acquire the mindset of improving themselves by self-study etc., and accumulate the work experience after graduation. To collect detailed information on IPRC's curricula and the reality of the class was not included in this survey's scope, but the further survey on above points and the reflection to curricula and a way of teaching are expected in the future.

[36] The Swiss Government is currently supporting the EAC TVET harmonization process. Also, as have been stated in 5.4, EASTRIP sponsored by World Bank supports collaboration among TVET institutions in Kenya, Tanzania and Ethiopia (non-member country of EAC) and harmonization of curricula and qualifications by placing IUCEA which is Uganda-based EAC organization as an implementing agency. French Government which started assistance in 2020 to IPRC Tumba for establishment of Mechatronics department will consider cooperation with EU-AU and EASTRIP on harmonization of qualification.

Based on the survey results, a SWOT analysis was conducted to examine the strategies that IPRC should take in the future. The result is shown in Figure 91. The direction of the support is determined by which of the three strategies (S×O, S×T and W×O) the IPRC should focus on. Based on Figure 9-1, assistance plans are proposed in "9.2 Recommendations".

Lastly, it should be noted that there was limitation for the information collection and analysis of this survey since Japanese experts could not conduct the field survey as originally planned due to the influence of COVID-19.

SWOT analysis to consider the strategy that IPRC should take (hypothesis)



Underlined items are related to the proposed project (A), items in blue are related to the proposed project (B) and the item in red is related to the proposed project (C).

Figure 9-1 SWOT Analysis of IPRC

Reference: JICA Survey Team

9.2. Recommendations

Based on the survey results, the following 3 strategies of assistance can be considered.

（1） Aggressive strategy（S×O）

1) <u>IPRCs should train personnel with engineering skills not only in application development but also in the fields of products and services that combine with IoT sensors and other devices.</u>

Not only reflecting in the curriculum, but IPRCs should upgrade the incubation centers and production units that are currently in place at each school by providing them with Fablab capabilities and make effective use of them. Also, Fablab which was established in Kigali by JICA and other Fablab which are going to be set up in Musanze, Huye and Rwamagana by 'The ICT Innovation Ecosystem Strengthening Project' should be effectively used, for example, IPRC teachers and students can produce products utilizing their facilities and equipment. In this process, IPRCs eventually form a network with TVET institutions in Rwanda and EAC countries to share product data for production in each school and to collaborate on new product development in order to stimulate ideas and raise the average level of technical skills.

2) <u>Production and sale of products which contribute to solving challenges in cooperation with foreign companies</u>

Some Japanese companies are interested in collaborative development with IPRC since IPRC students have good ideas to solve challenges and needs in Rwanda and are fluent in both English and French. A platform of IPRC and Japanese companies should be formulated so that IPRCs and Japanese companies which are interested in IPRC's ideas can be matched. It should be an attractive framework. For instance, if they are matched, the subsidy for product development will be provided within the Project budget. A similar system can be formulated and utilized with domestic companies and foreign capital companies in Rwanda.

（2） Differentiation strategy（S×T）

1) <u>Encourage training of human resources who can shift away from operators (IPRCs foster engineers who can customize and localize)</u>

To differentiate products and services from those from overseas and from university graduates, IPRCs should train personnel who can localize and customize various products using local resources, which should be reflected in the IPRC curriculum and strengthen practical skills.

2) Production and sale of localized products with foreign companies

There is already one Japanese company which is trying to develop a localized product with IPRC and there are some Japanese companies which are interested in production of their localized products at IPRCs. Therefore, IPRCs and Japanese companies which are interested in this activity need to be connected by a platform formulated by IPRCs and Japanese companies. When they are matched, Japanese companies provide technical instruction to IPRC teachers and production unit staff by the cost of the Project and products and teaching materials will be produced, sold outside and utilized in the class. In this activity, current production units will be effectively used, and it is expected by the technical transfer of Japanese companies that technical skills of IPRCs will be strengthened and reputation and awareness of IPRCs will be improved in Rwanda. If foreign capital companies in Rwanda are interested in, the similar activity can be examined.

（3） Stepwise measures（W×O)

1) Strengthening the curriculum for entrepreneurship and business skills (promoting entrepreneurship of IPRC graduates)

Although IPRC includes entrepreneurship classes in its curriculum and has a full range of teaching and learning materials[37], it was heard from Rwandan and Japanese companies that graduates' skills and the aspect of business are still insufficient. Also, according to IPRC, a part of materials cannot be used due to the limitation of the number of classes. Therefore, firstly it is recommended, try to improve the students' business skills by increasing the number of lessons of entrepreneurship and business skills and incorporating the contents based on the business aspect in specialized subjects so that the current materials can be fully used. Then, to establish a system in each IPRC which connects students and financial assistance organizations and private incubators to prevent failure of starting business without financial resources and technical advice.

IPRCs institutionalize support such as linking to financial support organizations and private incubators to prevent students from not being able to start their own businesses due to lack of funding or technical advice.

2) Introduction of curriculum and TOT which promote technical skills and self-improvement mind

To strengthen technical skills and promote acquiring self-improvement mind, curriculum revision and teacher training are necessary. In terms of curriculum revision, increment of practical classes aiming at acquiring more hand-on skills, introduction of research activities, inclusion of taking international ICT certification exams such as Cisco, CompTIA, and ICDL are considered. It is proposed to assist

[37] Business management (Level 6) and Business monitoring, evaluation and auditing (Level 7) which were developed in Project for Strengthening the Capacity of Tumba College of Technology Phase 2

curriculum revision in the Project, to formulate a platform of IPRCs, Rwandan and Japanese companies, to strengthen teachers' ability by companies' technical transfer, and to introduce practical learning materials using this platform. It is also necessary to promote further cooperation between IPRC schools and private companies to promote the internship system.

3) <u>Opportunity to join a start-up as an engineer and internship after graduation</u>

It was pointed out in an interview that employment opportunities for the fresh graduates are very limited in Rwanda although engineers need to accumulate experience after school since fresh graduates are still insufficient as engineers. To fill in the gap, incubation centers, incubators and IPRCs should collaborate to seek opportunities for graduates to join start-up companies as members. Also, to assist to establish the system of internship for IPRC graduates which is similar to the internship program for four-year university graduates implemented by RDB and National Capacity Building Secretariat[38] so more graduates can improve their technical skills in the real workplace.

In combination among the above (1) – (3), the following 3 project ideas are proposed.

(A) Comprehensive Assistance

Objective	To strengthen the ability of nurturing highly skilled human resources in the field of ICT by strengthening technical skills of IPRCs
Type of Assistance	Technical cooperation project
Target Organization	MINEDUC, MIFOTRA, MINICT, RP, IPRC
Major Activities	1) Strengthening the collaboration among IPRCs, companies and Kosen − Development of concepts and TOR − Establishment of a platform of IPRCs and Rwandan companies (This platform will be used in 2) and 3)) − Establishment of a platform of IPRCs, Japanese companies and Kosen (This platform will be used in 2) and 3))
	2) Curriculum review and improvement in teaching − Review and advise especially on practical classes, entrepreneurial and business skills, research and certification exams (international IT exams) − Special lectures by companies (including on-line lectures) − Observation of Kosen during the training in Japan
	3) Development and production of products and learning materials − Technical instruction by companies and Kosen − Hackathon, collaborative development − Ideathon and hackathon in collaboration with incubators in Rwanda − Utilization in the class, sale to outside customers
	4) Improvement of infrastructure − Improvement of infrastructure of electricity and internet − Improvement of the equipment of the production unit and ICT
	5) Establishment of an internship program after graduation − Assistance in interministerial collaboration − Establishment of an internship program for IPRC graduates

[38] [Ministry of Public Service and Labour, 2015]

	6) Awareness raising of the general public − Publicizing IPRC curriculum and training contents (activities 1)-5) above) − Publicizing IPRC outputs (how graduates are successful)
Japanese Inputs	− Experts (Team Leader, Industry-University Collaboration, ICT, Facility, Equipment etc.) − Training in Japan − Cost for facility and equipment − Activity cost (Training cost, meeting cost, material cost, research and development cost etc.)
Strength of Japan	− Technical skills in the field of ICT
Points to Consider	− New curriculum is under development by RP − Collaboration with other JICA projects such as 'The ICT Innovation Ecosystem Strengthening Project' − Coordination with other development partners which support the TVET sector

(B) Assistance for Policies and Ministries

Objective	To strengthen the role of Rwanda as a TVET leader in EAC in ICT field
Type of Assistance	Dispatch of long-term experts
Target Organization	MINEDUC, MIFOTRA, MINICT, RP, IPRC
Major Activities	1) Establishment of an internship program after graduation − Assistance in interministerial collaboration − Establishment of an internship program for IPRC graduates
	2) Assistance of harmonization of education system, curricula, certificates etc. in EAC − Assistance of the system revision in Rwanda based on the policy developed by EAC Secretariat − Development and dissemination of IT skill standard in Rwanda
	3) Strengthening co-learning inside Rwanda placing IPRC Tumba as a leader − Organizing opportunities of learning among IPRCs such as seminars, study sessions, collaborative development and research etc., placing IPRC Tumba which is CoE as a leader
	4) Strengthening collaboration among CoE in EAC − Organizing a study tour to other CoE institutions in ICT area in EAC and regular meetings for sharing activities − Conclusion of MoU with other CoE institutions in ICT area in EAC and conducting teacher training and short-term students' exchange
Japanese Inputs	− Experts (Advisor for MINEDUC, Advisor for RP) − Activity cost (Travel expense, training cost, meeting cost etc.) − The third country training
Strength of Japan	− Long-term experience in assistance of TVET and ICT areas in Rwanda − Operation experience of national examination system related to IT skill standard
Points to Consider	− Progress of harmonization of TVET facilitated by EAC Secretariat − Status of the new curriculum developed by RP

(C) Assistance for Upgrading Infrastructure (Electricity and Data Communication)

Objective	To upgrade the power supply and data communication for better learning environment

Type of Assistance	Grant aid
Target Organization	MINEDUC, IPRC
Major Activities	1) A survey of the current status − Information collection on the current status of power supply − Information collection on the current status of data communication and data capacity − Selection of IPRCs which will be the target of grant aid
	2) Installation of power backup − Power distribution/ introduction of generators or storage batteries or solar system
	3) Installation of data communication − Installation of data communication equipment between IPRC and access points of high-speed internet
Japanese Inputs	− Experts (Facility, Equipment【Electricity and Telecommunication】etc.)
Strength of Japan	− Rich experience in Africa in the field of electricity and telecommunication − Availability of Japanese companies' products in this field
Points to Consider	− A map of optical fibers set in Rwanda needs to be obtained.

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DATA COLLECTION SURVEY ON TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING IN THE REPUBLIC OF RWANDA

APPENDICES

February 2021

Japan International Cooperation Agency (JICA)

Koei Research & Consulting Inc.

RW
JR
21-002

Appendix 1: List of Interviewees

List of Interviewees

Category	Organization	Name	Title
Government Institution	Ministry of Education	Mr. Eric Niyongabo	TVET Specialist
	Ministry of ICT and Innovation	Mr. Ndungutse Paul	Technical Advisor to the Minister
	RISA	Mr. NGOGA Said	Division Manager
	WDA	Mr. AMON KWESIGA	Ag. Director of Technological Subjects & Infrastructure Quality Unit
RDB	RDB	Mr Amos Mfitundinda	Officer in Capacity Development Unity, RDB
ICT Chamber	ICT chamber	Mr. NTALE Alex	CEO
Private companies (ICT General Users)	Attraction Tours and Transport Ltd	Ndashyikirwa Jean Baptiste	General Manager
	Destiny Art Media Ltd	Uwera Nina Rahabu	Production Manager
	EAST AFRICAN FOODS AND BEVERAGES	Mr. VIREN SHAH	Managing Director
	Fair Construction Ltd	Mr. Katusa Joseph	Tender and Contract Coordinator
	Gloria Hotel	Mr. Uwizeyimana Joseph	General Manager
	HYGEBAT LTD	Mr. Rwigamba Antoine	HR Manager
	Kabuye Sugar Works Ltd	Mr. Thiru NAVUKKARASU	General Manager

Category	Organization	Name	Title
	KIME Ltd	Mugambira Jean Baptiste	Managing Director
	Landmark Ltd	Ms. Ngamije Thamar	Admin and Finance Manager
	LEMIGO Hotel	Mr. Denis Bizimana and Mrs. Kabirigi Nadia	HR Manager and Assistant Front Office Manager
	MANUMETAL Ltd	Mr. Bayigamba Jean Louis	CEO
	ROKO Construction Ltd	Mr. Gatsinzi Richard	Senior Quantity Surveyor
	RWACOF Export Ltd	Mr. Nkundikimpaye Valens	Technical Officer
	Rwanda Discovery and Travel Agency Ltd	Mr. Ndikubwimana Frederic	Managing Director
	Rwanda Tea Packers Ltd	Mr. Kabagambe Hamim	Factory Manager
	SAFINTRA RWANDA Ltd	Mr. Gerard Busyete	HR Manager
	SAGEC Ltd	Mr. Ngabonziza Jean Bosco	General Manager
	Uber Luxe Safaris Ltd	Mr. Edris KAMOGA	General Manager
Private companies (ICT Professional Users)	AFTEC LTd	Mr. Mujyambere Olivier	General Manager
	Andela Rwanda LTD	Alpha Ogilo	Engineering Lead
	Broadband Systems Coorporation	Ms. Uwamariya Noella	HR and Administration Manager
	COMPULEC RWANDA	Mr. Bimaro Noel	Managing Director

Category	Organization	Name	Title
	COMPUTECH Ltd	Ms. Kwizera Emelyne	Senior Accountant Manager
	Computer Support and Consultancy	Mr. Niyotwagira Emile	Director of Finance
	DYNAMIC BUSINESS GROUP	RUSAGARA Serge	Managing Director
	Imprimerie Professional Graphics system	Mr. Ngendahimana Nepomuscene	Marketing Officer
	Integrated Computer Networks	Ms. Gasasira Francoise	Operation Manager
	ISPA Ltd	Mr. TITO Musafiri, Mr. Habinshuti Benjamin	IT Engineer , Accountant
	Symphony Rwanda Ltd	Ms. Uwera Arlette	Sales Executive
	Vision Technologies Company Ltd	Mr. Albert Gisoda Ndayisenga	Chief Operating Officer
	ZIP Technologies Ltd	Mr. Jean de Dieu Iyamuremye	Marketing and sales Officer
RP	Rwanda Polytechnic	Mr. Kamanzi	Advisor of RP Vice Chancellor
IPRCs	IPRC Tumba	Mr. Maniraguha Muhamad	Lecturer/Head of Science and Common Cource Unit
	IPRC Kigali	HABAGUSENGA Louis	Director of Academic Services
	IPRC Ngoma	Mr. BIGARABA Aggee,	Director of Academic Services
		Ms. Murebwayire Marie Leonce	Ag. Deputy Principal Academics and Trainings
		Mr Ishimwe Theogene	Public Relation officer

Category	Organization	Name	Title
	IPRC Karongi	Mr. BIZIYAREMYE Jean Baptiste	Carrier Development and Guidance
	IPRC Musanze	Mr. Mfinanga Joseph	Deputy Principal in charge academic and training
	IPRC Huye	Mr. NIZEYIMANA Claude	Public Relations and Communication Officer
	IPRC Gishari	Mrs. INGABIRE Dominique	Deputy Principal Academics and Training
	IPRC Kitabi	Mr. Niyonzima Laurent	Director of Academic Services
Development partner	Chamber of Skilled Crafts Koblenz	Mr. Matti Tomingas	Project Manager Rwanda
	Swiss Embassy SDC	Mr. Peter Lindenmann	Deputy Head of Cooperation
	EDC Akazi Kanoze/ Huguka Dukore Project	Mr. Steve Kamanzi	Chief of Party
	USAID	Mr. David Rurangirwa	Senior Education Specialist
	KOICA TVET TAPF (Technical Assistance Pool Fund)	Ms. Maria Ramos	Senior TVET Specialist
	Mott MacDonald Strengthening Education for Agricultural Development (SEAD) Project	Mr. Rob Van de Gavel	Team Leader
	GIZ Digital Solutions for Suitable Development (DSSD) Project	Mr. Olaf Seidel	Program Director
	Expertise France TVET Support Project in Rwanda	Mr. David Farge	Resident Technical Assistant

Category	Organization	Name	Title
	Sparkassenstiftung für internationale Kooperation e.V. Savings Banks Foundation for International Cooperation (SBFIC)	Ms. Wiebke Anna Wedekind	Dual Apprenticeship System Advisor
	TVET SSWG Chair German Embassy	Ms. Inga Kluender-Preuss	Deputy Head of Development Cooperation
Graduates of IPRC Tumba	RP_IPRC KARONGI	Mr. NZABANDORA Fabien	IT Lab Technician
	IPRC Karongi	Mr. Sibomana Benjamin	IT Instructor
	-	Mr. Hagenimana Olivier	Not working
	NAICO	Mr. Japhet RUKUNDO	Technical Supervisor
	IPRC Karongi	Mr. Safari Cyprien	ICT Instructor
	IPRC Tumba	Mr. Wilson Mugabe	Instructor
	Manumetal Ltd	Mr. Nizeyimana Eugene	IT Manager
	Manumetal Ltd	Mrs. Mutuyimana Mathilde	Production Chief
	REG	Turatsinze Ignace	Machine Operator
	EUCL	Mr. Harindintwari Emmanuel	Electrician
	REG	Mr. Bigirimana Isaie	Electrician
	MARA Phones Rwanda Ltd	Ms. Kabanza Aline	Quality Control

Category	Organization	Name	Title
	Nyereka Tech	Mr. Munyeshyaka Nkurunziza Shadrach	CEO and Founder
	Nyereka Tech Ltd	Mr. Rukundo Amon	Sales Manager
	FAst Fix Tech	Mr. Rugina Patrick	Technician
	IPRC Tumba	Mr. Muzimanganye Jean Pierre	Instructor
	Brain Works Africa	Mr. Nzayisenga Samuel	Software Engineer
	RAPID Solution Ltd	Mr. Mugisha Julius	Managing Director
Incubators	BAG Innovation	Gabriel Ekman	Co-founder and CEO
	WESTERWELLE	Mr. Dusi Blaise	Operation Manager
	K-lab	Ms. Kamikazi Yettah	K-LAB General Manager
	Fab-lab	Mr. Danny Bizimana	FAB LAB General Manager
	Impact Hub	Mr. Mugisha Chris Aldo	Community and Events Host
EAC	EAC TVET section	Dr. James Otieno Jowi	Principal Education Officer
工業高等専門学校	長岡工業高等専門学校	村上　祐貴氏 宮田　真理氏	環境都市工学科　教授 物質工学科　助教授
	北九州工業高等専門学校	前川　孝司氏 白濱　成希氏	電気電子コース　准教授 生産デザイン工学科 情報システムコース教授、国際交流委員会長
本邦企業	株式会社 DIVE INTO CODE	野呂　浩良氏	代表取締役 CEO

Category	Organization	Name	Title
		市川　智也氏	Global Unit Leader
	音羽電気工業株式会社	井上　真二氏	取締役
	株式会社 Amegumi	常盤　瑛祐氏 福岡　洸太郎氏	代表 インド法人取締役
	NEC	吉藤　寛樹氏 北濱　満里子氏	市場開発本部 アフリカ事業開発室マネージャー アフリカ社ナイロビ事務所 Senior Sales Coordinator
	バンプレコーダー株式会社	八木　浩一氏	代表取締役社長
	フューチャー株式会社	貞光　九月氏	Strategic AI Group
	レックスバート・コミュニケーションズ株式会社	田中　秀和氏 Mr. Samuel IMANISHIMWE	代表取締役 Assistant Manager
	楽天ヨーロッパ	山中　翔大郎氏	インキュベーション事業　事業企画部
	株式会社 Ict4e	原　秀一氏	代表取締役
	株式会社 Momo	大津　真人氏	代表取締役
	凸版印刷株式会社	花木　英之氏	DX デザイン事業部 セキュアビジネスセンター グローバルセキュア本部 営業推進部　販売促進チーム担当部長

Appendix 2: List of Collected Documents

List of Collected Documents

S/N	Name of the Documents	Author/ Institution	Year of Issue
1	Old Organigram for IPRCs	Ministry of Public Service and Labor	2018
2	New Organigram for IPRCs	Ministry of Public Service and Labor	2020
3	IPRC Tumba Asset List	IPRC Tumba	2019
4	IPRC Tumba_Graduates Tracer Survey 2019 Final	IPRC Tumba	2019
5	IPRC Tumba_Operational Manual for the Company-Final Draft	IPRC Tumba	N/A
6	Proposal of IPRC Tumba Action Plan 2020/2021 (RDPU)	IPRC Tumba	2020
7	Industrial Attachment Tentative Work Plan 2019-2020	IPRC Tumba	2019
8	Reports of Business Incubation Center Database in IPRC Tumba Academic Year 2019-2020	IPRC Tumba	2019
9	Proposal of IPRC Tumba Action Plan 2020/2021 (Musanze Satellite)	IPRC Tumba	2020
10	Implementation Framework for ICT in Education	MINEDUC	2016
11	The Republic of Rwanda's Policy on Science, Technology and Innovation_2006	Ministry in the President's Office in Charge of Science, Technology and Scientific Research	2006
12	The Republic of Rwanda's Policy on Science, Technology and Innovation_2020	National Council for Science and Technology	2020
13	Summary of DPs activities in TVET Priority Programs	MINEDUC	2020
14	RP New Organigram	RP	2020
15	National Tracer Survey for TVET and Higher Education Graduates and Employer Satisfaction	Ministry of Education	2019
16	Layout of IPRC Kigali	IPRC Kigali	2020
17	IPRC Kigali Equipment	IPRC Kigali	2020
18	E-Learning Guidelines	RP	2020
19	Layout of IPRC Ngoma	IPRC Ngoma	2005
20	List of Assets (IPRC Ngoma)	IPRC Ngoma	2019
21	Tracer Survey Report	IPRC Ngoma	2018
22	ICT curriculum	Information Technology Group of IPRCs	2018
23	System configuration	IPRC Ngoma	2020
24	Revised Procedure Manual Guiding IPRC Ngoma Production Unit	IPRC Ngoma	2019
25	Asset List (IPRC Musanze)	IPRC Musanze	2020
26	Musanze_Layout	IPRC Musanze	N/A
27	IPRC Huye List of Assets	IPRC Huye	2020
28	Report of Research and Innovation Projects that Have Been Done in IPRC – Huye from 2015 - 2020	IPRC Huye	2020
29	IPRC Huye layout	IPRC Huye	2015
30	Valuation Report of Institutional Property Located in Shaburondo Village/ Bwinsanga Cell/ Gishari Sector/ Rwamagana District/ Eastern Province (Addressed to IPRC Gishari)	Pro Realty Ltd.	2020
31	ICT in Education Policy	Ministry of Education	2016
32	IPRC Gishari Layout Plan	IPRC Gishari	2019
33	Capacity Development Plan for Academic Year 2019-2020	IPRC Kitabi	2019
34	Draft of Satisfaction Survey Report for Academic Staff Done in Academic Year 2019-2020	IPRC Kitabi	2020
35	Draft of Tracer Survey Report of Alumni Graduated at IPRC Kitabi From Academic Year 2014 to Academic Year 2019	IPRC Kitabi	2020
36	Asset List (IPRC Karongi)	IPRC Karongi	2020
37	IPRC Karongi Nyamishaba Campus Layout	IPRC Karongi	N/A
38	TVET Partnership Project Fact Sheet	Chamber of Skilled Crafts (CSC) Koblenz	N/A
39	Brief on the SEAD Project and Major Activities presented at SMM meeting	SEAD	2019
40	Bird's Eye View : SEAD and SEAD West Project	SEAD	2020
41	TVET Support Project in Rwanda – Brief Presentation	Mr. David FARGE	2020
42	Year 59 Official Gazette no Special of 20/8/2020	Government of Rwanda	2020
43	SPIU Staff	RP	2020
44	RP e-learning Platform	RP	2020
45	Preparedness for School Reopening	RP	2020
46	RP Rationalization – Continuation of Activities	RP	2020
47	Minutes of SSWG Meeting as of 23 September 2020	SSWG	2020
48	Resolutions of SSWG made at Retreat in January 2020	SSWG	2020
49	ACQF	ACQF	2019
50	ACQF 3rd Peer Learning Webinar	ACQF	2020
51	atingi	German Embassy	N/A
52	Rwandan TVET Qualifications Framework	Ministry of Education, WDA	2012
53	The Rwanda Education Qualifications Framework	Ministry of Education	2016

Appendix 3: Questionnaires

Questionnaire for the Data Collection Survey on Technical
and Vocational Education and Training in the Republic of Rwanda

【RDB】

Objectives

This survey is to clarify the issues and specific measures to promote the use of ICT at TVET institutions and to enhance innovation functions that are necessary for the development of highly skilled human resources in the TVET sector in Rwanda. Also, this survey is to collect necessary information for considering future JICA support.

Information obtained during this survey will be used only for the above purposes and information will not be disclosed to any third parties.

Date: MM/DD , 2020	Name of Company:
Address:	Tel. Number:
Fax:	URL:
Name of interviewee:	Position:
Cell Phone Number:	E-mail Address:

Industry Sector：

☐Agriculture, Forestry, and Fishing ☐Mining ☐Construction ☐Manufacturing,
☐Transportation, Communications, Electric Gas, And Sanitary Services ☐Wholesale Trade
☐Retail Trade ☐Finance, Insurance, and Real Estate ☐Services
■Public Administration
☐Others: Specify:_____

1. National Industrial Policy of Rwanda

1-1 Please provide the latest version of any published documents or government's URL addresses which describe Rwanda's national industrial policy including policy outline itself, by sector, export promotion policy, and priority sector development policy, etc. If any unpublished documents are available through URL or any other ways, please provide the access information.

Name of published documents/URLs

Name of unpublished documents, URLs, or any other available sources

1-2 Are there any gaps between policies, implementation plans and achievements?

1-3 If there are any gaps between policies, implementation plans and achievements, what are the reasons and countermeasures including gaps between human resource development plans and actual situation?

1-4 According to "RWANDA VISION 2020 RVISED 2012", Rwanda is aiming for higher income per capita in 2020, which is US$1240 from US$595 in 2011. What are your comments on this national strategy? Do you think it is achievable or need to change in some way? If so, why?

1-5 In the National Strategy for Transformation (NST1), the high-priority industrial sub-sectors such as hospitality/tourism, printing, food processing and others are presented. What is current nurturing situation? Please state by each priority sub-sector.

1-6 There are many policies and plans such as NSDEPS and Rwanda Polytechnic Strategic Plan which concern the involvement of RDB, but which one is the guiding document for RDB?

1-7 What is the status of implementation of these policies and plans from the view of the RDB staff? What are the problems, solutions, the benefits and obstacles of each promotion policy?

1-8 The budget for providing education and various technical training programs seems to be decreasing year by year. What are the reasons and what are considered as countermeasures?

2. Industrial Structure

2-1 Please provide us with the latest version of any published documents or government's URL addresses which describe current status of industrial structure including on government issued documents, announcement from industry associations, or macro-economic statistical data. The information should include the followings;

(1) Data on GDP showing current and trends of the last five years and classifying by industry sector, particularly by manufacturing sub-sectors including agricultural products, food processing, commerce, pharmaceutical products, etc.

(2) If available, any information or statistical data on informal sectors or small shops and auto repairs shops, cell phone repair shops, small/medium/micro enterprises, and so on.

2-2 What are growing industries? Also, would you please state the reasons of growth?

_____

_____)

2-3 What are declining industry sectors or sub-sectors? Also, would you please state the reasons of declination?

_____

_____)

2-4 What are government's target settings like growth rate or production volume by each sector or sub-sector? And what are the selection criteria for each sector and sub-sector's target settings?

_____

_____)

2-5 What is the current status of priority industry such as hospitality/tourism, printing, food processing and others set by the government in terms of its output, growth rate, gaps between plan and actual output, etc. Please state if there are any changes in selecting industrial sectors, target settings, selection criteria?

_____

_____)

2-6 Are there any industries where many foreigners (especially from EAC) are working? If yes, please share with us the information on the industries and the countries where workers came from.

_____

_____

2-7 Are there any countries (especially in EAC) and industries where many Rwandan go and work? If yes, please share with us the information on the countries and industries.

_____

_____

3. Current Status of Business Investment

3-1 Please inform the current status of investing in business in terms of the number of applications of business entities in the country.

(1) ☐Increasing
(2) ☐Stable
(3) ☐Decreasing

3-2 If increasing, in which industry sector or sub-sector the new entities belong to?
☐Agriculture, Forestry, and Fishing ☐Mining ☐Construction ☐Manufacturing
☐Transportation, Communications, Electric Gas, And Sanitary Services
☐Wholesale Trade ☐Retail Trade ☐Finance, Insurance, and Real Estate ☐Services
☐Public Administration ☐Others: Specify:_____

3-3 If decreasing, which industry sector or sub-sector is decreasing?
☐Agriculture, Forestry, and Fishing ☐Mining ☐Construction ☐Manufacturing
☐Transportation, Communications, Electric Gas, And Sanitary Services
☐Wholesale Trade ☐Retail Trade ☐Finance, Insurance, and Real Estate ☐Services
☐Public Administration ☐Others: Specify:_____

3-4 Among the new business entity applicants, how many companies are relating to ICT sector in 2019? Please indicate by number.
_____ Applicants

3-5 Regarding the type of ownership of the new business entity, which type of ownership occupies the largest portion among them?
(1) ☐Completely domestic
(2) ☐Completely foreign
(3) ☐Joint venture (Capital ratio %)
(4) ☐Others (Specify:)

Ratio:____%

3-6 Regarding the legal status of the new business entity, which type of ownership occupies the largest portion among them?
(1) ☐Solely proprietorship
(2) ☐Partnership
(3) ☐Company limited
(4) ☐Publicly limited
(5) ☐Government owned
(6) ☐Cooperatives
(7) ☐Others (Specify:)

Ratio:____%

4. Industrial Estates and Free Trade Zones

4-1 Please provide the list of industrial estates, free trade zones, export processing zones, etc.

(1)_____

(2)_____

(3)_____

(4)_____

(5)_____

4-2 What is the status of occupation of the zones? Are they fully occupied or some spaces are still available? Describe the status and the type of occupied companies of each zone,.

(1)_____

(2)_____

(3)_____

(4)_____

(5)_____

4-3 What incentives do the companies receive from the government when they settle in the industrial estates, free trade zones, and export processing zones?

(1)_____

(2)_____

(3)_____

(4)_____

(5)_____

5. Internship in RDB

5-1 Does RDB accept internship students from IPRCs? If answer is no, please state the reason.)

(1) ☐Yes

(2) ☐No (Specify the reasons:_____)

If 5-1=Yes then go to the following questions. If No, please forward to Question 6.

5-2 What department at IPRC do the students belong to? (Multiple answers allowed.)

☐Information and Communication Technology

☐Electrical/Electronic Engineering

☐Civil Engineering

☐Mechanical Engineering

☐Irrigation and Drainage technology

☐Electric communication

☐Renewable energy
☐Mining Engineering
☐Agriculture and food processing
☐Hospitality
☐English language
☐Forest resources management
☐Wild life management/ tourism
☐Veterinary Technology
☐Others (Specify:)

5-3 How many interns does RDB accept from IPRCs? Please tell us the number of the last year as an example.

(1) ☐1 to 5
(2) ☐6 to 10
(3) ☐11 to 15
(4) ☐16 and more (Specify:)

5-4 How often does RDB accept the internship student?

(1) ☐Periodically/every year
(2) ☐Non periodically (Specify:)

5-5 What kind of job do those interns do in your workplace? (Multiple answers allowed.)

(1) ☐ICT related work
(2) ☐Clerical Support
(3) ☐Sales related work
(4) ☐Manual works (incl. assembling, maintenance of machineries, etc)
(5) ☐Others (Specify:)

5-6 How satisfied are you with the skills of the interns?

(1) ☐Very satisfied
(2) ☐Satisfied
(3) ☐Fair
(4) ☐Dissatisfied (Specify the reason:)
(5) ☐Very dissatisfied (Specify the reason:)

5-7 Do you consider hiring the interns as regular employees after they complete the intern period depending on their performance during the intern?

(1) ☐Yes, I consider hiring them if they have good skills.
(2) ☐No, the performance during the intern cannot be considered as an advantage in our recruitment
(3) ☐Others (Specify:)

5-8 If you have any opinions or comments on internship students and/or such systems, toward management personnel, or even to the government, please state;

_____

_____

_____

6. Recruitment of employees from IPRC

6-1 How many IPRC graduates did you hire during the last 4 years (2017-2020)?

(1) ☐Yes

Year	2017	2018	2019	2020
Number				

(2) ☐None (Specify the reasons:_____)

6-2 Among newly hired IPRC-graduates, how many are the same students as RDB accepted as an internship student previously? (_____)

6-3 What department at IPRC does the newly employed person graduated from?
Please indicate the numbers as well.

	Department/Year	2017	2018	2019	2020
(1)	Information and Communication Technology				
(2)	Electrical/Electronic				
(3)	Engineering				
(4)	Civil Engineering				
(5)	Mechanical Engineering				
(6)	Irrigation and Drainage technology				
(7)	Electric communication				
(8)	Renewable energy				
(9)	Mining Engineering				
(10)	Agriculture and food processing				
(11)	Hospitality				
(12)	English language				
(13)	Forest resources management				
(14)	Wild life management/ tourism				
(15)	Veterinary Technology				

7. Expectation toward IPRC from Employers (RDB)

7-1 In general, what would you expect toward IPRC?

(1) ☐To use curriculums on teaching more advanced ICT operation skill

(2) ☐To emphasize more on professional business knowledge in parallel with high skill of ICT operation

(3) ☐To use curriculums on world recognized ICT standard skills such as Microsoft, CompTIA, CISCO,

(4) Oracle, etc.

(5) ☐To let the students acquire more upper skills in project management

(6) ☐Others (Specify:)

7-2 Please state if you have any opinions or comments on IPRC including their contents of operation/management, academic curriculums, students/ teachers' activities, etc.

_____

_____

_____

7-3 Please state, as RDB what type of human resources would you require from IPRCs as contributors for industry development in the country? Please describe the technical fields and level.

_____

_____

_____

8. Expectations toward the Government from Employers (RDB)

8-1 What would you expect for government to generate well qualified workers in the country?

(1) ☐To prepare market best-matched education curriculums

(2) ☐To emphasize on more hands-on skills rather than theoretical education

(3) ☐To build up well-established training program of teachers (TOT)

(4) ☐To establish well-prepared internship programs among all educational institutions

(5) ☐Others (Specify:)

8-2 Please state if you have any opinions or comments on government's IPRC policy including its operation/management, academic curriculums, students/ teachers' activities, etc.

_____

_____

_____

- Thank you very much for your cooperation. -

Questionnaire for the Data Collection Survey on Technical and Vocational Education and Training in the Republic of Rwanda

ICT Chamber

Date of interview: _____

Name of interviewer: _____

Name of interviewee: Ms./ Mr. _____

Position of interviewee: _____

Department of interviewee: _____

Place of interview: _____

1. Rwanda is one of the leading countries to promote innovation in Africa based on the Smart Rwanda Master Plan. Among many projects and programs, what are outstanding ones related to ICT human resource development and entrepreneur support? Please describe three projects and programs as good practices.

1	Name of the project and/or program	
	Development partner which supports the project/program	
	Period of the project	
	Outline of the project (overall goal, objectives, purposes, outcomes, implementing agencies, targets, implementation structure)	
	Project budget and budget execution so far	
	The progress and performance of the project so far	
	Challenges, lessons learnt and best practices of the project	
2	Name of the project and/or program	
	Development partner which supports the project/program	
	Period of the project	
	Outline of the project (overall goal, objectives, purposes,	

	outcomes, implementing agencies, targets, implementation structure)	
	Project budget and budget execution so far	
	The progress and performance of the project so far	
	Challenges, lessons learnt and best practices of the project	
3	Name of the project and/or program	
	Development partner which supports the project/program	
	Period of the project	
	Outline of the project (overall goal, objectives, purposes, outcomes, implementing agencies, targets, implementation structure)	

	Project budget and budget execution so far	
	The progress and performance of the project so far	
	Challenges, lessons learnt and best practices of the project	

2. If ICT Chamber has the report about "Develop a Strategic plan to match ICT Skills with ICT Sector industry needs in Rwanda" supported by UNESCO, would you kindly share the related document with us?

3. According to the Global Innovation Index (2019), Rwanda ranks the 5th among the 26 economies in Sub-Saharan Africa. However, it also points out the weakness of "human capital and research" for innovation. Is there any challenge related to human capital and research identified by ICT Chamber?

4. How does ICT Chamber define the ICT human resource who can promote industrial development and innovation in Rwanda? Is there any specific framework of skillset and/or ICT skill standard?

☐ 1. Yes ☐ 2. No

If yes, would you kindly share the related document with us?

5. After **National Digital Talent Policy** was developed in 2016, was it revised or replaced by another policy?

☐ 1. Yes ☐ 2. No

If yes, would you kindly share the latest version of it with us?

6. According to National Digital Talent Policy 2016, ICT human resources are categorized into three levels such as **Associate** level, **Professional** level, and **Expert** level. Which level is relevant to graduates from TVET? Please check (✓) the level relevant to IPRC and Technical

Secondary School.

Level / Graduate from	Level		
	Associate	Professional	Expert
IPRC			
Technical Secondary School			

7. According to **National Skills Development and Employment Promotion Strategy (NSDEPS) 2019-2024**, about 3 million jobs will be created from 1 million in 2016 by 2030 in ICT sector. This report categorized ICT skills into four broad categories; (a) digital literacy, (b) content processing (use of technology to communicate and analyze information), (c) hardware management, (d) content creation (software development and application management). Which jobs do you expect **IPRC graduates** to be engaged? Please check (✓) the expectation

Expectation Level / ICT Job Category	Expectation for IPRC graduates		
	Low	Middle	High
(a) digital literacy			
(b) content processing			
(c) hardware management			
(d) content creation			

8. Compared to University, what is the expected roles of TVET (**especially IPRC)** to promote industrial development and innovation in Rwanda? Would you kindly describe the different roles of graduate from University and TVET (**especially IPRC**)?

Expected roles of university

Expected roles of TVET (**especially IPRC**)

9. Does ICT Chamber have any expectation for TVET (**especially IPRC**) and TVET (**especially IPRC**) graduate to play a role for promoting innovation within the national innovation ecosystem?

☐ 1. Yes ☐ 2. No

If yes, would you describe what kind of role you expect them?

11. Is there any gap between the expectation and reality?

☐ 1. Yes ☐ 2. No

If yes, would you describe the details (what kinds of gaps you identify)?

12. Is there any project to minimize the gap in collaboration with donors?

☐ 1. Yes ☐ 2. No

If yes, would you describe the details on the following sheets and/or share such project reports with us?

1	Name of the project and/or program	
	Development partner which supports the project/program	
	Period of the project	
	Outline of the project (overall goal, objectives, purposes, outcomes, implementing agencies, targets, implementation structure)	
	Project budget and budget execution so far	
	The progress and performance of the project so far	
	Challenges, lessons learnt and best practices of the project	
2	Name of the project and/or program	
	Development partner which supports the project/program	
	Period of the project	
	Outline of the project (overall goal, objectives, purposes,	

	outcomes, implementing agencies, targets, implementation structure)	
	Project budget and budget execution so far	
	The progress and performance of the project so far	
	Challenges, lessons learnt and best practices of the project	
3	Name of the project and/or program	
	Development partner which supports the project/program	
	Period of the project	
	Outline of the project (overall goal, objectives, purposes, outcomes, implementing agencies, targets, implementation structure)	

	Project budget and budget execution so far	
	The progress and performance of the project so far	
	Challenges, lessons learnt and best practices of the project	

13. According to National Digital Talent Policy 2016, in order to achieve "Objective 2: Strengthen ICT Curriculum in Education Institutions measures", there is the "**Measure 3: Integrating Digital Skills and Certification in formal education curriculum at all levels.**" Is formal education curriculum consistent to any certification such as ICDL (International Computer Driving License) and MCP (Microsoft Certificate Professional)?

☐ 1. Yes ☐ 2. No

If yes, which certificate and how is it consistent?
If any, would you share the related documents?

14. According to National Digital Talent Policy 2016, **"ICT Sector skills Council"** is responsible for Professional Certification. Does "ICT Sector skills Council" still play the same role?

☐ 1. Yes ☐ 2. No

If no, would you tell us which organization is responsible for it?

15. Please describe the role of **"ICT Sector skills Council"** for ICT human resource development. If any, would you share the related documents such as action plan, progress report, and meeting materials?

16. According to **Rwanda Polytechnic Strategic Plan (Draft) 2019-2024**, there are several plans to improve ICT environment and promote use of ICT in TVET (such as SMART classroom, provision of Positivo laptops, internet connectivity, digitalized contents, etc.). Does ICT Chamber support and collaborate with Rwanda Polytechnic to implement this plan?

☐ 1. Yes ☐ 2. No

If yes, would you kindly describe how ICT Chamber supports the implementation of Rwanda Polytechnic Strategic Plan (2019 - 2024)?

17. According to **Rwanda Polytechnic Strategic Plan (Draft) 2019-2024**, there are several plans to improve ICT environment and promote use of ICT in TVET. If ICT Chamber

observes any challenges that Rwanda Polytechnic faced to implement Rwanda Polytechnic Strategic Plan (2019-2024), would you describe it?

18. According to Rwanda Polytechnic Strategic Plan (Draft) 2019-2024 (P25), there is the plan to develop and approve a **Rwanda Polytechnic Information and Communication Technology (ICT) Policy by 2020**. Did ICT Chamber support and contribute to developing it?

☐ 1. Yes ☐ 2. No

→ If yes, would you kindly describe what are strong points and challenges for Rwanda Polytechnic to implement Rwanda Polytechnic Strategic Plan (2019-2024) for ICT human resource development?

19. What types of ICT human resources are in demand to promote industrial development and innovation in Rwanda? Please check (✓) the level of the demand relevant to each profession.

Needs / Profession	Level of Demand		
	Low	Middle	High
Operators			
Application engineers (programmers)			
System architects			
Infrastructure engineers			
Project managers			
IT/Business Consultants (who has capability to support CEO and CIO to set and implement ICT strategy in a company)			
Digital business planner (who has capability to promote digital transformation in a company and/or create new business with digital technology)			
Other ( )			

20. What types of digital technology/skills are prioritized and/or specifically focused to be utilized to promote industrial development and innovation in Rwanda? Please check (✓) priority level relevant to each technology.

Priority / Technology		Priority Level		
		Low	Middle	High
System development	Application development			
	Web development			
	embedded control system			
	Data base development			
Operation & Maintenance	Operation skills			
	CAD (3D, including design)			

Technology \ Priority		Priority Level		
		Low	Middle	High
	PC disassembly and assembly			
Newly emerging technology	VR/AR			
	AI			
	Big Data analysis			
	Block Chain			
	IoT sensor technology			
	Drone			
	3D printer			
	RFID			
	robots			
Network technology	Infrastructure technology			
	Network construction and			
	Mobile networks			
	Network security			
	Others ( )			

21. While ICT can promote industrial development and innovation, does ICT Chamber have prioritized fields (industries) to utilize ICT? Please check (✓) priority level relevant to each field.

Fields \ Priority	Priority Level		
	Low	Middle	High
Fintech (Finance x ICT),			
Agritech (Agriculture x ICT)			
Edtech (Education x ICT),			
Healthtech (Health x ICT)			

Priority / Fields	Priority Level		
	Low	Middle	High
Foodtech (Food x ICT),			
Smart factory (Manufacturing x ICT)			
Martech (Marketing x ICT),			
Retech (Real Estate x ICT)			
Mobility tech (Mobility x ICT),			
Instech (Insurance x ICT)			
Travel Tech (Tourism x ICT)			
Other ( )			

Thank you for your cooperation!

ICT- G
No.

Company Survey on "Data Collection Survey on
Technical and Vocational Education and Training in the Republic of Rwanda"

【ICT】ICT General User

Objectives

This survey is to clarify the issues and specific measures to promote the use of ICT at TVET institutions and to enhance innovation functions that are necessary for the development of highly skilled human resources in the TVET sector in Rwanda. Also, this survey is to collect necessary information for considering future JICA support.

Information obtained during this survey will be used only for the above purposes and information will not be disclosed to any third parties.

Date: MM/DD , 2020	Name of Company:
Address:	Tel. Number:
Fax:	URL:
Name of interviewee:	Position:
Cell Phone Number:	E-mail Address:

Industry Sector：

☐Agriculture, Forestry, and Fishing ☐Mining ☐Construction ☐Manufacturing,
☐Transportation, Communications, Electric Gas, And Sanitary Services ☐Wholesale Trade
☐Retail Trade ☐Finance, Insurance, and Real Estate ☐Services
☐Public Administration
☐Others: Specify:_____

Note: If specific guidance is not given in the multiple-choice questions, please select only 1 option.

1. Company Information

1-1 List three major product(s) of the company in order of sales ranking and its ratio in total sales amount of the last year.

(1) _____ (%)
(2) _____ (%)
(3) _____ (%)

1-2 Describe type of ownership of the company.

(1) ☐Completely domestic
(2) ☐Completely foreign
(3) ☐Joint venture (Capital ratio %)

(4) ☐Others (Specify:)

1-3 What is the legal status of the company?

(1) ☐Solely proprietorship
(2) ☐Partnership
(3) ☐Company limited
(4) ☐Publicly limited
(5) ☐Government owned
(6) ☐Cooperatives
(7) ☐Others (Specify:)

1-4 Number of employees of the company

(1) ☐Less than 10
(2) ☐10 to 19
(3) ☐20 to 29
(4) ☐30 to 39
(5) ☐40 and above(Specify:)

1-5 Year of company establishment

(_____)

1-6 Membership of industry association(s) that the company belongs

(_____)

2. Management of the company

2-1 What are major issues and problems currently faced by your company? (Multiple answers allowed.)

(1) ☐Market
(2) ☐Access to financial institutions
(3) ☐Access to business advisory services
(4) ☐Human resource development
(5) ☐Others(Specify:)

(*Please specify more details on each of the above issues and problems:_____

_____

_____)

3. Recruitment of Employees

3-1 How often does the company recruit new employees?

(1) ☐Periodically (Once in a year)
(2) ☐Periodically (Twice in a year)
(3) ☐Periodically (Quarterly)
(4) ☐As needed
(5) ☐Others(Specify:)

3-2 In which field (occupation) did you recruit during the last 3 years (2017-2020)?

	Field/ occupation	Example	Number of recruitments during 2017 and 2020	Of which how many are new graduates/ rookies?	Of which how many are mid-career?
(1)	Information and Communication Technology	・Application development ・Web development ・Control/embedded system development ・ Profession of integrated systems operation ・Big data analysis ・CAD, 3D operation ・Drones ・Database including Block Chain ・Network construction and operation ・Mobile networks ・Network security ・PC disassembly and assembly ・IoT sensor technology ・3D printer			
(2)	Electrical/Electronic Engineering	・Drawings/designs ・Cabling/wiring ・Soldering/welding ・Repair of home electrical appliances ・Handling of analytical tools ・Operation of machine tools ・Repairing/re-aasembling of equipment and tools ・Operation of process control equipment and tools			

	Field/ occupation	Example	Number of recruitments during 2017 and 2020	Of which how many are new graduates/ rookies?	Of which how many are mid-career ?
		・Basic operation of ICT equipment			
(3)	Civil Engineering	・Drawings/designs ・Architectural technology ・Land/site planning and development ・Operation of machine/tools ・Management of menial laborers ・Facility construction/maintenance ・Basic operation of ICT equipment			
(4)	Mechanical Engineering	・Repair of parts/components of automobiles ・Handling of machines tools ・Drawing/design of physical structure of machines/equipment ・Operation of machine/equipment/tools ・Basic knowledge and operation of ICT equipment			
(5)	Irrigation and Drainage technology	・Drawings/designs of the sites ・Design of physical structures of machine/equipment ・Operation of machine/equipment/tools ・Management of menial laborers ・Basic knowledge and operation of ICT			
(6)	Electric communication	・Cabling/wiring technics ・Soldering/welding technics ・Handling of analytical tools ・Operation of machine tools ・Repairing/re-aasembling of equipment and tools ・Telecommunication and boradcasting technology ・Drawings/designs of parts/components ・Basic knowledge and operation of ICT ・Repair of mobile phones			
(7)	Renewable energy	・Design/drawing technic ・Metal working(forging/casting) ・Welding			

	Field/ occupation	Example	Number of recruitments during 2017 and 2020	Of which how many are new graduates/ rookies?	Of which how many are mid-career ?
		・Practical knowledge on mechanism of equipment ・Operation of lathe machine ・Operation of analytical machine/tools ・Basic knowledge and operation of ICT			
(8)	Mining Engineering	・Design/drawing ・Metal working technology (forging/casting) ・Welding ・Design/drawing ・Mechanical and structural knowledge ・Operation of lathe machine ・Operation of analytical machine/tools ・Basic knowledge and operation of ICT equipment ・Operation of lathe machine			
(9)	Agriculture and food processing	・Land planning and development ・Dairy and husbandry management ・Horticulture management ・Quality management of crops ・Soil management ・Fertilizer analysis ・Nutrition management ・Basic knowledge and operation of ICT			
(10)	Hospitality	・Cooking skill ・Table manners ・Hair styling/nailing ・Basic business tool operation ・Basic mathematic calculation ・Basic knowledge and operation of ICT ・Shop operation ・Cashiers operation			
(11)	English language	・Higher skills on English writing and reading ・Advanced knowledge and operation skill of ICT equipment			

	Field/ occupation	Example	Number of recruitments during 2017 and 2020	Of which how many are new graduates/ rookies?	Of which how many are mid-career ?
		・Understanding business system and structure ・General office clerk skill/secretary work ・Routine business operation			
(12)	Forest resources management	・Water resource management ・Wood treatment/wood working ・Botanic/afforestation zone management ・Briquette/charcoal production skill ・Heating system mechanisms			
(13)	Wildlife management/ tourism	・Zoological management ・Hotel management ・Business tool operation ・Wild life conservation mechanisms			
(14)	Veterinary Technology	・Dairy husbandry management ・Animal health and drug management ・Zoological science ・Genetic engineering			
(15)	Others	Specify ( )			

3-3 What is the recruiting method when the company hires new employees? (Multiple answers allowed)

(1) ☐Via public announcement (Newspapers, TV/radio broadcasting)
(2) ☐Via public announcement (Social media such as Facebook, Whatsapp, etc)
(3) ☐Via public announcement (Others)
(4) ☐Through student replacement department of the schools
(5) ☐Direct communication with individuals who did internship
(6) ☐Direct communication with individuals (individual relationships, etc)
(7) ☐Employee referral (introduction by the current/ ex-employees)
(8) ☐Network and recruiting events
(9) ☐Others(Specify:)

3-4 What is minimum academic qualification do you require for new applicants? (Multiple answers allowed)

(1) ☐Primary school level
(2) ☐Secondary school level
(3) ☐VTC (Department:)

(4) ☐TSS (Department:)
(5) ☐IPRC (Department:)
(6) ☐University (Department:)
(7) ☐Others (Specify:)

3-5 What is the basis of decision on hiring new employees? (Multiple answers allowed)

(1) ☐Result of entrance examination
(2) ☐Result of interviewing
(3) ☐Confirmation on holding diploma or certificate of specific skills
(4) ☐Give actual hands-on skill test
(5) ☐Result of performance during the intern
(6) ☐Others (Specify:)

3-6 How important are the following skills for newly hired employees? This question is to find out the distribution of qualification among all employees, but not limited to IPRC graduates in your company.

Skills		Priority/ Importance (Tick ONLY 1 column for each row)		
		High	Moderate	Low
	Example 1	✔		
	Example 2		✔	
	Example 3			✔
(1)	Marketing			
(2)	Sales			
(3)	Finance and accounting			
(4)	Business planning			
(5)	Mathematical skills (calculation, etc)			
(6)	English skills			
(7)	Leadership			
(8)	Communication			
(9)	Sense of responsibility			
(10)	Project management			
(11)	Logical thinking			
(12)	Time management			
(13)	ICT skills regarding system development Example: -To develop website and/or application for attracting customers, booking, marketing, etc. -To develop application for improving			

Skills		Priority/ Importance (Tick ONLY 1 column for each row)		
		High	Moderate	Low
	administration			
(14)	ICT skills regarding operation Example: -To use office application (Word, Excel, Power Point, Outlook) -To operate business application (Accounting System, Customer Relationship Management system, Enterprise Resource Planning system, Production Control System, Booking/ Reservation Management System, etc.) - To operate website and/or application for attracting customers, booking, marketing, etc.			
(15)	ICT related business skills Capability to use ICT to promote new business with digital technology			
(16)	ICT skills regarding Hardware Example: PC disassembly and assembly, IoT sensor technology, RFID, and Digital Electronics Drones, 3D printers			
(17)	ICT skills regarding Network Example: Network construction and operation, mobile networks, and network security			
(18)	Other skills (Specify:)			

3-7 How are you satisfied with skills of new employees after you hire them? This question is also to find out the distribution of qualification among all employees, but not limited to IPRC graduates in your company.

Skills		Satisfaction (Tick ONLY 1 column for each row)		
		High	Moderate	Low
	Example 1	✔		
	Example 2		✔	
	Example 3			✔
(1)	Marketing			
(2)	Sales			

Skills		Satisfaction (Tick ONLY 1 column for each row)		
		High	Moderate	Low
(3)	Finance and accounting			
(4)	Business planning			
(5)	Mathematical skills (calculation, etc)			
(6)	English skills			
(7)	Leadership			
(8)	Communication			
(9)	Sense of responsibility			
(10)	Project management			
(11)	Logical thinking			
(12)	Time management			
(13)	ICT skills regarding system development Example: -To develop website and/or application for attracting customers, booking, marketing, etc. -To develop application for improving administration			
(14)	ICT skills regarding operation Example: -To use office application (Word, Excel, Power Point, Outlook) -To operate business application (Accounting System, Customer Relationship Management system, Enterprise Resource Planning system, Production Control System, Booking/ Reservation Management System, etc.) - To operate website and/or application for attracting customers, booking, marketing, etc.			
(15)	ICT related business skills Capability to use ICT to promote new business with digital technology			
(16)	ICT skills regarding Hardware Example: PC disassembly and assembly, IoT sensor technology, RFID, and Digital Electronics Drones, 3D printers			
(17)	ICT skills regarding Network			

Skills		Satisfaction (Tick ONLY 1 column for each row)		
		High	Moderate	Low
	Example: Network construction and operation, mobile networks, and network security			
(18)	Other skills (Specify:)			

4. Human Resource Development Activities within the Company

4-1 Do you offer internal training to your employees?

(1) ☐Yes

(2) ☐No

If 4-1=Yes, then go to Question 4-2, and if 4-1=No, then go to Question 4.7.

4-2 Please specify the contents of the training.

_____

_____

4-3 What is the duration of the training? (Multiple answers allowed)

(1) ☐Half day

(2) ☐One full-day

(3) ☐2 – 3 days

(4) ☐More than 3 days

4-4 Who are the participants? (Multiple answers allowed)

(1) ☐Managerial personnel

(2) ☐Administration

(3) ☐Field engineers

(4) ☐Technical workers

(5) ☐Others (Specify:_____)

4-5 How often the training will be carried out?

(1) ☐Periodically (Specify:)

(2) ☐Implemented as needed

4-6 What are the sources of trainers?

(1) ☐Internally available trainers

(2) ☐Outsourced (Specify:)

(Please go to Question 5 after you responded above 4-6.)

4-7 Specify the reasons of currently not having training in the company. (Multiple answers allowed)

(1) ☐Because we carry out OJT during the initial stage of employment
(2) ☐Because qualified trainers are unavailable in my company
(3) ☐Because it is difficult to find qualified trainers outside my company
(4) ☐Because of lack of training materials (textbook, manuals, machinery or equipment)
(5) ☐Because we don't feel necessity of training in the first place
(6) ☐Because of the shortage of budget
(7) ☐Because we don't have enough time for the training
(8) ☐Others (Specify:)

5. Internship Program

5-1 Does your company accept internship students from TVET schools?

(1) ☐Yes
(2) ☐No (Specify the reasons:)

If 5-1=Yes then go to the following questions. If No, then go to Question 6.

5-2 What department at TVET do the students belong to? (Multiple answers allowed)

(1) ☐Information and Communication Technology
(2) ☐Electrical/Electronic Engineering
(3) ☐Civil Engineering
(4) ☐Mechanical Engineering
(5) ☐Irrigation and Drainage technology
(6) ☐Electric communication
(7) ☐Renewable energy
(8) ☐Mining Engineering
(9) ☐Agriculture and food processing
(10) ☐Hospitality
(11) ☐English language
(12) ☐Forest resources management
(13) ☐Wildlife management/ tourism
(14) ☐Veterinary Technology
(15) ☐Others (Specify:)

5-3 How many interns does your company accept from TVET schools in a year? Please tell us the number of the last year as an example.

(1) ☐1 to 5
(2) ☐6 to 10
(3) ☐11 to 15

(4) ☐16 and more (Specify:)

5-4 How often does your company accept the internship student?

(1) ☐Periodically/every year

(2) ☐Non periodically (Specify:)

5-5 What kind of job do those interns do in your workplace? (Multiple answers allowed)

(1) ☐ICT related work

(2) ☐Clerical Support

(3) ☐Sales related work

(4) ☐Manual works (incl. assembling, maintenance of machineries, etc.)

(5) ☐Others (Specify:)

5-6 How satisfied are you with the skills of the interns in general?

(1) ☐Very satisfied

(2) ☐Satisfied

(3) ☐Fair

(4) ☐Dissatisfied (Specify the reason:)

(5) ☐Very dissatisfied (Specify the reason:)

5-7 Do you consider hiring the interns as regular employees after they complete the intern period depending on their performance during the intern?

(1) ☐Yes, I consider hiring them if they have good skills.

(2) ☐No, the performance during the intern cannot be considered as an advantage in our recruitment

(3) ☐Others (Specify:)

5-8 If you have any opinions or comments on internship students and/or such systems, toward TVET management personnel, or even to the government, please state;

_____

_____

_____

6. Recruitment of employees from IPRC

6-1 Did you hire IPRC graduates during the last 4 years (2017-2020)?

(1) ☐Yes (Please write the numbers in the table below.)

Year	2017	2018	2019	2020
Number				

(2) ☐No (Specify the reasons:_____)

6-2 Among newly hired IPRC-graduates during the past four years, how many are the same students as the company accepted as an internship student previously? (_____)

6-3 What department at IPRC does the newly employed person graduated from?
Please indicate the numbers as well.

	Department/Year	2017	2018	2019	2020
(1)	Information and Communication Technology				
(2)	Electrical/Electronic				
(3)	Engineering				
(4)	Civil Engineering				
(5)	Mechanical Engineering				
(6)	Irrigation and Drainage technology				
(7)	Electric communication				
(8)	Renewable energy				
(9)	Mining Engineering				
(10)	Agriculture and food processing				
(11)	Hospitality				
(12)	English language				
(13)	Forest resources management				
(14)	Wildlife management/ tourism				
(15)	Veterinary Technology				

6-4 How satisfied are you with the skills of the newly hired **IPRC graduates** from the point of technical skill level?

Skills		Satisfaction (Tick ONLY 1 column for each row)		
		High	Moderate	Low
	Example 1	✔		
	Example 2		✔	
	Example 3			✔
(1)	Marketing			
(2)	Sales			
(3)	Finance and accounting			
(4)	Business planning			
(5)	Mathematical skills (calculation, etc)			
(6)	English skills			

Skills		Satisfaction (Tick ONLY 1 column for each row)		
		High	Moderate	Low
(7)	Leadership			
(8)	Communication			
(9)	Sense of responsibility			
(10)	Project management			
(11)	Logical thinking			
(12)	Time management			
(13)	ICT skills regarding system development Example: -To develop website and/or application for attracting customers, booking, marketing, etc. -To develop application for improving administration			
(14)	ICT skills regarding operation Example: -To use office application (Word, Excel, Power Point, Outlook) -To operate business application (Accounting System, Customer Relationship Management system, Enterprise Resource Planning system, Production Control System, Booking/ Reservation Management System, etc.) - To operate website and/or application for attracting customers, booking, marketing, etc.			
(15)	ICT related business skills Capability to use ICT to promote new business with digital technology			
(16)	ICT skills regarding Hardware Example: PC disassembly and assembly, IoT sensor technology, RFID, and Digital Electronics Drones, 3D printers			
(17)	ICT skills regarding Network Example: Network construction and operation, mobile networks, and network security			
(18)	Other skills (Specify:)			

7. Survey as general ICT user

The following questions are dealt with the situation of companies that use ICT equipment and facilities such as personal computers and internet for routine operation of the company.

7-1 How many personal computers does your company have?

(1) ☐None
(2) ☐1 to 5
(3) ☐6 to 10
(4) ☐11 and more(Specify:)

7-2 What is the operating system of the computers?

(1) ☐Windows (Version:)
(2) ☐MacOS (Version:)
(3) ☐Solaris (Version:)
(4) ☐Others (Specify:)

7-3 What is the configuration of above computers?

(1) ☐Stand alone
(2) ☐Network connected(LAN/WAN, intranet, internet connected etc.)

7-4 What major application software packages are installed in the computer?

(1) ☐Microsoft Office (Version:)
(2) ☐Mac OS Office (Version:)
(3) ☐Others (Specify:)

7-5 What application software among below are the most frequently used? Select top 3 from the followings.

(1) ☐Documentation including word processing and presentation material
(2) ☐Spread sheet
(3) ☐Database management
(4) ☐Design/Drawings
(5) ☐E-mailing
(6) ☐SNS connection
(7) ☐Others (Specify:)

7-6 Are you satisfied with the technical level of operators of the above application software?

(1) ☐Very satisfied
(2) ☐Fairy satisfied
(3) ☐Not satisfied (Specify the reason:)

7-7 Where did those operators acquire their ICT operation skills?
(1) ☐At school (Specify: IPRC, Private institutions, etc.)
(2) ☐Through personal training
(3) ☐In the company after employed through training session or OJT, etc.
(4) ☐Others (Specify :)

7-8 Do you think the productivity has improved through the use of ICT in your company?
(1) ☐Very much improved
(2) ☐Fairy improved
(3) ☐Hasn't improved (Please specify the reason :)

7-9 In what field is your company intending to improve productivity or enhance capacity through the use of ICT?
(1) ☐Increase sales
(2) ☐Enhance market
(3) ☐Improve personnel management
(4) ☐Improve process of documentation/inventory control/financial processing
(5) ☐Connectivity with external sources for obtaining information
(6) ☐Have no particular reason
(7) ☐Others (Specify :)

8. Expectation toward IPRC from Employers (companies)

8-1 In general, what would you expect toward IPRC?
(1) ☐To use curriculums on teaching more advanced ICT operation skill
(2) ☐To emphasize more on professional business knowledge in parallel with high skill of ICT operation
(3) ☐To use curriculums on world recognized ICT standard skills such as Microsoft, CompTIA, CISCO, Oracle, etc.
(4) ☐To let the students acquire more upper skills in project management
(5) ☐Others (Specify:)

8-2 Please state if you have any opinions or comments on IPRC including their contents of operation/management, academic curriculums, students/ teachers' activities, etc.

_____

_____

9. Expectations toward the Government from Employers (companies)

9-1 What would you expect for government to generate well qualified workers in the country?

(1) ☐To prepare market best-matched education curriculums

(2) ☐To emphasize on more hands-on skills rather than theoretical education

(3) ☐To build up well-established training program of teachers (TOT)

(4) ☐To establish well-prepared internship programs among all educational institutions

(5) ☐Others (Specify:)

9-2 Please state if you have any opinions or comments on government's IPRC policy including its operation/management, academic curriculums, students/ teachers' activities, etc.

- Thank you very much for your cooperation. -

ICT- P
No.

Company Survey on "Data Collection Survey on
Technical and Vocational Education and Training in the Republic of Rwanda"

【ICT】ICT Professional User

Objectives

This survey is to clarify the issues and specific measures to promote the use of ICT at TVET institutions and to enhance innovation functions that are necessary for the development of highly skilled human resources in the TVET sector in Rwanda. Also, this survey is to collect necessary information for considering future JICA support.

Information obtained during this survey will be used only for the above purposes and information will not be disclosed to any third parties.

Date: MM/DD , 2020	Name of Company:
Address:	Tel. Number:
Fax:	URL:
Name of interviewee:	Position:
Cell Phone Number:	E-mail Address:

Industry Sector :

☐Agriculture, Forestry, and Fishing ☐Mining ☐Construction ☐Manufacturing,
☐Transportation, Communications, Electric Gas, And Sanitary Services ☐Wholesale Trade
☐Retail Trade ☐Finance, Insurance, and Real Estate ☐Services
☐Public Administration
☐Others: Specify:_____

1. Company Information

1-1 List three major product(s) of the company in order of sales ranking and its ratio in total sales amount of the last year.

(1) _____ (%)
(2) _____ (%)
(3) _____ (%)

1-2 Describe type of ownership of the company.

(1) ☐Completely domestic
(2) ☐Completely foreign
(3) ☐Joint venture (Capital ratio %)
(4) ☐Others (Specify:)

1-3 Legal status of the company?

(1) ☐Solely proprietorship
(2) ☐Partnership
(3) ☐Company limited
(4) ☐Publicly limited
(5) ☐Government owned
(6) ☐Cooperatives
(7) ☐Others (Specify:)

1-4 Number of employees of the company

(1) ☐Less than 10
(2) ☐10 to 19
(3) ☐20 to 29
(4) ☐30 to 39
(5) ☐40 and above(Specify:)

1-5 Year of company establishment

(_____)

1-6 Membership of industry association(s) that the company belongs

(_____)

2. Management of the company

2-1 What are major issues and problems currently faced by company? (Multiple answers allowed.)

(1) ☐Market
(2) ☐Access to financial institutions
(3) ☐Access to business advisory services
(4) ☐Human resource development
(5) ☐Others(Specify:)

(*Please specify more details on each of the above issues and problems:_____

_____

_____)

3. Recruitment of Employees

3-1 How often does the company recruit new employees?

(1) ☐Periodically (Once in a year)
(2) ☐Periodically (Twice in a year)
(3) ☐Periodically (Quarterly)

(4) ☐As needed

(5) ☐Others(Specify:)

3-2 In which field (occupation) did you recruit during the last 3 years (2017-2020)?

	Field/ occupation	Example	Number of recruitment during 2017 and 2020	Of which how many are new graduates/ rookies?	Of which how many are mid-career?
(1)	Information and Communication Technology	・Application development ・Web development ・ Control/embedded system development ・Profession of integrated systems operation ・Big data analysis ・CAD, 3D operation ・Drones ・Database including Block Chain ・ Network construction and operation ・Mobile networks ・Network security ・PC disassembly and assembly ・IoT sensor technology ・3D printer			
(2)	Electrical/Electronic Engineering	・Drawings/designs ・Cabling/wiring ・Soldering/welding ・ Repair of home electrical appliances ・Handling of analytical tools ・Operation of machine tools ・ Repairing/re-aasembling of equipment and tools ・Operation of process control equipment and tools ・ Basic operation of ICT			

	Field/ occupation	Example	Number of recruitment during 2017 and 2020	Of which how many are new graduates/ rookies?	Of which how many are mid-career?
		equipment			
(3)	Civil Engineering	・Drawings/designs ・Architectural technology ・Land/site planning and development ・Operation of machine/tools ・Management of menial laborers ・Facility construction/maintenance ・Basic operation of ICT equipment			
(4)	Mechanical Engineering	・Repair of parts/components of automobiles ・Handling of machines tools ・ Drawing/design of physical structure of machines/equipment ・ Operation of machine/equipment/tools ・Basic knowledge and operation of ICT equipment			
(5)	Irrigation and Drainage technology	・Drawings/designs of the sites ・Design of physical structures of machine/equipment ・Operation of machine/equipment/tools ・Management of menial laborers ・Basic knowledge and operation of ICT			
(6)	Electric communication	・Cabling/wiring technics ・Soldering/welding technics ・Handling of analytical tools ・Operation of machine tools			

	Field/ occupation	Example	Number of recruitment during 2017 and 2020	Of which how many are new graduates/ rookies?	Of which how many are mid-career?
		・ Repairing/re-aasembling of equipment and tools ・ Telecommunication and boradcasting technology ・ Drawings/designs of parts/components ・Basic knowledge and operation of ICT ・Repair of mobile phones			
(7)	Renewable energy	・Design/drawing technic ・Metal working(forging/casting) ・Welding ・Practical knowledge on mechanism of equipment ・Operation of lathe machine ・Operation of analytical machine/tools ・Basic knowledge and operation of ICT			
(8)	Mining Engineering	・Design/drawing ・Metal working technology (forging/casting) ・Welding ・Design/drawing ・Mechanical and structural knowledge ・Operation of lathe machine ・Operation of analytical machine/tools ・Basic knowledge and operation of ICT equipment ・Operation of lathe machine			
(9)	Agriculture and food	・Land planning and development			

	Field/ occupation	Example	Number of recruitment during 2017 and 2020	Of which how many are new graduates/ rookies?	Of which how many are mid-career?
	processing	・ Dairy and husbandry management ・Horticulture management ・Quality management of crops ・Soil management ・Fertilizer analysis ・Nutrition management ・Basic knowledge and operation of ICT			
(10)	Hospitality	・Cooking skill ・Table manners ・Hair styling/nailing ・Basic business tool operation ・Basic mathematic calculation ・Basic knowledge and operation of ICT ・Shop operation ・Cashiers operation			
(11)	English language	・Higher skills on English writing and reading ・Advanced knowledge and operation skill of ICT equipment ・Understanding business system and structure ・General office clerk skill/secretary work ・Routine business operation			
(12)	Forest resources management	・Water resource management ・Wood treatment/wood working ・ Botanic/afforestation zone management ・ Briquette/charcoal production			

	Field/ occupation	Example	Number of recruitment during 2017 and 2020	Of which how many are new graduates/ rookies?	Of which how many are mid-career?
		skill ・Heating system mechanisms			
(13)	Wildlife management/ tourism	・Zoological management ・Hotel management ・Business tool operation ・Wild life conservation mechanisms			
(14)	Veterinary Technology	・Dairy husbandry management ・ Animal health and drug management ・Zoological science ・Genetic engineering			
(15)	Others	Specify ( )			

3-3 What is the recruiting method when the company hires new employees? (Multiple answers allowed)

(1) ☐Via public announcement (Newspapers, TV/radio broadcasting)
(2) ☐Via public announcement (Social media such as Facebook, Whatsapp, etc)
(3) ☐Via public announcement (Others)
(4) ☐Through student replacement department of the schools
(5) ☐Direct communication with individuals who did internship
(6) ☐Direct communication with individuals (individual relationships, etc)
(7) ☐Employee referral (introduction by the current employees)
(8) ☐Network and recruiting events
(9) ☐Others(Specify:)

3-4 What is minimum academic qualification do you require for new applicants? (Multiple answers allowed.)

(1) ☐Primary school level
(2) ☐Secondary school level
(3) ☐TVET level (Department:)
(4) ☐VTC
(5) ☐IPRC

(6) ☐University (Department:)

(7) ☐Others (Specify:)

3-5 What is the basis of decision on hiring new employees? (Multiple answers allowed)

(1) ☐Result of entrance examination

(2) ☐Result of interviewing

(3) ☐Confirmation on holding diploma or certificate of specific skills

(4) ☐Give actual hands-on skill test

(5) ☐Others (Specify:)

3-6 What technical skills would you require the most for newly hired employees? This question is to find out the distribution of qualification among all employees, but not limited to IPRC graduates in your company.

Skills		Priority/ Importance (Tick ONLY 1 column for each row)		
		High	Moderate	Low
	Example 1	✔		
	Example 2		✔	
	Example 3			✔
(1)	Marketing			
(2)	Sales			
(3)	Finance and accounting			
(4)	Business planning			
(5)	Mathematical skills (calculation, etc.)			
(6)	English skills			
(7)	Leadership			
(8)	Communication			
(9)	Sense of responsibility			
(10)	Project management			
(11)	Logical thinking			
(12)	Time management			
(13)	ICT skills regarding Software Example: Application development technology, web development technology, control/embedded system development technology, AI, Big Data analysis, database (including Block Chain)			
(14)	ICT skills regarding operation			

Skills		Priority/ Importance (Tick ONLY 1 column for each row)		
		High	Moderate	Low
	Example: System operation, CAD (3D, including design),			
(15)	ICT related business skills Capability to use ICT to promote digital transformation in a company and/or create new business with digital technology			
(16)	ICT skills regarding Hardware Example: PC disassembly and assembly, IoT sensor technology, RFID, and Digital Electronics Drones, 3D printers			
(17)	ICT skills regarding Network Example: Network construction and operation, mobile networks, and network security			
(18)	Other skills (Specify:)			

3-7 How are you satisfied with skills of new employees after you hire them? This question is also to find out the distribution of qualification among all employees, but not limited to IPRC graduates in your company.

Skills		Satisfaction (Tick ONLY 1 column for each row)		
		High	Moderate	Low
	Example 1	✔		
	Example 2		✔	
	Example 3			✔
(1)	Marketing			
(2)	Sales			
(3)	Finance and accounting			
(4)	Business planning			
(5)	Mathematical skills (calculation, etc.)			
(6)	English skills			
(7)	Leadership			
(8)	Communication			
(9)	Sense of responsibility			
(10)	Project management			

Skills		Satisfaction (Tick ONLY 1 column for each row)		
		High	Moderate	Low
(11)	Logical thinking			
(12)	Time management			
(13)	ICT skills regarding Software Example: Application development technology, web development technology, control/embedded system development technology, AI, Big Data analysis, database (including Block Chain)			
(14)	ICT skills regarding operation Example: System operation, CAD (3D, including design),			
(15)	ICT related business skills Capability to use ICT to promote digital transformation in a company and/or create new business with digital technology			
(16)	ICT skills regarding Hardware Example: PC disassembly and assembly, IoT sensor technology, RFID, and Digital Electronics Drones, 3D printers			
(17)	ICT skills regarding Network Example: Network construction and operation, mobile networks, and network security			
(18)	Other skills (Specify:)			

4. Human Resource Development Activities within the Company

4-1 Do you offer internal trainings to your employees?

(1) ☐Yes

(2) ☐No

If 4-1=Yes then go to Question 4-2, and if 4-1=No then go to Question 4.7.

4-2 Please specify the contents of trainings.

_____

_____

4-3 What is the duration of the training? (Multiple answers allowed.)

(1) ☐Half day
(2) ☐One full-day
(3) ☐2 – 3 days
(4) ☐More than 3 days

4-4 Who are the participants? (Multiple answers allowed.)
(1) ☐Managerial personnel
(2) ☐Administration
(3) ☐Field engineers
(4) ☐Technical workers
(5) ☐Others (Specify:)

4-5 How often the trainings will be carried out?
(1) ☐Periodically (Specify:)
(2) ☐Implemented as needed

4-6 What are the sources of trainers?
(1) ☐Internally available trainers
(2) ☐Outsourced (Specify:)

4-7 Specify what kind of training you would like to offer to your employees.
(Contents: , target participants:)

4-8 Specify the reasons of currently not having trainings in the company. (Multiple answers allowed.)
(1) ☐Because we carry out OJT during the initial stage of employment
(2) ☐Because qualified trainers are unavailable in my company
(3) ☐Because it is difficult to find qualified trainers outside my company
(4) ☐Because of lack of training materials (textbook, manuals, machinery or
(5) ☐Because we don't feel necessity of training in the first place
(6) ☐Because of the shortage of budget
(7) ☐Because we don't have enough spare time for training.
(8) ☐Others (Specify:)

5. Internship Program

5-1 Does your company accept internship students from IPRCs?
(1) ☐Yes
(2) ☐No (Specify the reasons:)

If 5-1=Yes then go to the following questions. If 5-1=No, please go to Question 6.

5-2 What department at IPRC do the students belong to? (Multiple answers allowed.)

(1) ☐Information and Communication Technology
(2) ☐Electrical/Electronic Engineering
(3) ☐Civil Engineering
(4) ☐Mechanical Engineering
(5) ☐Irrigation and Drainage technology
(6) ☐Electric communication
(7) ☐Renewable energy
(8) ☐Mining Engineering
(9) ☐Agriculture and food processing
(10) ☐Hospitality
(11) ☐English language
(12) ☐Forest resources management
(13) ☐Wild life management/ tourism
(14) ☐Veterinary Technology
(15) ☐Others (Specify:)

5-3 How many interns does your company accept from IPRCs? Please tell us the number of the last year as an example.

(1) ☐1 to 5
(2) ☐6 to 10
(3) ☐11 to 15
(4) ☐16 and more (Specify:)

5-4 How often does your company accept the internship student?

(1) ☐Periodically/every year
(2) ☐Non periodically (Specify:)

5-5 What kind of job do those interns do in your workplace? (Multiple answers allowed.)

(1) ☐ICT related work
(2) ☐Clerical Support
(3) ☐Sales related work
(4) ☐Manual works (incl. assembling, maintenance of machineries, etc)
(5) ☐Others (Specify:)

5-6 How satisfied are you with the skills of the interns?

(1) ☐Very satisfied
(2) ☐Satisfied

(3) ☐Fair

(4) ☐Dissatisfied (Specify the reason:)

(5) ☐Very dissatisfied (Specify the reason:)

5-7 Do you consider hiring the interns as regular employees after they complete the intern period depending on their performance during the intern?

(1) ☐Yes, I consider hiring them if they have good skills.

(2) ☐No, the performance during the intern cannot be considered as an advantage in our recruitment

(3) ☐Others (Specify:)

5-8 If you have any opinions or comments on internship students and/or such systems, toward TVET management personnel, or even to the government, please state;

_____

_____

_____

6. Recruitment of employees from IPRC

6-1 How many IPRC graduates did you hire during the last 4 years (2017-2020)?

(1) ☐Yes

Year	2017	2018	2019	2020
Number				

(2) ☐None (Specify the reasons:_____)

6-2 Among newly hired IPRC-graduates, how many are the same students as the company accepted as an internship student previously? (_____)

6-3 What department at IPRC does the newly employed person graduated from?
Please indicate the numbers as well.

	Department/Year	2017	2018	2019	2020
(1)	Information and Communication Technology				
(2)	Electrical/Electronic				
(3)	Engineering				
(4)	Civil Engineering				
(5)	Mechanical Engineering				
(6)	Irrigation and Drainage technology				
(7)	Electric communication				
(8)	Renewable energy				
(9)	Mining Engineering				

(10)	Agriculture and food processing				
(11)	Hospitality				
(12)	English language				
(13)	Forest resources management				
(14)	Wildlife management/ tourism				
(15)	Veterinary Technology				

6-4 How satisfied are you with the skills of the newly hired **IPRC graduates** from the point of technical skill level? This question is also to find out the distribution of qualification among all employees, but not limited to IPRC graduates in your company.

Skills		Satisfaction (Tick ONLY 1 column for each row)		
		High	Moderate	Low
	Example 1	✔		
	Example 2		✔	
	Example 3			✔
(1)	Marketing			
(2)	Sales			
(3)	Finance and accounting			
(4)	Business planning			
(5)	Mathematical skills (calculation, etc.)			
(6)	English skills			
(7)	Leadership			
(8)	Communication			
(9)	Sense of responsibility			
(10)	Project management			
(11)	Logical thinking			
(12)	Time management			
(13)	ICT skills regarding Software Example: Application development technology, web development technology, control/embedded system development technology, AI, Big Data analysis, database (including Block Chain)			
(14)	ICT skills regarding operation Example: System operation, CAD (3D, including design),			
(15)	ICT related business skills			

Skills		Satisfaction (Tick ONLY 1 column for each row)		
		High	Moderate	Low
	Capability to use ICT to promote digital transformation in a company and/or create new business with digital technology			
(16)	ICT skills regarding Hardware Example: PC disassembly and assembly, IoT sensor technology, RFID, and Digital Electronics Drones, 3D printers			
(17)	ICT skills regarding Network Example: Network construction and operation, mobile networks, and network security			
(18)	Other skills (Specify:)			

7. Survey as professional ICT user

The following questions are dealt with the situation of companies that use ICT equipment and facilities such as personal computers, its peripherals, and internet environment for development of ICT products including software and related products.

7-1 What is your company's industry sector sub-classification among ICT industry sector classification shown in below? Please check in the right square. (Multiple answer allowed.)

Category	By industry	Type of service
Communication service	Fixed communication	☐
	Mobile communication	☐
Broadcasting service	Public broadcasting	☐
	Private broadcasting	☐
	Cable broadcasting	☐
Information service	Software development	
	・Contracted software development	☐
	・Embedded software	☐
	・Packaged software	☐
	・Game software	☐
	Information processing and providing	
	・Information processing	☐
	・Information providing	☐
Internet related service	・Web information retrieval service	☐

	・Operation of shopping/auction site	☐
	・Operation of bill board, blog service, SNS	☐
	・Delivering web contents	☐
	・Cloud computing service	☐
	・Electronic authentication	☐
	・Network security service	☐
	・Payment/settlement agency service	☐
	・Contracted server management	☐
Production and delivery service of video/voice/letter information	・Production of video/voice/letter information	☐
	・Newspaper issue	☐
	・Publication	☐
	・News delivery service	☐
	・Printing/publishing	☐
Others (Specify)	☐	

7-2 How many personal computers for <u>above development work</u> does your company have?

(1) ☐None

(2) ☐1 to 5

(3) ☐6 to 10

(4) ☐11 and more(Specify:)

7-3 What is the operating system of the computers?

(1) ☐Windows (Version:)

(2) ☐MacOS (Version:)

(3) ☐Solaris (Version:)

(4) ☐Others (Specify:)

7-4 What is the configuration of above computers?

(1) ☐Stand alone

(2) ☐Network connected(LAN/WAN, intranet, internet connected etc.)

7-5 What major application software packages are installed in the computer?

(1) ☐Microsoft Office (Version:)

(2) ☐Mac OS Office (Version:)

(3) ☐Others (Specify:)

7-6 What <u>application software for development work</u> among above are most frequently used?

(1) ☐ (Name of software:)

(2) ☐ (Name of software:)

(3) ☐ (Name of software:)

(4) ☐ (Name of software:)

7-7 Did the development order come from abroad?

(1) ☐ Yes (Where:)

(2) ☐ No

7-7 Did the order come directly to you or through the contractor?

(1) ☐ Yes

(2) ☐ No

7-8 Are you satisfied with the technical level of development staff?

(1) ☐Very satisfied

(2) ☐Fairy satisfied

(3) ☐Not satisfied（Specify the reason:)

7-9 Where did those development staff acquire their development skills?

(1) ☐At school (Specify: University, IPRC, RP, VTC, Private institutions, etc.)

(2) ☐Through personal training

(3) ☐In the company after employed through training session or OJT, etc.

(4) ☐Others (Specify :)

7-10 Which skill would you expect your newly hired employee to have prior to enrollment in the company. Please check and describe in detail. (Multiple answers allowed.)

(1) ☐Application development (Specify:)

(2) ☐Web development (Specify:)

(3) ☐Control/embedded system development (Specify:)

(4) ☐Profession of integrated systems operation (Specify:)

(5) ☐Big data analysis (Specify:)

(6) ☐CAD, 3D operation (Specify:)

(7) ☐Drones (Specify:)

(8) ☐Database including Block Chain (Specify:)

(9) ☐Network construction and operation (Specify:)

(10) ☐Mobile networks (Specify:)

(11) ☐Network security (Specify:)

(12) ☐PC disassembly and assembly (Specify:)

(13) ☐IoT sensor technology (Specify:)

(14) ☐3D printer (Specify:)

(15) ☐ICT related business skills (Specify:)

(16) ☐Others (Specify:)

7-12 If you have any comments or opinions related to human resource development program in the company, please describe.

_____

_____

_____

_____

8. Expectation toward TVET(IPRC) from Employers(companies)

8-1 In general, what would you expect toward TVET (IPRC) as a supplier of highly-skilled ICT personnel?

(1) ☐To prepare curriculums on teaching more advanced ICT operation skill

(2) ☐To emphasize more on professional business knowledge in parallel with high skill of ICT operation

(3) ☐To have curriculums on world recognized ICT standard skills such as Microsoft, CompTIA, CISCO, Oracle, etc.

(4) ☐To have more upper skills in project management

(5) ☐Others (Specify:)

8-2 Please state if you have any opinions or comments on TVET including their contents of operation/management, academic curriculums, students/teachers activities, etc.

_____

_____

_____

9. Expectations toward the Government from Employers (companies)

9-1 What would you expect for government to generate well qualified workers in the country?

(1) ☐To prepare market best-matched education curriculums

(2) ☐To emphasize on more hands-on skills rather than theoretical education

(3) ☐To build up well-established training program of teachers

(4) ☐To establish well-prepared internship programs among all educational institutions

(5) ☐Others (Specify:)

9-2 Please state if you have any opinions or comments on government's TVET policy including its operation/management, academic curriculums, students'/teachers' activities, etc.

_____

_____

_____

- Thank you very much for your cooperation. -

Questionnaire for the Data Collection Survey on Technical and Vocational Education and Training in the Republic of Rwanda

Ministry of Education

Date of interview: _____

Name of interviewer: _____

Name of interviewee: Ms./ Mr. _____

Position of interviewee: _____

Department of interviewee: _____

Place of interview: _____

Certification System

1. After Rwandan TVET Qualifications Framework (RTQF) was developed in 2012, was it revised?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know (Please introduce the person who has the information.)

→ If yes, would you kindly share the latest version of RTQF with us?

2. Was the National Occupational Standards completed?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know (Please introduce the person who has the information.)

→ If yes, would you kindly share with us?

3. Is there any certification system or ability-based grade system for ICT?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know (Please introduce the person who has the information.)

→ If yes, would you share the related documents?

4. Was the National Examination and Certification Framework completed?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know (Please introduce the person who has the information.)

→ If yes, would you kindly share with us?

5. Was the Labour Market Information System (LMIS) established?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know (Please introduce the person who has the information.)

If yes, how is it used? Please share the details.

Budget

6. Would you provide us with the budget data for TVET in these 3 fiscal years?

FY	Amount (RWF)	Proportion of TVET budget to the whole (%)
2018		
2019		
2020		

7. Among the above 3 fiscal years' budgets, would you tell us the amount which was provided to Rwanda Polytechnic (RP)?

FY	Amount (RWF)	Proportion of RP's budget to the whole TVET budget (%)
2018		
2019		
2020		

8. How does the budget flow for TVET?

☐	1.	The next fiscal year's budget is requested from IPRC to RP, then RP submits the request to MINEDUC, then MINEDUC submits the request to Ministry of Finance and Economic Planning (MINECOFIN). If it's approved, the budget is provided from MINECOFIN to MINEDUC. Then MINEDUC distributes to each organization, such as RP, WDA. Then RP distributes the budget to IPRCs.
☐	2.	The next fiscal year's budget is requested from IPRC to RP, then RP submits the request to MINEDUC, then MINEDUC submits the request to Ministry of Finance

		and Economic Planning (MINECOFIN). If it's approved, the budget is provided from MINECOFIN to each organization, such as RP, WDA directly. Then, RP distributes the budget to IPRCs.
	3.	Other

If your answer is '3. Other', please share the details.

IPRCs

Roles of Organizations

9. How do you work with other organizations in the field of TVET, such as RDB, RP and WDA? Would you briefly explain each role and the workflow?

10. How are roles divided by each IPRC? Among them, what is the position of IPRC Tumba?

Difference between IPRCs and Universities

11. It is understood that IPRCs are expected to produce skilled workers who can create jobs and compete in the labor market while universities are expected to produce the workers with technical knowledge who are employed by companies. Is this understanding correct?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If no, what are the expectations to IPRC and universities? Please tell us the details.

12. How do you currently differentiate the teaching contents/ curriculum between IPRCs and universities? For instance, which parts are different in those of IT department of IPRCs and universities? Please tell us the details.

13. Is there any plan to upgrade IPRCs to universities?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If yes, when and how? Please tell us the details. If there is any relevant document, please share with us.

ICT

14. According to Rwanda Polytechnic Strategic Plan (Draft) 2019-2024, there are several plans to improve ICT environment and promote use of ICT in TVET (such as SMART classroom,

provision of personal laptops, internet connectivity, digitalized contents, etc.). How does your ministry support and collaborate with Rwanda Polytechnic?

15. Are there any plans/ documents on the utilization of digital contents and ICT infrastructure (e.g. ICT system on school operation, communication infrastructure, equipment etc.) of IPRCs?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

→ If yes, would you share with us?

16. How is the current situation of the utilization of digital contents and ICT infrastructure both for teaching and administration work of IPRCs?

17. Do you have any plans to train IPRCs' teachers through ICT, such as developing and utilizing digital contents and train them by remote lectures?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

→ If yes, please tell us the details.

18. Do you have any plans to introduce new teaching methods such as mobile learning and utilizing VR and AR?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

→ If yes, please tell us the details.

19. Do you have any plans to introduce ICT system in IPRCs to reduce their administration work?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If yes, please tell us the details.

20. Would you tell us the challenges on utilization of ICT at IPRCs, if any, as well as the ways for improvement?

Applied Research, Innovation and Entrepreneurship

21. Were applied research, innovation and entrepreneurship plans at national level developed?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If yes, would you share the plans with us?

22. Are there any actual activities in the fields of applied research, innovation and entrepreneurship at IPRCs?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If yes, would you share the details, such as the name of IPRC, contents of activities etc.?

23. We heard that all IPRCs install Research Development and Production Unit. Is it correct?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

→ If yes, how is it operated.? Please tell us the information as much as you know.

Collaboration Work

24. Are there any examples of past or current collaboration work of several TVET institutions inside or outside Rwanda (e.g. mutual exchanges of students and instructors)?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

→ If yes, tell us the details, such as the name of institutions, contents of collaboration, period etc.

25. Are there any plans of collaboration among TVET institutions inside or outside Rwanda?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

→ If yes, tell us the details, such as the name of institutions, contents of collaboration, period etc.

The Support of Development Partners to Rwanda TVET (especially IPRC level)

26. Could you share with us major TVET projects targeting IPRCs which are supported by development partners?

1	Name of the TVET project and program	
	Development partner which supports the project/program	
	Period of the project	
	Outline of the project (overall goal, objectives, purposes, outcomes, implementing agencies, targets, implementation structure)	
	Project budget and budget execution so far	
	The project supports ICT utilization and/or innovation promotion	☐ 1. Yes ☐ 2. No ☐ 3. Don't know → Please explain the details ( )
	The progress and performance of the project so far	
	Challenges, lessons learnt and best practices of the project	

2	Name of the TVET project and program	
	Development partner which supports the project/program	
	Period of the project	
	Outline of the project (overall goal, objectives, purposes, outcomes, implementing agencies, targets, implementation structure)	
	Project budget and budget execution so far	
	The project supports ICT utilization and/or innovation promotion	☐ 1. Yes ☐ 2. No ☐ 3. Don't know → Please explain the details ( )
	The progress and performance of the project so far	
	Challenges, lessons learnt and best practices of the project	

3	Name of the TVET project and program	
	Development partner which supports the project/program	
	Period of the project	
	Outline of the project (overall goal, objectives, purposes, outcomes, implementing agencies, targets, implementation structure)	
	Project budget and budget execution so far	
	The project supports ICT utilization and/or innovation promotion	☐ 1. Yes ☐ 2. No ☐ 3. Don't know → Please explain the details ( )
	The progress and performance of the project so far	
	Challenges, lessons learnt and best practices of the project	

4	Name of the TVET project and program	
	Development partner which supports the project/program	
	Period of the project	
	Outline of the project (overall goal, objectives, purposes, outcomes, implementing agencies, targets, implementation structure)	
	Project budget and budget execution so far	
	The project supports ICT utilization and/or innovation promotion	☐ 1. Yes ☐ 2. No ☐ 3. Don't know → Please explain the details ( )
	The progress and performance of the project so far	
	Challenges, lessons learnt and best practices of the project	

5	Name of the TVET project and program	
	Development partner which supports the project/program	
	Period of the project	
	Outline of the project (overall goal, objectives, purposes, outcomes, implementing agencies, targets, implementation structure)	
	Project budget and budget execution so far	
	The project supports ICT utilization and/or innovation promotion	☐ 1. Yes ☐ 2. No ☐ 3. Don't know → Please explain the details ( )
	The progress and performance of the project so far	
	Challenges, lessons learnt and best practices of the project	

27. Regarding ongoing projects with development partners, if the project has a predecessor support, how the ongoing one evolved from the predecessor?

TVET project and program	How was it evolved from the former project?
1)	
2)	
3)	
4)	

28. Is there a project which supports TVET collaboration in Rwanda, across EAC region or globally?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If yes, please explain in detail in the table below.

Name of the project	Details of TVET collaboration

29. Do you expect any other TVET pipeline and newly committed projects targeting IPRCs supported by Development Partners?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If yes, please explain in detail in the table below.

Name of the project	Details of the project	Development partner

EAC

30. We would like to know how Government of Rwanda is working on EAC TVET program. Could you shed lights on the progress of the TVET program such as the maintenance and utilization of Center of Excellences (CoEs)?

31. Regarding EASTECO and IUCEA, do they have any activities or collaboration with Rwandan TVET Institutions?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If yes, please explain the details.

Thank you for your cooperation!

Questionnaire for the Data Collection Survey on Technical and Vocational Education and Training in the Republic of Rwanda

Rwanda Polytechnic

Date of interview: _____

Name of interviewer: _____

Name of interviewee: Ms./ Mr. _____

Position of interviewee: _____

Department of interviewee: _____

Place of interview: _____

Rwanda Polytechnic Strategic Plan (Draft) 2019-2024

1. According to Rwanda Polytechnic Strategic Plan (Draft) 2019-2024, competency-based staff capacity building plan and work exposure program for all staff are to be developed. How is the progress?

2. According to Rwanda Polytechnic Strategic Plan (Draft) 2019-2024, there are several plans to improve ICT environment and promote use of ICT in TVET (such as SMART classroom, provision of personal laptops, internet connectivity, digitalized contents, etc.). Has MINEDUC provided enough budget to support these activities, or is there any funding gap?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If yes, what kind of support did you get?

3. According to Rwanda Polytechnic Strategic Plan (Draft) 2019-2024 (P39), there is the plan (3.2) to review and update existing competency-based curricula by 2024. As a part of this plan, there is the activity (3.2.2) to ensure a specific focus on curricula leading to skills

required by strategic Government of Rwanda Ministries by 2020. Do you have any related document such as action plan, progress report and meeting materials, especially regarding ICT skills?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If yes, would you kindly share it with us?

If no, would you kindly describe the current status?

4. Were activities of IPRC Tumba also taken into consideration upon the development of Rwanda Polytechnic Strategic Plan (e.g. 11.3 Publicize success stories of TVET)? If so, which points were referred?

Budget

5. Would you provide us with the budget data for Rwanda Polytechnic in these 3 fiscal years?

FY	Amount (RWF)
2018	
2019	
2020	

6. Would you provide us with the budget data of each IPRC in these 3 fiscal years?

Currency: RWF

	FY 2018	FY 2019	FY 2020
Tumba			
Kigali			

	FY 2018	FY 2019	FY 2020
Ngoma			
Karongi			
Musanze			
Huye			
Gishari			
Kitabi			

7. How does the budget flow for TVET?

	1. The next fiscal year's budget is requested from IPRC to RP, then RP submits the request to MINEDUC, then MINEDUC submits the request to Ministry of Finance and Economic Planning (MINECOFIN). If it's approved, the budget is provided from MINECOFIN to MINEDUC. Then MINEDUC distributes to each organization, such as RP, WDA. Then RP distributes the budget to IPRCs.
	2. The next fiscal year's budget is requested from IPRC to RP, then RP submits the request to MINEDUC, then MINEDUC submits the request to Ministry of Finance and Economic Planning (MINECOFIN). If it's approved, the budget is provided from MINECOFIN to each organization, such as RP, WDA directly. Then, RP distributes the budget to IPRCs.
	3. Other

If your answer is '3. Other', please share the details.

8. We previously heard that there is a bursary to IPRC students depending on their financial situation. The poorest students can receive 600,000RWF as the tuition fee and the same amount for their living expenses. Second poorest students can receive 600,000RWF as the tuition fee. Does this kind of bursary system still exist?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

→ If yes, would you tell us the details, such as the current amount, whether it's a loan (students

need to return) or benefit type (no need to return), qualifications to receive, percentage of IPRC students who receive this bursary?

IPRCs

Roles of Organizations

9. Would you kindly share the organigram of your organization?
10. How do you work with other organizations in the field of TVET, such as MINEDUC, RDB and WDA? Would you briefly explain each role and the workflow?

11. Do you have detailed ICT skill standard for TVET which TVET graduates should acquire for graduation?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

→ If yes, please share that standard with us.

12. How do you currently differentiate the teaching contents/ curriculum between IPRCs and universities? For instance, which parts are different in those of IT department of IPRCs and universities? Please tell us the details.

13. How do you create the opportunity for IPRCs to work with the private sector?

14. Do IPRCs get enough cooperation from the private sector on Industrial Attachment Program?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If no, why?

15. How do you monitor and supervise IPRC? Also, if available, would you kindly share guidelines for IPRC and monitoring documents/ forms?

16. How are roles divided by each IPRC? Among them, what is the position of IPRC Tumba?

17. Do you think the above division of roles is played as planned by each IPRC?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

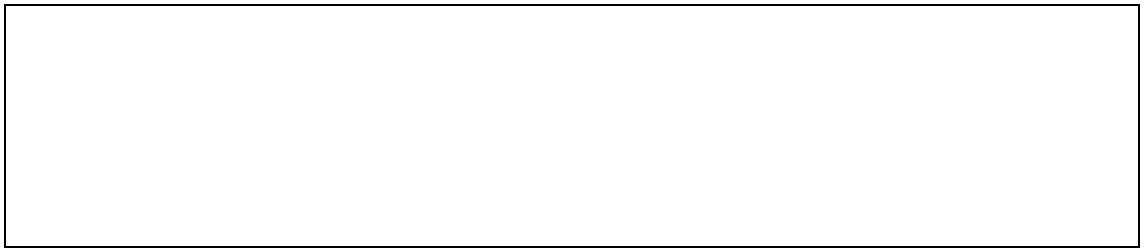
If no, why?

18. If you have the information of IPRC students' employment, starting business or proceeding to further education, please fill in the information in the next page.

19. Are there any challenges in the employment or starting up business of graduates?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

20. How do you think the employment rate and the rate of entrepreneurs can be improved?



Unit: Number of gradua

	FY 2018				FY 2019				FY 2020		
	1) Total number of graduates	Among 1), Employed	Among 1), Entrepreneurs	Among 1), Further education	1) Total number of graduates	Among 1), Employed	Among 1), Entrepreneurs	Among 1), Further education	1) Total number of graduates	Among 1), Employed	Among 1), Entrepreneurs
Tumba											
Kigali											
Ngoma											
Karongi											
Musanze											
Huye											
Gishari											
Kitabi											

ICT

21. Are there any plans/ documents on the utilization of digital contents and ICT infrastructure (e.g. ICT system on school operation, communication infrastructure, equipment etc.) of IPRCs? (For example, according to Rwanda Polytechnic Strategic Plan (Draft) 2019-2024 (P25), there is the plan to develop and approve a **Rwanda Polytechnic Information and Communication Technology (ICT) Policy** by 2020. Was it already developed?)

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

→ If yes, would you share with us?

22. How do IPRCs use ICT system in administration work? If they use ICT system for inventory, documents sharing, matching job offers and students' applications etc., please share the examples with the IPRC's name.

23. If these is any administration work which you think IPRCs can reduce the workload by introducing ICT system, please share with us.

24. How is the current situation of the utilization of digital contents and ICT infrastructure for teaching of IPRCs?

25. According to Rwanda Polytechnic Strategic Plan (Draft) 2019-2024 (P45, P58), there are the plans (4.3) to equip classroom with ICT tools for quality teaching and learning by 2024 and (6.5) to improve and provide appropriate ICT (such as SMART classrooms and internet connection) to TVET institutions by 2024. As a part of this plan, there is the activities (4.3.1

and 4.3.2) to develop an **implementation plan** and **ICT provision plan** for creating proposed budget. Do you have any related documents such as **implementation plan and ICT provision plan**, progress report and meeting materials?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If yes, would you kindly share it with us?

If no, would you kindly describe the current status?

26. Do you have any plans to train IPRCs' teachers through ICT, such as developing and utilizing digital contents and train them by remote lectures?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If yes, please tell us the details.

27. According to Rwanda Polytechnic Strategic Plan (Draft) 2019-2024 (P44, P65), there are the plans (4.1) to develop and approve a process for improved teaching and research capacity at universities for teacher education in all fields by 2024 and (8.2) to build capacity of TVET staff to conduct research, innovation, and entrepreneurship by 2021. As a part of these plans, there are activities (4.1.2) to perform **national audit to assess teacher competencies on ICT skills** and (8.2.1-3) to develop a **plan on improving teacher capacity** in research, innovation, and entrepreneurship and to **assess teacher capabilities** nationally. Do you have any related document such as policy, assessment report, capacity building plan, action plan, progress report and meeting materials?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If yes, would you kindly share it with us?

If no, would you kindly describe the current status?

28. Do you have any plans to introduce new teaching methods such as mobile learning and utilizing VR and AR?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

→ If yes, please tell us the details.

29. Would you tell us the challenges on utilization of ICT at IPRCs, if any, as well as the ways for improvement?

Applied Research, Innovation and Entrepreneurship

30. Was an applied research, innovation and entrepreneurship plan at national level developed? (According to Rwanda Polytechnic Strategic Plan (Draft) 2019-2024 (P64), there is the plan (8.1) to develop an applied research, innovation, and entrepreneurship plan by 2020. As a part of this plan, there are several activities (8.1.1-4) such as to develop, approve, and publish a **policy on creative innovation together with entrepreneurship** at national level (as well as institutional) by 2020)

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

→ If yes, would you share the plans with us?

31. Are there any actual activities in the fields of applied research, innovation and entrepreneurship at IPRCs? (For example, according to Rwanda Polytechnic Strategic Plan (Draft) 2019-2024 (P66), there are the plans (8.3) to conduct research into community issues

by 2021 and (8.4) to implement new innovative projects and engage the private sector for commercialization of developed innovation products by 2024. As a part of this plan, there are several activities (8.4.1-7) such as to support **innovative entrepreneurial student projects** at institution level by 2022, and to engage the private sector for further **development and commercialization of TVET innovative products** by 2020.)

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If yes, would you share the details, such as the name of IPRC, contents of activities etc.?

32. We heard that all IPRCs install Research Development and Production Unit. Is it correct?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If yes, how is it operated.? Please tell us the information as much as you know.

Collaboration Work

33. Are there any examples of past or current collaboration work of several TVET institutions inside or outside Rwanda (e.g. mutual exchanges of students and instructors)?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If yes, tell us the details, such as the name of institutions, contents of collaboration, period etc.

34. Are there any plans of collaboration among TVET institutions inside or outside Rwanda?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If yes, tell us the details, such as the name of institutions, contents of collaboration, period etc.

The Support of Development Partners to Rwanda TVET (especially IPRC level)

35. Could you share with us major TVET projects targeting IPRCs which are supported by development partners?

1	Name of the TVET project and program	
	Development partner which supports the project/program	
	Period of the project	
	Outline of the project (overall goal, objectives, purposes, outcomes, implementing agencies, targets, implementation structure)	
	Project budget and budget execution so far	
	The project supports ICT utilization and/or innovation promotion	☐ 1. Yes ☐ 2. No ☐ 3. Don't know → Please explain the details ( )
	The progress and performance of the project so far	
	Challenges, lessons learnt and best practices of the project	

2	Name of the TVET project and program	
	Development partner which supports the project/program	
	Period of the project	
	Outline of the project (overall goal, objectives, purposes, outcomes, implementing agencies, targets, implementation structure)	
	Project budget and budget execution so far	
	The project supports ICT utilization and/or innovation promotion	☐ 1. Yes ☐ 2. No ☐ 3. Don't know → Please explain the details ( )
	The progress and performance of the project so far	
	Challenges, lessons learnt and best practices of the project	

3	Name of the TVET project and program	
	Development partner which supports the project/program	
	Period of the project	
	Outline of the project (overall goal, objectives, purposes, outcomes, implementing agencies, targets, implementation structure)	
	Project budget and budget execution so far	
	The project supports ICT utilization and/or innovation promotion	☐ 1. Yes ☐ 2. No ☐ 3. Don't know → Please explain the details ( )
	The progress and performance of the project so far	
	Challenges, lessons learnt and best practices of the project	

4	Name of the TVET project and program	
	Development partner which supports the project/program	
	Period of the project	
	Outline of the project (overall goal, objectives, purposes, outcomes, implementing agencies, targets, implementation structure)	
	Project budget and budget execution so far	
	The project supports ICT utilization and/or innovation promotion	☐ 1. Yes ☐ 2. No ☐ 3. Don't know → Please explain the details ( )
	The progress and performance of the project so far	
	Challenges, lessons learnt and best practices of the project	

5	Name of the TVET project and program	
	Development partner which supports the project/program	
	Period of the project	
	Outline of the project (overall goal, objectives, purposes, outcomes, implementing agencies, targets, implementation structure)	
	Project budget and budget execution so far	
	The project supports ICT utilization and/or innovation promotion	☐ 1. Yes ☐ 2. No ☐ 3. Don't know → Please explain the details ( )
	The progress and performance of the project so far	
	Challenges, lessons learnt and best practices of the project	

36. Regarding ongoing projects with development partners, if the project has a predecessor support, how the ongoing one evolved from the predecessor?

TVET project and program	How was it evolved from the former project?
1)	
2)	
3)	
4)	

37. Is there a project which supports TVET collaboration in Rwanda, and at the same time, across EAC region or globally?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If yes, please explain in detail in the table below.

Name of the project	Details of TVET collaboration

38. Do you expect any other TVET pipeline and newly committed projects targeting IPRCs supported by Development Partners?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If yes, please explain in detail in the table below.

Name of the project	Details of the project	Development partner

EAC

39. We would like to know how Government of Rwanda is working on EAC TVET program. Could you shed lights on the progress of the TVET program such as the maintenance and utilization of Center of Excellences (CoEs)?

Thank you for your cooperation!

Questionnaire for the Data Collection Survey on Technical and Vocational Education and Training in the Republic of Rwanda

Workforce Development Authority

Date of interview: _____

Name of interviewer: _____

Name of interviewee: Ms./ Mr. _____

Position of interviewee: _____

Department of interviewee: _____

Place of interview: _____

Certification System

1. Was the National Occupational Standards completed?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know (Please introduce the person who has the information.)

→ If yes, would you kindly share with us?

2. Is there any certification system or ability-based grade system for ICT?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know (Please introduce the person who has the information.)

→ If yes, would you share the related documents?

3. Was the National Examination and Certification Framework completed?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know (Please introduce the person who has the information.)

→ If yes, would you kindly share with us?

4. Was the Labour Market Information System (LMIS) established?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know (Please introduce the person who has the information.)

→ If yes, how is it used? Please share the details.

5. Did you take any particular action for TVET harmonization in EAC? Or did you make RTQF or other Rwandan certification system recognized in other EAC countries so that Rwandan TVET graduates can easily work in other EAC countries?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know (Please introduce the person who has the information.)

If yes, please tell us the details.

Budget

6. Would you provide us with the budget data for TVET in these 3 fiscal years?

FY	Amount (RWF)	Proportion of TVET budget to the whole (%)
2018		
2019		
2020		

7. How is the budget flow for TVET?

☐	1.	It is requested to MINEDUC and MINEDUC submits the budget request to Ministry of Finance and Economic Planning (MINECOFIN). After MINECOFIN's approval, the budget is provided from MINECOFIN to MINEDUC. Then MINEDUC distributes to each organization, such as RP, WDA.
☐	2.	It is requested to MINEDUC and MINEDUC submits the budget request to Ministry of Finance and Economic Planning (MINECOFIN). After MINECOFIN's approval, the budget is provided from MINECOFIN to each organization, such as RP, WDA directly.
☐	3.	Other

If your answer is '3. Other', please share the details.

Skills Required to Jobseekers

8. Could WDA obtain enough support from industries/ companies to reflect their needs to IPRC's curricula?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

→ If yes, what kinds of needs and how did you reflect?

If no, why can't you obtain enough support from them?

9. Generally speaking, in-service training at companies is common in Rwanda?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

→ If yes, what kind of training contents are available? Would you kindly tell us the examples of contents related to IPRCs' departments?

10. On the other hand, what kind of skills cannot be nurtured in in-service training?

IPRCs

Roles of Organizations

11. How do you work with other organizations in the field of TVET, such as MINEDUC, RDB, and RP? Would you briefly explain each role and the workflow?

12. It is understood that your organization is developing IPRCs' unified curricula. How is the progress?

13. What is the balance between theory and practice of IPRCs' curricula?

☐ % (Theory) ☐ % (Practice)

14. Is the same curriculum used for the same department of the different IPRCs?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If no, why and what is the situation?

Difference between IPRCs and Universities

15. It is understood that IPRCs are expected to produce more practical persons while universities are expected to produce management persons. Is this understanding correct?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If no, what kind of personnel are expected to be produced by IPRCs and universities respectively? Please tell us the details.

16. How do you currently differentiate the teaching contents/ curriculum between IPRCs and universities? For instance, which parts are different in those of IT department of IPRCs and universities? Please tell us the details.

17. Why does Rwandan TVET Qualifications Framework (RTQF) correspond to Scottish Qualifications Framework (SCQF), in addition to International Standard Classification of Occupations (ISCO) and International Standard Classification of Education (ISCED)? ISCO and ISCED are international standards, but SCQF is Scottish standard. Why did Rwanda choose it? Is there any reason?

ICT

18. Do you have detailed **ICT skills standard** for IPRCs which IPRCs' graduates should acquire for graduation (something like TVET version of International Computer Driving License (ICDL))?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If available, please share it with us?

19. Are there any plans/ documents on the utilization of digital contents and ICT infrastructure (e.g. ICT system on school operation, communication infrastructure, equipment etc.) of IPRCs?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If yes, would you share with us?

20. How is the current situation of the utilization of digital contents and ICT infrastructure both for teaching and administration work of IPRCs?

21. Do you have any plans to train IPRCs' teachers through ICT, such as developing and utilizing digital contents and train them by remote lectures?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If yes, please tell us the details.

22. Do you have any plans to introduce new teaching methods such as mobile learning and utilizing VR and AR?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If yes, please tell us the details.

23. Do you have any plans to introduce ICT system in IPRCs to reduce their administration work?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

→ If yes, please tell us the details.

24. Would you tell us the challenges on utilization of ICT at IPRCs, if any, as well as the ways for improvement?

Applied Research, Innovation and Entrepreneurship

25. Was an applied research, innovation and entrepreneurship plan at national level developed?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

→ If yes, would you share the plan with us?

26. Are there any actual activities in the fields of applied research, innovation and entrepreneurship at IPRCs?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

→ If yes, would you share the details, such as the name of IPRC, contents of activities etc.?

27. We heard that all IPRCs install Research Development and Production Unit. Is it correct?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If yes, how is it operated.? Please tell us the information as much as you know.

Collaboration Work

28. Are there any examples of past or current collaboration work of several TVET institutions inside or outside Rwanda (e.g. mutual exchanges of students and instructors)?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If yes, tell us the details, such as the name of institutions, contents of collaboration, period etc.

29. Are there any plans of collaboration among TVET institutions inside or outside Rwanda?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If yes, tell us the details, such as the name of institutions, contents of collaboration, period etc.

Thank you for your cooperation!

Questionnaire for the Data Collection Survey on Technical and Vocational Education and Training in the Republic of Rwanda

Integrated Polytechnic Regional College

Date of interview: _____

Name of interviewer: _____

Name of IPRC: _____

Name of interviewee: Ms./ Mr. _____

Position of interviewee: _____

Department of interviewee: _____

Place of interview: _____

School Information

1. Would you share organigram of your organization?

2. Please confirm if the following department list is still current for your IPRC. Please specify if there have been any changes.

Academic Department	IPRC							
	Tumba	Kigali	Ngoma	Karongi	Musanze	Huye	Gishari	Kitabi
ICT	○	○	○	○		○		
Electrical and Electronic Engineering		○	○	○	○	○	○	
Civil Engineering		○	○		○	○	○	
Mechanical Engineering		○	○	○		○	○	
Irrigation and Drainage Technology					○			
Electric Communication	○							
Renewable Energy	○							
Mining Engineering		○						
Agriculture and Food Processing					○			
Hospitality			○		○			
English Language and Communication Skills		○						
Forest Resources Management								○
Wildlife Management								○
Wildlife Tourism								○
Veterinary Technology						○		

3. If there is any plan to abolish or newly establish or rename the departments, would you share the information? Also, please provide us the reasons for such updates.

4. Please provide the number of your administrative staff members.

No. of admin. staff	
Male	Female

5. Please provide the number of **<u>administrative staff</u>** members who left the job in 2019, as well as the number of those who newly joined in 2019.

The number of **admin. staff** who quit	The number of **admin. staff** who are hired

6. Is there Vice Principal in your IPRC?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If no, why?

7. Necessary staff are assigned to all sections/ positions?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If no, why and which sections are vacant?

8. Please fill in the academic staff' information in the table below.

Department	Type of the academic staff	No. of staff			
		Male	Female	Total	Grand total
	Lecturer			0	0
	Assistant lecturer			0	
	Instructor			0	
	Other			0	
	Lecturer			0	0
	Assistant lecturer			0	
	Instructor			0	
	Other			0	

9. Please provide the number of **academic staff** members who left the job in 2019, as well as the number of those who newly joined in 2019.

The number of **academic staff** who quit	The number of **academic staff** who are hired

10. Please fill in the students' information in the table below.

Department	Number of students		
	Male	Female	Total
			0
			0
			0
			0
			0
			0
			0
		Grand total	0

11. Would you kindly provide us with the layout and the list of the whole **facility** of your IPRC? Also, please provide us with the major **equipment** lists.

12. Would you tell us who are in charge of the maintenance of the above equipment? Please tick the applicable options. (Multiple answers are allowed.)

☐ 1. Academic staff of the department ☐ 2. Specialized staff for the maintenance ☐ 3. Other

If '3. Other', please specify the details.

13. Would you tell us how is the maintenance done?

☐ 1. Regularly done ☐ 2. Depending on the needs ☐ 3. Other

If '1. Regularly done', how often is it conducted?

If '3. Other', please tell us the details.

14. Would you tell us the budget for the maintenance of the above equipment?

Year	FY2018	FY2019	FY2020
Budget for the maintenance (RWF)			

Budget

15. Would you provide us with the official budget data for your IPRC in these 3 fiscal years?

(Currency: RWF)

	FY2018	FY2019	FY2020
Approved amount			
Disbursed amount			

16. Would you provide us with the other budget data for your IPRC in these 3 fiscal years?

(Currency: RWF)

		FY2018	FY2019	FY2020
Income	From students (Tuition fee)			
	From the private sector			
	From income generation activities			
	Others			
	Total	0	0	0
Expenditure				

Graduates' Employment, Starting Jobs and Further Education

17. Does your IPRC conduct a tracer survey?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If yes, how frequently do you conduct? Also, please share the latest survey report.

If no, why?

18. Please fill in the table below with the number of students who was employed, started their own business and proceeded further education.

Department	Year	FY2017			FY2018	
		Male	Female	Total	Male	Female
	Total No. of graduates			0		
	1) No. of graduates who were employed			0		
	2) No. of graduates who started their own business			0		
	3) No. of graduates who proceeded further education			0		
	Subtotal of 1)-3)	0	0	0	0	0
	% of graduates either 1), 2) or 3)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	Total No. of graduates			0		
	1) No. of graduates who were employed			0		

19. Would you share major companies where graduates were employed?

Department	Major companies

20. Would you share major universities where graduates proceeded?

Department	Major universities

21. Does your IPRC conduct an employers' satisfaction survey?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If yes, how frequently do you conduct? Also, please share the latest survey report.

If no, why?

22. What are the challenges in the job placement of graduates? Please choose the applicable

reasons for each department from the following options. (Multiple answers are allowed.)

1.	They prefer university graduates to IPRC graduates	2.	Contents of the department aren't well-known
3.	Lower salary than graduates' expectation	4.	Location of the work is not graduates' preference.
5.	Workload looks too heavy.	6.	Job contents and what graduates want to do don't match.
7.	Others (Specify the reason)		

Department	Major reasons

23. How can the employment rate be improved? Please choose the effective ways for each department from the following options. (Multiple answers are allowed.)

1.	Increase information exchanges between industries and IPRCs	2.	Advertise more about departments' activities in the school website, exhibitions and workshops
3.	Provide more companies' information to students	4.	Provide more career guidance to students, such as mental preparation for work, career plan etc.
5.	Others (Specify the effective way)		

Department	Major effective ways

24. How do the graduates find their jobs? Please tick the applicable options. (Multiple answers are allowed.)

☐	1. Through industrial attachment program	☐	2. IPRC's job matching/ job placement
☐	3. Through job information website	☐	4. Through personal connection of students
☐	5. Through Alumni Associations	☐	6. Starting their own business
☐	7. Others (Specify:)		

25. Are there any graduates who work abroad?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If yes, would you share some examples with us?

If no, why? Please tick the applicable options. (Multiple answers are allowed.)

☐	1. Information of working abroad is not available.
☐	2. Obtaining a passport or visa is difficult.
☐	3. Language barrier
☐	4. There are enough business opportunities in Rwanda.
☐	5. Without physically going abroad, they can do business with foreign customers through internet
☐	6. Others (Specify:)

Cooperation with Private Sector

26. Could your IPRC obtain enough support from industries/ companies to reflect their needs to IPRC's curricula?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If yes, what kinds of needs and how did you reflect?

If no, why can't you obtain enough support from them?

27. Does your IPRC cooperate with the private sector in the following fields? Please tick the applicable options. (Multiple answers are allowed.)

☐	1. Applied research	☐	2. Development/ improvement of products
☐	3. Cooperate community outreach activity	☐	4. Sharing facility and equipment each other
☐	5. Training of companies' personnel	☐	6. Obtaining technical advice at meetings (e.g. Technical Advisory Committee)
☐	7. Sending students to company visits	☐	8. Inviting companies' personnel to lectures/ practical lessons as lecturers
☐	9. Others (Specify:)		

28. Could your IPRC obtain enough support from industries/ companies for industrial attachment program (IAP)?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If yes, how could you get their support?

If no, why can't you obtain enough support from them? Please tick the applicable options from the following. (Multiple answers are allowed.)

☐	1. They are too busy to take care of students	☐	2. Timing of IPRC's IAP is too late (TSS and VTC students already occupied seats)

☐	3. The technical level of IPRC is lower than company's expectation.	☐	4. Period of IAP is too long.
☐	5. The number of students is more than companies' availability	☐	6. Condition of work is not good (e.g. Far from the city but no accommodation).
☐	7. Others (Specify:)		

29. How do you arrange the following during industrial attachment program? Please write the arrangement of your IPRC and companies respectively.

Insurance	
Transportation expenses	
Daily allowance	
Accommodation (if necessary)	
Monitoring (e.g. the use of logbooks, monitoring visits of IPRC staff etc.)	

30. Do you conduct any activities to increase the number of companies which receive IPRC students for IAP?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

→ If yes, what kind of activities do you conduct?

Curriculum

31. What is the balance between theory and practice of your IPRCs' curricula?

Department	Theory %	Practice %
Whole departments	%	%
	%	%
	%	%
	%	%
	%	%

	%	%
	%	%

32. We understand WDA develops IPRC's curricula. Are you currently using the curricula which WDA developed?

☐	1. Yes. For all departments	☐	2. Yes, but not for all departments
☐	3. No	☐	4. Don't know

If '2. Yes, but not for all departments', which departments are using the curricula which were developed by WDA?

If no, who developed the current curricula? Also, when will you be able to use WDA's curricula?

33. Would you share the curriculum for ICT education with us? (only if you have IT department and the latest curriculum is not on the website)

34. Do your IPRC's students take any national or international certificates (especially ICT area), such as Implementing and Administering Cisco Solutions (CCNA), International Computer Driving License (ICDL) and Microsoft Certificate Professional (MCP)?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If yes, what kind of certificates do they take? Also, does your IPRC encourage them to take examinations for certificates by holding such examinations at your IPRC?

ICT

35. Would you provide us with the information on system configuration and topology of the school?

36. Are there any plans/ documents on the utilization of digital contents and ICT infrastructure (e.g. ICT system on school operation, communication infrastructure, equipment etc.) of your IPRC?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If yes, would you share with us?

37. How is the current situation of the utilization of digital contents and ICT infrastructure both for teaching and administration work of your IPRC?

38. Do you have any plans to train your IPRC's teachers through ICT, such as developing and utilizing digital contents and train them by remote lectures?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If yes, please tell us the details.

39. Do you have any plans to introduce new teaching methods such as mobile learning and utilizing VR and AR?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If yes, please tell us the details.

40. Do you have any plans to introduce ICT system in your IPRC to reduce the administration work?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If yes, please tell us the details.

41. Would you tell us the challenges on utilization of ICT at your IPRC, if any, as well as the ways for improvement?

Applied Research, Innovation and Entrepreneurship

42. Was an applied research, innovation and entrepreneurship plan developed at your IPRC?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If yes, would you share the plan with us?

43. Are there any actual activities in the fields of applied research, innovation and entrepreneurship at your IPRC?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If yes, would you share the details, such as the contents of activities etc.?

44. We heard that all IPRCs install (Research Development and) Production Unit. Is it correct?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

→ If yes, how is it operated at your IPRC? Please tell us the information as much as you know.

Capacity Building of Staff

45. According to Rwanda Polytechnic Strategic Plan, competency-based staff capacity building plan and work exposure program for all staff are to be developed. Were they developed and shared with your IPRC?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

→ If yes, would you share with us?

46. Have your IPRC's teachers and administrative staff received in-service training before?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

→ If yes, please share the information on the frequency, period, targeted personnel, contents of the training.

47. If there are any training needs for your IPRC's teachers and administrative staff, please tell us the contents, targeted staff and frequency which are desired.

48. What needs to be improved by your IPRC? Please answer in 2 aspects below.

Technical aspect	
Operation and management	

Relationship with Other IPRCs

49. How are roles divided by each IPRC? Please tell us the each role. Also, what is the position of your IPRC?

50. Does your IPRC play the above division of role? If not, what is the difficulty?

51. Has your IPRC worked with other TVET institutions inside or outside Rwanda (e.g. mutual exchanges of students and instructors)?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

→ If yes, tell us the details, such as the name of institutions, contents of collaboration, period etc.

52. Does your IPRC have a plan to work with other TVET institutions inside or outside Rwanda?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If yes, tell us the details, such as the name of institutions, contents of collaboration, period etc.

Development Partners

53. Has your IPRC received any support from development partners so far?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If yes, would you share the information in the next page?

54. Are there any newly committed projects of development partners targeting your IPRC?

☐ 1. Yes ☐ 2. No ☐ 3. Don't know

If yes, would you share the information in the final page?

Table for Q. 53

1	Name of the TVET project and program	
	Development partner which supports the project/program	
	Period of the project	
	Outline of the project (overall goal, objectives, purposes, outcomes, implementing agencies, targets, implementation structure)	
	Project budget and budget execution so far	
	The project supports ICT utilization and/or innovation promotion	☐ 1. Yes ☐ 2. No ☐ 3. Don't know → Please explain the details ( )
	The progress and performance of the project so far	
	Challenges, lessons learnt and best practices of the project	
2	Name of the TVET project and	

	program	
	Development partner which supports the project/program	
	Period of the project	
	Outline of the project (overall goal, objectives, purposes, outcomes, implementing agencies, targets, implementation structure)	
	Project budget and budget execution so far	
	The project supports ICT utilization and/or innovation promotion	☐ 1. Yes ☐ 2. No ☐ 3. Don't know → Please explain the details ( )
	The progress and performance of the project so far	
	Challenges, lessons learnt and best practices of the project	
3	Name of the TVET project and	

	program	
	Development partner which supports the project/program	
	Period of the project	
	Outline of the project (overall goal, objectives, purposes, outcomes, implementing agencies, targets, implementation structure)	
	Project budget and budget execution so far	
	The project supports ICT utilization and/or innovation promotion	☐ 1. Yes ☐ 2. No ☐ 3. Don't know → Please explain the details ( )
	The progress and performance of the project so far	
	Challenges, lessons learnt and best practices of the project	

Table for Q. 54

Name of the project	Details of the project	Development partner

Thank you for your cooperation!

Questionnaire for the Data Collection Survey on Technical and Vocational Education and Training in the Republic of Rwanda

Development Partner supporting TVET

Date of interview: _____

Name of interviewer: _____

Name of interviewee: _____

Position of interviewee: _____

Department of interviewee: _____

Place of interview: _____

Overall TVET situation

1. How do you assess the overall situation of TVET in Rwanda? Could you share with us the recent trends, issues, challenges and prospects? We would appreciate it if you could compare with the global TVET trend as well.

2. Does your organization support IPRC level TVET in Africa in collaboration with other multi-lateral organizations such as UNESCO-UNEVOC, World Bank, or AU? If so, could you share with us the outline of the projects/programs following the table on the next page?

Your Support for TVET in Rwanda

3. Could you share with us the outline of your ongoing TVET projects and programs targeting IPRCs and RP as is shown in the table on the next page? Our interest is more on ICT of education and innovation creation.

4. Regarding your ongoing projects, if the project has a predecessor support, how the ongoing one evolved from the predecessor?

TVET project and program	How was it evolved from the former project?
1)	
2)	
3)	

1	Name of the TVET project and program	
	Development partner which supports the project/program	
	Period of the project	
	Outline of the project (overall goal, objectives, purposes, outcomes, implementing agencies, targets, implementation structure)	
	Project budget and budget execution so far	
	The project supports ICT utilization and/or innovation promotion	☐ 1. Yes ☐ 2. No → Please explain the details ( )
	The progress and performance of the project so far	
	Challenges, lessons learnt and best practices of the project	

2	Name of the TVET project and program	
	Development partner which supports the project/program	
	Period of the project	
	Outline of the project (overall goal, objectives, purposes, outcomes, implementing agencies, targets, implementation structure)	
	Project budget and budget execution so far	
	The project supports ICT utilization and/or innovation promotion	☐ 1. Yes ☐ 2. No → Please explain the details ( )
	The progress and performance of the project so far	
	Challenges, lessons learnt and best practices of the project	

3	Name of the TVET project and program	
	Development partner which supports the project/program	
	Period of the project	
	Outline of the project (overall goal, objectives, purposes, outcomes, implementing agencies, targets, implementation structure)	
	Project budget and budget execution so far	
	The project supports ICT utilization and/or innovation promotion	☐ 1. Yes ☐ 2. No → Please explain the details ( )
	The progress and performance of the project so far	
	Challenges, lessons learnt and best practices of the project	

EAC

5. Do you have TVET projects/programs targeting EAC? If yes, please share with us the outline, using the table on page 2. Our interest is more on ICT of education and innovation creation.

6. Do you have TVET projects/programs targeting IPRC equivalent level in other EAC countries? If yes, please share with us the outline, using the table on page 2. Our interest is more on ICT of education and innovation creation.

7. Regarding to 3., 5., and 6., do they have a component to link TVET institutions in EAC countries to share best practices and lessons learnt one another? If so, please share with us your experience.

8. If you have worked with EAC before,

   (1) Regarding EAC, once we overheard that EAC faced cash flow problem due to some partner states failing to meet the commitment in time for EAC's budget execution. Could you share with us if EAC still face similar situation these days, or any other operation challenges?

   (2) How do you look at TVET situation of EAC Region? Could you share with us how you assess the overall situation, trends, challenges, and collaboration among TVET institutions across EAC partner states?

Thank you for your cooperation!

Questionnaire for the Data Collection Survey on Technical and Vocational Education and Training in the Republic of Rwanda

German Embassy, DP Co-Chair of TVET Sub-Sector Working Group

Date of interview: _____

Name of interviewer: _____

Name of interviewee: Ms./ Mr. _____

Position of interviewee: _____

Department of interviewee: _____

Place of interview: _____

TVET SSWG

1. How do you assess the overall situation of TVET in Rwanda? Could you share with us the recent trends, issues, challenges and prospects? We would appreciate it if you could compare with the global TVET trend as well.

German Government's Support for TVET

2. Could you share with us the outline of your ongoing TVET projects and programs in Rwanda as is shown in the table on the next page? Our interest is more on ICT of education and innovation creation.

3. Regarding your ongoing projects in Rwanda, if the project has a predecessor support, how the ongoing one evolved from the predecessor?

TVET project and program	How was it evolved from the former project?
1)	
2)	
3)	

4. Does your organization support IPRC level TVET in Africa in collaboration with other multi-lateral organizations such as UNESCO-UNEVOC, World Bank, or AU? If so, could you share with us the outline of the projects/programs following the table on the next page?

1	Name of the TVET project and program	
	Development partner which supports the project/program	
	Period of the project	
	Outline of the project (overall goal, objectives, purposes, outcomes, implementing agencies, targets, implementation structure)	
	Project budget and budget execution so far	
	The project supports ICT utilization and/or innovation promotion	☐ 1. Yes ☐ 2. No → Please explain the details ( )
	The progress and performance of the project so far	
	Challenges, lessons learnt and best practices of the project	

2	Name of the TVET project and program	
	Development partner which supports the project/program	
	Period of the project	
	Outline of the project (overall goal, objectives, purposes, outcomes, implementing agencies, targets, implementation structure)	
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	The progress and performance of the project so far	
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	Outline of the project (overall goal, objectives, purposes, outcomes, implementing agencies, targets, implementation structure)	
	Project budget and budget execution so far	
	The project supports ICT utilization and/or innovation promotion	☐ 1. Yes ☐ 2. No → Please explain the details ( )
	The progress and performance of the project so far	
	Challenges, lessons learnt and best practices of the project	

EAC

5. Regarding EAC, once we overheard that EAC faced cash flow problem due to some partner states failing to meet the commitment in time for EAC's budget execution. We understand that the German Government also supports EAC in different programs. Could you share with us if EAC still face similar situation these days, or any other operation challenges?

6. How do you look at TVET situation of EAC Region? Could you share with us how you assess the overall situation, trends, challenges, and collaboration among TVET institutions across EAC partner states?

7. Could you share with us the outline of ICT Excellence Centre CENIT@EA?

8. If you have TVET projects/programs targeting EAC, please share with us the outline, using the table on page 2. Our interest is more on ICT of education and innovation creation.

Thank you for your cooperation!

Questionnaire for the Data Collection Survey on Technical and Vocational Education and Training in the Republic of Rwanda

World Bank

East Africa Skills for transformation and Regional Integration Project(EASTRIP)

Date of interview: _____

Name of interviewer: _____

Name of interviewee: _____

Position of interviewee: _____

Department of interviewee: _____

Place of interview: _____

Global TVET Situation and Trend

1. How do you assess the overall situation of TVET globally? Could you share with us the major challenges including those caused by COVID-19?

African TVET Situation and Trend

2. How do you assess the overall situation of TVET in Eastern Africa? Could you share with us the major challenges including those caused by COVID-19?

EASTRIP

3. Does it have a predecessor support? If yes, how has EASTRIP evolved from the predecessor?

TVET project and program	How was it evolved from the former project?

4. Could you share with us the outline of EASTRIP as is shown below? We attempted to fill a part of information via internet. We would appreciate if you could confirm what is filled and explain us where it is blank (yellow highlights).

EASTRIP Project Outline

Name of the TVET project and program	East African Skills for Transformation and Regional Integration Project (EASTRIP)
Development partner which supports the project/program	The World Bank Other Country Partners of EASTRIP: China Guangdong Province, Mozambique, Seychelles, and Uganda. (What are their roles?):
Period of the project	2019-2024
Project budget and budget execution so far	Budget: USD293 million Budget execution so far: USD

Outline of the project (overall goal, objectives, purposes, outcomes, implementing agencies, targets, implementation structure)	• ***Project Development Objectives***: To increase the access and improve the quality of TVET programs and to support regional integration
	• ***Key Results***:
	  • 270+ industry demanded programs developed;
	  • 60,000+ trained cumulatively;
	  • graduate employment rate improved;
	  • 16 Regional Flagship TVET Institutes transformed;
	  • Regional faculty/student mobility facilitated;
	  • harmonized standards and programs developed;
	  • learning platform and community of practice

<table>
<tr><td>Components & Sub-components</td><td>
<table>
<tr><th>COMPONENT 1:
Strengthening selected Regional Flagship TVET Institutes for high-quality skills development in priority sectors</th><th>COMPONENT 2:
Creating national TVET enabling environments</th><th>COMPONENT 3:
Enhancing regional collaboration in TVET and project coordination</th></tr>
<tr><td>1. Strengthening governance and management
2. Institutionalizing industry links
3. Developing market relevant competency-based training programs
4. Training of TVET managers and teachers/trainers
5. Provision of key training facilities and equipment
6. Outreach and support for non-project national TVET institutes</td><td>1. Strengthening national TVET quality assurance and industrial partnership
2. Capacity building for TVET policy development and implementation
3. Promoting regional integration
4. Facilitating national project coordination, and M&E</td><td>1. Harmonization of standards and mutual recognition of qualifications for priority occupations
2. Facilitating student and staff mobility through exchange programs
3. Regional project coordination and M&E</td></tr>
</table>
</td></tr>
<tr><td>The project supports ICT utilization and/or innovation promotion</td><td>☐ 1. Yes ☐ 2. No
→ Please explain the details
( )</td></tr>
<tr><td>16 Regional Flagship TVET Institutes (RFTIs)</td><td>
<table>
<tr><th>Sector</th><th>Regional Flagship TVET Institute</th></tr>
<tr><td>ICT</td><td>Dar es Salam Institute of Technology (DIT)</td></tr>
<tr><td>Power/energy</td><td>General Wingate Polytechnic College</td></tr>
<tr><td></td><td>KenGen Geothermal Training Center</td></tr>
<tr><td></td><td>Arusha Technical College</td></tr>
<tr><td>Transport/infrastructure</td><td>Meles Zenawi Memorial TVET Polytechnic College</td></tr>
<tr><td></td><td>Ethiopia Railway Academy</td></tr>
<tr><td></td><td>Kenya Coast National Polytechnic</td></tr>
<tr><td></td><td>National Institute of Transport</td></tr>
<tr><td></td><td>Kombolcha TVET Polytechnic College</td></tr>
<tr><td></td><td>Meru National Polytechnic</td></tr>
<tr><td></td><td>Kenya Institute of Highway and Building Technology</td></tr>
<tr><td>Manufacturing</td><td>TVET Institute</td></tr>
<tr><td></td><td>Hawassa TVET Polytechnic College</td></tr>
<tr><td></td><td>Kisumu National Polytechnic</td></tr>
<tr><td></td><td>DIT Mwanza Campus</td></tr>
<tr><td></td><td>Holeta TVET Polytechnic College</td></tr>
</table>
</td></tr>
</table>

The progress and performance of the project so far	Progress up to June 2019 • Governance structure in place; Operation Manual developed • Strategic Investment Plan developed and benchmarked to global standards (with procurement plan, environmental and social framework including gender, program and staff development plan, results framework) • Each RFTI to establish full-fledged implementation unit • Each RFTI has established Industrial Advisory Board/committee with lead industries and companies • Ethiopia, Kenya, and IUCEA are effective Progress from June 2019 to date
Challenges, lessons learnt and best practices of the project	

5. Regarding RFTI, could you describe the definition, role, and its selection criteria?

6. As you may be aware, EAC selected 3 TVET Centres of Excellence (CoEs), and they are IPRC Tumba of Rwanda, Rift Valley Technical Training Institute of Kenya, and National Institute of Public Health of Burundi. Do you have any plan for RFTIs to collaborate with EAC CoEs?

7. Is it possible for us to interview Dar es Salam Institute of Technology (DIT) of Tanzania RFTI? (JICA supported IPRC Tumba of Rwanda, which is EAC CoE, which also has ICT department.)

8. Could you elaborate how EASTRIP works on TVET harmonization under Component 3?

9. What is the role of IUCEA? It is assumed that the membership of IUCEA is limited to universities, while RFTIs are not universities. Having said that how can IUCEA effectively intervene in TVET institutions under EASTRIP?

EAC

10. How does EASTRIP work with EAC Secretariat and EAC partner states?

11. Regarding EAC, once we overheard that EAC faced cash flow problem due to some partner states failing to meet the commitment in time for EAC's budget execution. Do you have any idea if EAC still face similar situation these days, or any other operation challenges?

Thank you for your cooperation!

Questionnaire for the Data Collection Survey on Technical and Vocational Education and Training in the Republic of Rwanda

Ministry of ICT and Innovation

Date of interview: _____

Name of interviewer: _____

Name of interviewee: Ms./ Mr. _____

Position of interviewee: _____

Department of interviewee: _____

Place of interview: _____

1. Rwanda is one of the leading countries to promote innovation in Africa based on the Smart Rwanda Master Plan. Among many projects and programs, what are outstanding ones related to ICT human resource development and entrepreneur support? Please describe three projects and programs as good practices.

1	Name of the project and/or program	
	Development partner which supports the project/program	
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	Period of the project	
	Outline of the project (overall goal, objectives, purposes, outcomes, implementing agencies, targets, implementation structure)	

	Project budget and budget execution so far	
	The progress and performance of the project so far	
	Challenges, lessons learnt and best practices of the project	

2. If your ministry has the report about "Develop a Strategic plan to match ICT Skills with ICT Sector industry needs in Rwanda" supported by UNESCO, would you kindly share the related document with us?

3. According to the Global Innovation Index (2019), Rwanda ranks the 5th among the 26 economies in Sub-Saharan Africa. However, it also points out the weakness of "human capital and research" for innovation. Is there any challenge related to human capital and research identified by your ministry?

4. How does your ministry define the ICT human resource who can promote industrial development and innovation in Rwanda? Is there any specific framework of skillset and/or ICT skill standard?

☐ 1. Yes ☐ 2. No

→ If yes, would you kindly share the related document with us?

5. After **National Digital Talent Policy** was developed in 2016, was it revised or replaced by another policy?

☐ 1. Yes ☐ 2. No

→ If yes, would you kindly share the latest version of it with us?

6. According to National Digital Talent Policy 2016, ICT human resources are categorized into three levels such as **Associate** level, **Professional** level, and **Expert** level. Which level is relevant to graduates from TVET? Please check (✓) the level relevant to IPRC and Technical

Secondary School.

Level / Graduate from	Level		
	Associate	Professional	Expert
IPRC			
Technical Secondary School			

7. According to National Skills Development and Employment Promotion Strategy (NSDEPS) 2019-2024, about 3 million jobs will be created from 1 million in 2016 by 2030 in ICT sector. This report categorized ICT skills into four broad categories; (a) digital literacy, (b) content processing (use of technology to communicate and analyze information), (c) hardware management, (d) content creation (software development and application management). Which jobs do you expect **IPRC graduates** to be engaged? Please check (✓) the expectation

Expectation Level / ICT Job Category	Expectation for IPRC graduates		
	Low	Middle	High
(a) digital literacy			
(b) content processing			
(c) hardware management			
(d) content creation			

8. Compared to University, what is the expected roles of TVET (**especially IPRC**) to promote industrial development and innovation in Rwanda? Would you kindly describe the different roles of graduate from University and TVET **(especially IPRC**)?

Expected roles of university

Expected roles of TVET (**especially IPRC**)

9. Does your ministry have any expectation for TVET (**especially IPRC**) and TVET (**especially IPRC**) graduate to play a role for promoting innovation within the national innovation ecosystem?

☐ 1. Yes ☐ 2. No

If yes, would you describe what kind of role you expect them?

11. Is there any gap between the expectation and reality?

☐ 1. Yes ☐ 2. No

If yes, would you describe the details (what kinds of gaps you identify)?

12. Is there any project to minimize the gap in collaboration with donors?

☐ 1. Yes ☐ 2. No

If yes, would you describe the details on the following sheets and/or share such project reports with us?

1	Name of the project and/or program	
	Development partner which supports the project/program	
	Period of the project	
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13. According to National Digital Talent Policy 2016, in order to achieve "Objective 2: Strengthen ICT Curriculum in Education Institutions measures", there is the "**Measure 3: Integrating Digital Skills and Certification in formal education curriculum at all levels.**" Is formal education curriculum consistent to any certification such as ICDL (International Computer Driving License) and MCP (Microsoft Certificate Professional)?

☐ 1. Yes ☐ 2. No

If yes, which certificate and how is it consistent?
If any, would you share the related documents?

14. According to National Digital Talent Policy 2016, **"ICT Sector skills Council"** is responsible for Professional Certification. Does "ICT Sector skills Council" still play the same role?

☐ 1. Yes ☐ 2. No

If no, would you tell us which organization is responsible for it?

15. Please describe the role of **"ICT Sector skills Council"** for ICT human resource development. If any, would you share the related documents such as action plan, progress report, and meeting materials?

16. According to **Rwanda Polytechnic Strategic Plan (Draft) 2019-2024**, there are several plans to improve ICT environment and promote use of ICT in TVET (such as SMART classroom, provision of Positivo laptops, internet connectivity, digitalized contents, etc.). Does your ministry support and collaborate with Rwanda Polytechnic to implement this plan?

☐ 1. Yes ☐ 2. No

If yes, would you kindly describe how your ministry supports the implementation of Rwanda Polytechnic Strategic Plan (2019 - 2024)?

17. According to **Rwanda Polytechnic Strategic Plan (Draft) 2019-2024**, there are several plans to improve ICT environment and promote use of ICT in TVET. If your ministry

observes any challenges that Rwanda Polytechnic faced to implement Rwanda Polytechnic Strategic Plan (2019-2024), would you describe it?

18. According to Rwanda Polytechnic Strategic Plan (Draft) 2019-2024 (P25), there is the plan to develop and approve a **Rwanda Polytechnic Information and Communication Technology (ICT) Policy by 2020**. Did your ministry support and contribute to developing it?

☐ 1. Yes ☐ 2. No

If yes, would you kindly describe what are strong points and challenges for Rwanda Polytechnic to implement Rwanda Polytechnic Strategic Plan (2019-2024) for ICT human resource development?

19. What types of ICT human resources are in demand to promote industrial development and innovation in Rwanda? Please check (✓) the level of the demand relevant to each profession.

Needs / Profession	Level of Demand		
	Low	Middle	High
Operators			
Application engineers (programmers)			
System architects			
Infrastructure engineers			
Project managers			
IT/Business Consultants (who has capability to support CEO and CIO to set and implement ICT strategy in a company)			
Digital business planner (who has capability to promote digital transformation in a company and/or create new business with digital technology)			
Other ( )			

20. What types of digital technology/skills are prioritized and/or specifically focused to be utilized to promote industrial development and innovation in Rwanda? Please check (✓) priority level relevant to each technology.

Priority / Technology		Priority Level		
		Low	Middle	High
System development	Application development			
	Web development			
	embedded control system			
	Data base development			
Operation & Maintenance	Operation skills			
	CAD (3D, including design)			

Technology \ Priority		Priority Level		
		Low	Middle	High
	PC disassembly and assembly			
Newly emerging technology	VR/AR			
	AI			
	Big Data analysis			
	Block Chain			
	IoT sensor technology			
	Drone			
	3D printer			
	RFID			
	robots			
Network technology	Infrastructure technology			
	Network construction and			
	Mobile networks			
	Network security			
	Others ( )			

21. While ICT can promote industrial development and innovation, does your ministry have prioritized fields (industries) to utilize ICT? Please check (✓) priority level relevant to each field.

Fields \ Priority	Priority Level		
	Low	Middle	High
Fintech (Finance x ICT),			
Agritech (Agriculture x ICT)			
Edtech (Education x ICT),			
Healthtech (Health x ICT)			

Priority / Fields	Priority Level		
	Low	Middle	High
Foodtech (Food x ICT),			
Smart factory (Manufacturing x ICT)			
Martech (Marketing x ICT),			
Retech (Real Estate x ICT)			
Mobility tech (Mobility x ICT),			
Instech (Insurance x ICT)			
Travel Tech (Tourism x ICT)			
Other ( )			

Thank you for your cooperation!

Questionnaire for the Data Collection Survey on Technical and Vocational Education and Training in the Republic of Rwanda

Rwanda Information Society Authority

Date of interview: _____

Name of interviewer: _____

Name of interviewee: Ms./ Mr. _____

Position of interviewee: _____

Department of interviewee: _____

Place of interview: _____

1. Rwanda is one of the leading countries to promote innovation in Africa based on the Smart Rwanda Master Plan. Among many projects and programs, what are outstanding ones related to ICT human resource development and entrepreneur support? Please describe three projects and programs as good practices.

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	Project budget and budget execution so far	
	The progress and performance of the project so far	
	Challenges, lessons learnt and best practices of the project	

2. If RISA has the report about "Develop a Strategic plan to match ICT Skills with ICT Sector industry needs in Rwanda" supported by UNESCO, would you kindly share the related document with us?

3. According to the Global Innovation Index (2019), Rwanda ranks the 5th among the 26 economies in Sub-Saharan Africa. However, it also points out the weakness of "human capital and research" for innovation. Is there any challenge related to human capital and research identified by RISA?

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20. What types of digital technology/skills are prioritized and/or specifically focused to be utilized to promote industrial development and innovation in Rwanda? Please check (✓) priority level relevant to each technology.

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	RFID			
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Network technology	Infrastructure technology			
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21. While ICT can promote industrial development and innovation, does RISA have prioritized fields (industries) to utilize ICT? Please check (✓) priority level relevant to each field.

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Agritech (Agriculture x ICT)			
Edtech (Education x ICT),			
Healthtech (Health x ICT)			
Foodtech (Food x ICT),			

Priority / Fields	Priority Level		
	Low	Middle	High
Smart factory (Manufacturing x ICT)			
Martech (Marketing x ICT),			
Retech (Real Estate x ICT)			
Mobility tech (Mobility x ICT),			
Instech (Insurance x ICT)			
Travel Tech (Tourism x ICT)			
Other ( )			

Thank you for your cooperation!

Questionnaire for the Data Collection Survey on Technical and Vocational Education and Training in the Republic of Rwanda

National Industrial Research and Development Agency

Date of interview: _____

Name of interviewer: _____

Name of interviewee: Ms./ Mr. _____

Position of interviewee: _____

Department of interviewee: _____

Place of interview: _____

1. Rwanda is one of the leading countries to promote innovation in Africa based on the Smart Rwanda Master Plan. Among many projects and programs, what are outstanding ones related to ICT human resource development and entrepreneur support? Please describe three projects and programs as good practices.

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	Development partner which supports the project/program	
	Period of the project	
	Outline of the project (overall goal, objectives, purposes, outcomes, implementing agencies, targets, implementation structure)	

	Project budget and budget execution so far	
	The progress and performance of the project so far	
	Challenges, lessons learnt and best practices of the project	

2. According to the Global Innovation Index (2019), Rwanda ranks the 5th among the 26 economies in Sub-Saharan Africa. However, it also points out the weakness of "human capital and research" for innovation. Is there any challenge related to human capital and research identified by NIRDA?

3. How does NIRDA define the ICT human resource who can promote industrial development and innovation in Rwanda? Is there any specific framework of skillset and/or ICT skill standard?

☐ 1. Yes ☐ 2. No

→ If yes, would you kindly share the related document with us?

4. After **National Digital Talent Policy** was developed in 2016, was it revised or replaced by another policy?

☐ 1. Yes ☐ 2. No

→ If yes, would you kindly share the latest version of it with us?

5. According to National Digital Talent Policy 2016, ICT human resources are categorized into three levels such as **Associate** level, **Professional** level, and **Expert** level. Which level is relevant to graduates from TVET? Please check (✓) the level relevant to IPRC and Technical Secondary School.

Level / Graduate from	Level		
	Associate	Professional	Expert
IPRC			
Technical Secondary School			

6. According to National Skills Development and Employment Promotion Strategy (NSDEPS) 2019-2024, about 3 million jobs will be created from 1 million in 2016 by 2030 in ICT sector. This report categorized ICT skills into four broad categories; (a) digital literacy, (b) content processing (use of technology to communicate and analyze information), (c) hardware management, (d) content creation (software development and application management). Which jobs do you expect **IPRC graduates** to be engaged? Please check (✓) the expectation

Expectation Level / ICT Job Category	Expectation for IPRC graduates		
	Low	Middle	High
(a) digital literacy			
(b) content processing			
(c) hardware management			
(d) content creation			

7. Compared to University, what is the expected roles of TVET (**especially IPRC**) to promote industrial development and innovation in Rwanda? Would you kindly describe the different roles of graduate from University and TVET **(especially IPRC**)?

Expected roles of university

Expected roles of TVET (**especially IPRC**)

8. Does NIRDA have any expectation for TVET (**especially IPRC**) and TVET (**especially IPRC**) graduate to play a role for promoting innovation within the national innovation ecosystem?

☐ 1. Yes ☐ 2. No

If yes, would you describe what kind of role you expect them?

10. Is there any gap between the expectation and reality?

☐ 1. Yes ☐ 2. No

If yes, would you describe the details (what kinds of gaps you identify)?

11. Is there any project to minimize the gap in collaboration with donors?

☐ 1. Yes ☐ 2. No

If yes, would you describe the details on the following sheets and/or share such project reports with us?

1	Name of the project and/or program	
	Development partner which supports the project/program	
	Period of the project	
	Outline of the project (overall goal, objectives, purposes, outcomes, implementing agencies, targets, implementation structure)	
	Project budget and budget execution so far	
	The progress and performance of the project so far	
	Challenges, lessons learnt and best practices of the project	
2	Name of the project and/or program	
	Development partner which supports the project/program	
	Period of the project	
	Outline of the project (overall goal, objectives, purposes,	

	outcomes, implementing agencies, targets, implementation structure)	
	Project budget and budget execution so far	
	The progress and performance of the project so far	
	Challenges, lessons learnt and best practices of the project	
3	Name of the project and/or program	
	Development partner which supports the project/program	
	Period of the project	
	Outline of the project (overall goal, objectives, purposes, outcomes, implementing agencies, targets, implementation structure)	

	Project budget and budget execution so far	
	The progress and performance of the project so far	
	Challenges, lessons learnt and best practices of the project	

12. According to National Digital Talent Policy 2016, in order to achieve "Objective 2: Strengthen ICT Curriculum in Education Institutions measures", there is the "**Measure 3: Integrating Digital Skills and Certification in formal education curriculum at all levels.**" Is formal education curriculum consistent to any certification such as ICDL (International Computer Driving License) and MCP (Microsoft Certificate Professional)?

☐ 1. Yes ☐ 2. No

If yes, which certificate and how is it consistent?
If any, would you share the related documents?

13. According to National Digital Talent Policy 2016, **"ICT Sector skills Council"** is responsible for Professional Certification. Does "ICT Sector skills Council" still play the same role?

☐ 1. Yes ☐ 2. No

If no, would you tell us which organization is responsible for it?

14. Please describe the role of **"ICT Sector skills Council"** for ICT human resource development. If any, would you share the related documents such as action plan, progress report, and meeting materials?

15. According to **Rwanda Polytechnic Strategic Plan (Draft) 2019-2024**, there are several plans to improve ICT environment and promote use of ICT in TVET (such as SMART classroom, provision of Positivo laptops, internet connectivity, digitalized contents, etc.). Does NIRDA support and collaborate with Rwanda Polytechnic to implement this plan?

☐ 1. Yes ☐ 2. No

If yes, would you kindly describe how NIRDA supports the implementation of Rwanda Polytechnic Strategic Plan (2019 - 2024)?

16. According to **Rwanda Polytechnic Strategic Plan (Draft) 2019-2024**, there are several plans to improve ICT environment and promote use of ICT in TVET. If NIRDA observes any challenges that Rwanda Polytechnic faced to implement Rwanda Polytechnic Strategic Plan (2019-2024), would you describe it?

17. According to Rwanda Polytechnic Strategic Plan (Draft) 2019-2024 (P25), there is the plan to develop and approve a **Rwanda Polytechnic Information and Communication Technology (ICT) Policy by 2020**. Did NIRDA support and contribute to developing it?

☐ 1. Yes ☐ 2. No

If yes, would you kindly describe what are strong points and challenges for Rwanda Polytechnic to implement Rwanda Polytechnic Strategic Plan (2019-2024) for ICT human resource development?

18. What types of ICT human resources are in demand to promote industrial development and innovation in Rwanda? Please check (✓) the level of the demand relevant to each profession.

Needs / Profession	Level of Demand		
	Low	Middle	High
Operators			

Needs / Profession	Level of Demand		
	Low	Middle	High
Application engineers (programmers)			
System architects			
Infrastructure engineers			
Project managers			
IT/Business Consultants (who has capability to support CEO and CIO to set and implement ICT strategy in a company)			
Digital business planner (who has capability to promote digital transformation in a company and/or create new business with digital technology)			
Other ( )			

19. What types of digital technology/skills are prioritized and/or specifically focused to be utilized to promote industrial development and innovation in Rwanda? Please check (✓) priority level relevant to each technology.

Priority / Technology		Priority Level		
		Low	Middle	High
System development	Application development			
	Web development			
	embedded control system			
	Data base development			
Operation & Maintenance	Operation skills			
	CAD (3D, including design)			
	PC disassembly and assembly			
	VR/AR			

Technology \ Priority		Priority Level		
		Low	Middle	High
Newly emerging technology	AI			
	Big Data analysis			
	Block Chain			
	IoT sensor technology			
	Drone			
	3D printer			
	RFID			
	robots			
Network technology	Infrastructure technology			
	Network construction and			
	Mobile networks			
	Network security			
	Others ( )			

20. While ICT can promote industrial development and innovation, does NIRDA have prioritized fields (industries) to utilize ICT? Please check (✓) priority level relevant to each field.

Fields \ Priority	Priority Level		
	Low	Middle	High
Fintech (Finance x ICT),			
Agritech (Agriculture x ICT)			
Edtech (Education x ICT),			
Healthtech (Health x ICT)			
Foodtech (Food x ICT),			
Smart factory (Manufacturing x ICT)			

Priority / Fields	Priority Level		
	Low	Middle	High
Martech (Marketing x ICT),			
Retech (Real Estate x ICT)			
Mobility tech (Mobility x ICT),			
Instech (Insurance x ICT)			
Travel Tech (Tourism x ICT)			
Other ( )			

Thank you for your cooperation!

Questionnaire for the Data Collection Survey on Technical and Vocational Education and Training in the Republic of Rwanda

Incubator

Date of interview: _____

Name of interviewer: _____

Name of interviewee: Ms./ Mr. _____

Position of interviewee: _____

Department of interviewee: _____

Place of interview: _____

1. What kinds of services do you provide as an incubator? Please check (✓) and describe about your services. If you have any brochure, please share it with us.

Services	Answer		
	Yes	No	Details
Office space provision			(Ex: types of space, price, etc.)
Training			(Ex: for what subjects (accounting, marketing, law, etc.), how long?, how frequently?, how much (price)?, etc.)
Mentorship			(Ex: for what subjects (accounting, marketing, law, etc.), how long?, how frequently?, who is mentor?, how much (price)?,etc.)
Acceleration program			(Ex: how long?, for how many startups?, what is goal?, who is sponsor?, how much (price)?, etc.)

Services	Answer		
	Yes	No	Details
Business matching			(Ex: how to match?, for how many startups?, in which sector?, how much (price)?, etc.)
Event (business contest, ideathon, hackathon, etc.)			(Ex: in which sector?, how frequently?, who is sponsor?, for what purpose?, what is prize?, etc.)
Loan			(Ex: for how many startups?, in which sector?, how much (price)?, what is criteria?, who is sponsor?, for what purpose?, etc.)
Grant			(Ex: for how many startups?, in which sector?, how much (price)?, what is criteria?, who is sponsor?, for what purpose?,. etc.)

2. How many startups and entrepreneurs are members (customers)?

3. What academic background do you think the entrepreneurs have? Please describe based on your guess (it doesn't matter even if you don't have accurate information).

Academic Background
(1) Foreign University graduate: (_____) %

(2) Rwandan University graduate: (_____) %

(3) IPRC graduate: (_____) %

(4) Technical Secondary School graduate: (_____) %

(5) Secondary School or lower education graduate: (_____) %

(6) Others: Specify:_____

4. What business sectors do you cover? Please check (✓)

Industry Sector：

☐ICT, ☐Agriculture, Forestry, and Fishing ☐Mining ☐Construction

☐Manufacturing, ☐Transportation, Communications, Electric Gas, And Sanitary Services

☐Wholesale Trade ☐Retail Trade □Finance, Insurance, and Real Estate ☐Services

☐Public Administration ☐Education ☐Logistics

☐Others: Specify:_____

5. Do you have a specific focus and interests in ICT sector and/or use of ICT?

☐ 1. Yes ☐ 2. No

If yes, please check (✓) the interested fields.

Priority / Fields	Priority Level		
	Low	Middle	High
Fintech (Finance x ICT),			
Agritech (Agriculture x ICT)			
Edtech (Education x ICT),			
Healthtech (Health x ICT)			
Foodtech (Food x ICT),			
Smart factory (Manufacturing x ICT)			
Martech (Marketing x ICT),			
Retech (Real Estate x ICT)			
Mobility tech (Mobility x ICT),			
Instech (Insurance x ICT)			
Travel Tech (Tourism x ICT)			
Other ( )			

6. Do you have any collaboration project with Rwandan government (Ministry, Agency, ICT Chamber, etc.) and/or educational institutes in these 3 years?

☐ 1. Yes ☐ 2. No

If yes, please describe what project (s) you have implemented (implementing).

Name of project: _____
Government: _____
Educational institute: _____
Donor Partners, if any: _____
Project period: _____
Outline of the project:

Name of project: _____
Government: _____
Educational institute: _____
Donor Partners, if any: _____
Project period: _____
Outline of the project:

Name of project: _____
Government: _____
Educational institute: _____
Donor Partners, if any: _____
Project period: _____
Outline of the project:

Name of project: _____

Government:_____
Educational institute:_____
Donor Partners, if any:_____
Project period:_____
Outline of the project:

Name of project: _____
Government:_____
Educational institute:_____
Donor Partners, if any:_____
Project period:_____
Outline of the project:

7. What do you think about collaboration with IPRC? For example, IPRC has a production unit with equipped laboratory which can be used for making not only prototypes but also products. In fact, IPRC produces and sales products (ex. Solar power water boiling machines) to local companies. Some of IPRC students may have practical skills for production as well as programming (coding) skills to develop software prototypes. Do you feel any merit and/or interest in matching entrepreneurs and IPRC?

☐ 1. Yes ☐ 2. No

If yes, please describe what activity and program may be possible.

If no, please describe the reason.

8. Do you expect IPRC to play a role to promote innovation ecosystem (startup ecosystem) in Rwanda?

☐ 1. Yes ☐ 2. No

If yes, please describe what role (s) IPRC can play within innovation ecosystem (startup ecosystem) in Rwanda.

If no, please describe the reason.

Thank you for your cooperation!

Questionnaire for the Data Collection Survey on Technical and Vocational Education and Training in the Republic of Rwanda

EAC TVET Section
(Director of Social Sectors, Education, Culture, Sports and Science & Technology Department, DSG Productive and Social Sectors)

Date of interview: _____

Name of interviewer: _____

Name of interviewee: Ms./ Mr. _____

Position of interviewee: _____

Department of interviewee: _____

Place of interview: _____

Reference is made to your presentation in Nairobi made in March 2020 (obtained from internet) and EAC Website.

1. EAC Organogram

   Could you confirm with us if the overall EAC organogram which is found on EAC Website. Can we assume it remains the same up to now? If no, please share with us the latest version.

2. EAC TVET Section

   Under the Department, how many staff members are in charge of TVET and how do you share the work? If you have TVET Section organogram, please share it with us.

3. Entities running EAC TVET programs

3.1. We assume EAC established three entities to run TVET programs: TVET TECHCOM (for Harmonization of TVET) and the Sectoral Council on Education, Science and Technology, Culture and Sports. Is it correct? If no, please share with us the correct information.

3.2. Membership and TORs for TVET TECHCOM: Are there any changes from the presentation you made in Nairobi in March 2020? If no, please share with us the changes.

3.3. Could you share with us the membership and TORs for the Sectoral Council on Education, Science and Technology, Culture and Sports?

3.4. Regarding the recommendation for EAC Secretariat to facilitate the establishment of a regional body to coordinate TVET in the EAC, adopted in TVET TECHCOM meeting held in August 2019 what is the progress? If this body is different from the TVET coordinating forum, which also seemed to be proposed, how far is it operationalized?

4. TVET Budget

4.1. Could you share with us the information of EAC budget for TVET in the past three years, as to: approved budget, allocated amount, and executed amount for each sub-program?

4.2. How much of 4.1 above is supported by Development Partners? We would appreciate it if you could share with us both on budget and off budget support information by each DP.

4.3. Please explain the outline of the programs supported by the DPs (please follow Annex 1). Are there regional TVET projects other than EASTRIP?

5. Contents and Progress of TVET programs/projects

5.1. Could you share with us the past three years' progress of EAC TVET programs? If you have reports, please share with us. (Our special interest is on the Centre of Excellence program and EASTRIP project supported by the World Bank.)

5.2. Could you shed lights on the progress of the TVET program such as the maintenance and utilization of Center of Excellences (CoEs)?

5.3. When is TVET Harmonization Strategy planned to be finalized?

5.4. Please share with us, if possible, your future plan of programs/projects, including those which are pipeline.

6. ICT and Innovation of TVET

Does EAC have any policy regarding ICT, Innovation and TVET (digitization of TVET, or promoting innovation through education)?

7. What is the following organizations' involvement in TVET programs and in promoting mutual collaboration among TVET institutions in EAC?

The Inter-University Council for East Africa (IUCEA, Uganda)

East African Science and Technology Commission (EASTECO, Rwanda)

Academia-Public-Private Partnership Forum (APPPF)

8. EAC Industry, Labor Demand, and TVET

(1) Do you have an analysis report of EAC Industry and Labor Structure? If so, please share with us.

(2) Do you have any statistics regarding the labor movement amongst EAC countries, and the procedure on the same?

(3) How do you look at the demand for TVET in EAC region in the following fields?

Field	Example	Level of demand for TVET （Tick ONLY 1 column for each row (field)）		
		High	Moderate	Low
(Example) Field 1	Example 1 Example 2	☑	☐	☐
(Example) Field 2	Example 1 Example 2	☐	☑	☐
Information and Communication Technology	・Application development ・Web development ・Control/embedded system development ・Profession of integrated systems operation ・Big data analysis ・CAD, 3D operation ・Drones ・Database including Block Chain ・Network construction and operation ・Mobile networks ・Network security ・PC disassembly and assembly ・IoT sensor technology ・3D printer	☐	☐	☐
Electrical/Electronic Engineering	・Drawings/designs ・Cabling/wiring ・Soldering/welding ・Repair of home electrical appliances ・Handling of analytical tools ・Operation of machine tools ・Repairing/re-assembling of equipment and tools	☐	☐	☐

Field	Example	Level of demand for TVET (Tick ONLY 1 column for each row (field))		
		High	Moderate	Low
	・Operation of process control equipment and tools ・Basic operation of ICT equipment			
Civil Engineering	・Drawings/designs ・Architectural technology ・Land/site planning and development ・Operation of machine/tools ・Management of menial laborers ・Facility construction/maintenance ・Basic operation of ICT equipment	□	□	□
Mechanical Engineering	・Repair of parts/components of automobiles ・Handling of machines tools ・Drawing/design of physical structure of machines/equipment ・Operation of machine/equipment/tools ・Basic knowledge and operation of ICT equipment	□	□	□
Irrigation and Drainage technology	・Drawings/designs of the sites ・Design of physical structures of machine/equipment ・Operation of machine/equipment/tools ・Management of menial laborers ・Basic knowledge and operation of ICT	□	□	□
Electric communication	・Cabling/wiring technics ・Soldering/welding technics ・Handling of analytical tools ・Operation of machine tools ・Repairing/re-assembling of equipment and tools ・Telecommunication and broadcasting technology ・Drawings/designs of parts/components ・Basic knowledge and operation of ICT ・Repair of mobile phones	□	□	□
Renewable energy	・Design/drawing technic ・Metal working(forging/casting) ・Welding ・Practical knowledge on mechanism of equipment ・Operation of lathe machine	□	□	□

Field	Example	Level of demand for TVET (Tick ONLY 1 column for each row (field))		
		High	Moderate	Low
	・Operation of analytical machine/tools ・Basic knowledge and operation of ICT			
Mining Engineering	・Design/drawing ・Metal working technology (forging/casting) ・Welding ・Design/drawing ・Mechanical and structural knowledge ・Operation of lathe machine ・Operation of analytical machine/tools ・Basic knowledge and operation of ICT equipment ・Operation of lathe machine	□	□	□
Agriculture and food processing	・Land planning and development ・Dairy and husbandry management ・Horticulture management ・Quality management of crops ・Soil management ・Fertilizer analysis ・Nutrition management ・Basic knowledge and operation of ICT	□	□	□
Hospitality	・Cooking skill ・Table manners ・Hair styling/nailing ・Basic business tool operation ・Basic mathematic calculation ・Basic knowledge and operation of ICT ・Shop operation ・Cashiers operation	□	□	□
English language		□	□	□
Forest resources management	・Water resource management ・Wood treatment/wood working ・Botanic/afforestation zone management ・Briquette/charcoal production skill ・Heating system mechanisms	□	□	□
Wildlife	・Zoological management	□	□	□

Field	Example	Level of demand for TVET (Tick ONLY 1 column for each row (field))		
		High	Moderate	Low
management/ tourism	・Hotel management ・Business tool operation ・Wild life conservation mechanisms			
Veterinary Technology	・Dairy husbandry management ・Animal health and drug management ・Zoological science ・Genetic engineering	☐	☐	☐
Others	Specify ( )	☐	☐	☐

(4) According to "EAC Vision 2050 (page 34)", EAC aims to have a developed, stable and competitive regional bloc. Also, EAC desires to build ICT capacities to encourage innovation and increase competitiveness.

Regarding the above-mentioned points, how TVET can contribute? (Multiple answers are allowed)

☐ (a) By providing practical and technical training courses of ICT

☐ (b) By incorporating practical exercises of basic ICT into various existing training courses in all fields

☐ (c) By improving the quality and efficiency of the training utilizing ICT technology (mobile learning, Virtual Reality (VR), Augmented Reality (AR), etc)

☐ (d) Others
(Specify：)

9. Schedule for TVET activities：July 2020-June 2021

Could you share with us EAC schedule of TVET activities for the coming year?

Annex 1 TVET program/project

1	Name of the TVET project and program	
	Development partner which supports the project/program	
	Period of the project	
	Outline of the project (overall goal, objectives, purposes, outcomes, implementing agencies, targets, implementation structure)	
	Project budget and budget execution so far	
	The project supports ICT utilization and/or innovation promotion	☐ 1. Yes ☐ 2. No → Please explain the details ( )
	The progress and performance of the project so far	
	Challenges, lessons learnt and best practices of the project	

2	Name of the TVET project and program	
	Development partner which supports the project/program	
	Period of the project	
	Outline of the project (overall goal, objectives, purposes, outcomes, implementing agencies, targets, implementation structure)	
	Project budget and budget execution so far	
	The project supports ICT utilization and/or innovation promotion	☐ 1. Yes ☐ 2. No → Please explain the details ( )
	The progress and performance of the project so far	
	Challenges, lessons learnt and best practices of the project	

3	Name of the TVET project and program	
	Development partner which supports the project/program	
	Period of the project	
	Outline of the project (overall goal, objectives, purposes, outcomes, implementing agencies, targets, implementation structure)	
	Project budget and budget execution so far	
	The project supports ICT utilization and/or innovation promotion	☐ 1. Yes ☐ 2. No → Please explain the details ( )
	The progress and performance of the project so far	
	Challenges, lessons learnt and best practices of the project	

4	Name of the TVET project and program	
	Development partner which supports the project/program	
	Period of the project	
	Outline of the project (overall goal, objectives, purposes, outcomes, implementing agencies, targets, implementation structure)	
	Project budget and budget execution so far	
	The project supports ICT utilization and/or innovation promotion	☐ 1. Yes ☐ 2. No → Please explain the details ( )
	The progress and performance of the project so far	
	Challenges, lessons learnt and best practices of the project	

5	Name of the TVET project and program	
	Development partner which supports the project/program	
	Period of the project	
	Outline of the project (overall goal, objectives, purposes, outcomes, implementing agencies, targets, implementation structure)	
	Project budget and budget execution so far	
	The project supports ICT utilization and/or innovation promotion	☐ 1. Yes ☐ 2. No → Please explain the details ( )
	The progress and performance of the project so far	
	Challenges, lessons learnt and best practices of the project	

10. Do you expect any other TVET pipeline projects supported by Development Partners?

☐ 1. Yes ☐ 2. No

→If yes, please explain in detail in the table below.

Name of the project	Details of the project	Development partner

Thank you for your cooperation!

Survey on "Data Collection Survey on
Technical and Vocational Education and Training in the Republic of Rwanda"

IPRC Tumba Graduates

Objectives

This survey is to clarify the issues and specific measures to promote the use of ICT at TVET institutions and to enhance innovation functions that are necessary for the development of highly skilled human resources in the TVET sector in Rwanda. Also, this survey is to collect necessary information for considering future JICA support.

Information obtained during this survey will be used only for the above purposes and information will not be disclosed to any third parties.

Date: MM/DD , 2020	Name of Company:
Address:	Tel. Number:
Name of interviewee:	Position:
Cell Phone Number:	E-mail Address:

Industry Sector of your company :

☐Agriculture, Forestry, and Fishing ☐Mining ☐Construction ☐Manufacturing,
☐Transportation, Communications, Electric Gas, And Sanitary Services ☐Wholesale Trade
☐Retail Trade ☐Finance, Insurance, and Real Estate ☐Services
☐Public Administration
☐Others: Specify:_____

Note: If specific guidance is not given in the multiple-choice questions, please select only 1 option.

1. Personal Information

1-1 Which department at IPRC did you graduate from?

(1) ☐Information and Communication Technology
(2) ☐Electric communication
(3) ☐Renewable energy

1-2 Which year did you graduate from IPRC?

(1) ☐Before 2014
(2) ☐2015
(3) ☐2016
(4) ☐2017

(5) ☐2018
(6) ☐2019
(7) ☐2020

1-3 What kind of job do you do in your workplace? (Multiple answers allowed)

(1) ☐ICT related work
(2) ☐Clerical Support
(3) ☐Sales related work
(4) ☐Manual works (incl. assembling, maintenance of machineries, etc.)
(5) ☐Others (Specify:)

1-4 What is your status at the current company?

(1) ☐Paid employee (permanent worker)
(2) ☐Paid employee (fixed term set by a contract)
(3) ☐Paid employee (short-term temporary worker)
(4) ☐Intern (Unpaid)

1-5 How did you find the current job?

(1) ☐Via public announcement (Newspapers, TV/radio broadcasting)
(2) ☐Via public announcement (Social media such as Facebook, Whatsapp, etc)
(3) ☐Via public announcement (Others)
(4) ☐Through job placement department of the schools
(5) ☐Offered from the company after internship
(6) ☐Direct communication with individuals (individual relationships, etc)
(7) ☐Employee referral (introduction by the current/ ex-employees)
(8) ☐Network and recruiting events
(9) ☐Others(Specify:)

1-6 How long have you been working at the current company?

(1) ☐Less than 6 month
(2) ☐More than 7 month and less than 1 year
(3) ☐More than 1 year and less than 3 years
(4) ☐More than 3 years and less than 5 years
(5) ☐More than 5 years

1-7 Approximately how many days do you work per week?

Approximately days/ week

1-8 How many jobs have you worked so far after you graduated from IPRC?

(1) ☐1 job (=The current job is the first job that you worked after graduation of IPRC)
(2) ☐2 jobs
(3) ☐3 jobs
(4) ☐4 jobs
(5) ☐More than 5 jobs

1-9 How long did it take you to start the first job after graduation of IPRC?

(1) ☐Before graduation
(2) ☐Within 6 months
(3) ☐Within 1 year
(4) ☐Within 1year and half
(5) ☐Within 2 years
(6) ☐Within 2 years and half
(7) ☐Within 3 years
(8) ☐More than 3 years

1-10 If you quit or changed jobs, what were the reasons. (Multiple answer allowed)

(1) ☐Because of low salary
(2) ☐Because of problems in human relationship
(3) ☐Because of heavy workload
(4) ☐Because of the contract was expired
(5) ☐Because I was laid off
(6) ☐Due to a bankrupt of the company
(7) ☐Because I established my own company
(8) ☐Because of location
(9) ☐Because the type of the job did not allow me to utilize the skills which I learned at IPRC
(10) ☐Other reasons (Specify:)
(11) ☐I have never quit/ changed jobs

2. Utilization of the skills and knowledge learned at IPRC

2-1 What kind of skills did you acquire at IPRC? Please select from the following, regardless of the department that you graduated from. (Multiple answers allowed)

Skills		
(1)	Marketing	☐
(2)	Sales	☐
(3)	Finance and accounting	☐
(4)	Business planning	☐
(5)	Mathematical skills (calculation, etc.)	☐
(6)	English skills	☐
(7)	Leadership	☐
(8)	Communication	☐
(9)	Sense of responsibility	☐
(10)	Project management	☐
(11)	Logical thinking	☐
(12)	Time management	☐
(13)	ICT skills regarding Software Example: Application development technology, web development technology, control/embedded system development technology, AI, Big Data analysis, database (including Block Chain)	☐
(14)	ICT skills regarding operation Example: System operation, CAD (3D, including design)	☐
(15)	ICT related business skills Capability to use ICT to promote digital transformation in a company and/or create new business with digital technology	☐
(16)	ICT skills regarding Hardware Example: PC disassembly and assembly, IoT sensor technology, RFID, and Digital Electronics Drones, 3D printers	☐
(17)	ICT skills regarding Network Example: Network construction and operation, mobile networks, and network security	☐
(18)	ICT skills regarding network Example: Network construction and operation, mobile networks, and network security	☐

(19)	Technical skills related to Electric Communication (Example) ・ Cabling/wiring technics ・ Soldering/welding technics ・ Handling of analytical tools ・ Operation of machine tools ・ Repairing/re-assembling of equipment and tools ・ Telecommunication and broadcasting technology ・ Drawings/designs of parts/components ・ Basic knowledge and operation of ICT ・ Repair of mobile phones	☐
(20)	Technical skills related to Renewable Energy ・Design/drawing technic ・Metal working(forging/casting) ・Welding ・Practical knowledge on mechanism of equipment ・Operation of lathe machine ・Operation of analytical machine/tools ・Basic knowledge and operation of ICT	☐
(21)	Others (Specify:)	☐

2-2 How well do you put such skills in practical use in your current work? Please select the degree which you think the most applicable.

Skills		Degree that you practically use at your current work (Tick ONLY 1 column for each row)		
		I use this skill very much	Moderate	I do NOT use this skill very much/ Didn't learn
	Example 1	✔		
	Example 2		✔	
	Example 3			✔
(1)	Marketing			
(2)	Sales			
(3)	Finance and accounting			
(4)	Business planning			
(5)	Mathematical skills (calculation, etc)			
(6)	English skills			
(7)	Leadership			
(8)	Communication			

Skills		Degree that you practically use at your current work (Tick ONLY 1 column for each row)		
		I use this skill very much	Moderate	I do NOT use this skill very much/ Didn't learn
(9)	Sense of responsibility			
(10)	Project management			
(11)	Logical thinking			
(12)	Time management			
(13)	ICT skills regarding Software Example: Application development technology, web development technology, control/embedded system development technology, AI, Big Data analysis, database (including Block Chain)			
(14)	ICT skills regarding operation Example: System operation, CAD (3D, including design)			
(15)	ICT related business skills Capability to use ICT to promote digital transformation in a company and/or create new business with digital technology			
(16)	ICT skills regarding Hardware Example: PC disassembly and assembly, IoT sensor technology, RFID, and Digital Electronics Drones, 3D printers			
(17)	ICT skills regarding Network Example: Network construction and operation, mobile networks, and network security			
(18)	ICT skills regarding network Example: Network construction and operation, mobile networks, and network security			
(19)	Technical skills related to Electric Communication (Example) ・ Cabling/wiring technics ・ Soldering/welding technics			

Skills		Degree that you practically use at your current work (Tick ONLY 1 column for each row)		
		I use this skill very much	Moderate	I do NOT use this skill very much/ Didn't learn
	・ Handling of analytical tools ・ Operation of machine tools ・ Repairing/re-assembling of equipment and tools ・ Telecommunication and broadcasting technology ・ Drawings/designs of parts/components ・ Basic knowledge and operation of ICT ・ Repair of mobile phones			
(20)	Technical skills related to Renewable Energy ・Design/drawing technic ・Metal working(forging/casting) ・Welding ・Practical knowledge on mechanism of equipment ・Operation of lathe machine ・Operation of analytical machine/tools ・Basic knowledge and operation of ICT			
(21)	Others (Specify:)			

2-3 Regarding 2-1 and 2-2, in your current work, if you do not use the skills that you obtained at IPRC, what is the reasons for it? (Multiple answers allowed)

(1) ☐I work in a different field from the department that I graduated. Therefore, I do not have an opportunity to use the skills that I obtained at IPRC.

(2) ☐I work in a field which is close to the department that I graduated. However, my current duty does don't require the skills that I obtained at IPRC.

(3) ☐I work in a field which is close to the department that I graduated. However, my current work requires only basic skills. Therefore, I do not use the advanced skills that I learned at IPRC.

(4) ☐Others (Specify:)

2-4 Are there any skills which you wanted to learn at IPRC?

(1) ☐Yes (Go to the next question)

(2) ☐No (Go to question No. 3-1)

2-5 Tell us the skills that you wanted to learn at IPRC.

_____

_____

3. Expectation toward IPRC

3-1 In general, what would you expect toward IPRC? （Multiple answer allowed）

(1) ☐To use curriculums on teaching more advanced ICT operation skill

(2) ☐To emphasize more on professional business knowledge in parallel with high skill of ICT operation

(3) ☐To use curriculums on world recognized ICT standard skills such as Microsoft, CompTIA, CISCO, Oracle, etc.

(4) ☐To let the students acquire more upper skills in project management

(5) ☐Others (Specify:)

3-2 Please state if you have any opinions or comments on IPRC including their contents of operation/management, academic curriculums, students/ teachers' activities, etc.

_____

_____

_____

- Thank you very much for your cooperation. -

ルワンダ国高等技術教育に係る情報収集・確認調査（対高等専門学校向け質問票）

調査目的

本調査はルワンダの技術教育及び訓練（TVET）セクターで、高度スキル人材育成を進めるために必要な TVET 機関における ICT 利活用の促進、およびイノベーション機能の強化に係る制度構築について、その課題と実施に向けた具体的方策を整理し、今後の JICA による支援を検討する上で必要な情報収集を行うことを目的としている。なお、本質問票で答えた内容、企業名とその他の付帯情報、担当者名などは一切公表されない。

実施方法

オンラインによる聞き取り調査。ただし調査目的や質問項目への理解を得るため、本質問票を対象校へ事前に送付し、聞き取りを行う。

日付: 2020 年　　月　　日	高専校名:
住所:	電話番号:
Fax 番号:	URL アドレス:
担当者氏名:	所属部署:
E-mail :	設立年月日 :

調査団による事前準備

1. 基本的な学校情報（概要、学部・学科、カリキュラム等）については予めネット等により検索・調査し、活動状況・内容を把握する。

2. 学校の活動について、国内のみか、海外でも活動を展開しているか確認する。

質問項目

3. アフリカでの活動に対して関心はありますか。

4. 上記 3. で「ある」、または「高い」と回答された場合、その対象国や地域はどちらですか。

5. 既にアフリカの大学、高専などの教育機関と共同活動を行っている場合、その対象国、国の選定理由、活動内容、活動展開の経緯、運営の方法などをお聞かせください。

6. ルワンダ（国）についてお持ちの情報の内容、国に対するイメージ、学校活動参入への関心度をお聞かせください。

7. ルワンダの大学、短大、高等技術専門学校（IPRC）や職業訓練学校との研究・開発、人材交流分野などでの連携を検討されていらっしゃいますか。検討していらっしゃる場合、どのレベルの教育機関との連携を検討していますか。

8. 既にルワンダの教育機関と共同活動を実施、または打診している場合、参入の理由と経緯、活動内容、運営形態などをお聞かせください。

9. 近い将来、ルワンダの教育機関と連携を検討されている場合、具体的にどの分野（ICT、電子等）での連携を検討していますか。また提携形態はどのような形で考えていますか（例：特定プロジェクトのための合同研究、製品の合同開発、現地側への委託開発、人材の相互交流（研修生の受入れ等含む）、研究資金の提供、開発ツール、モジュールの提供など）。

10. ルワンダの教育機関との連携について、実施方法（開始時期、人員体制、現地採用人員、国内からのバックアップ体制等）について現時点での計画をお聞かせください。

調査団からの情報共有

11. 現地側教育機関との連携は行っていないが近い将来に検討を開始すると返答した高専に対してはルワンダの現状の概況、海外投資の状況、IPRC など教育機関の存在、RDB の存在などについて調査団側より説明を行う。

ルワンダ国高等技術教育に係る情報収集・確認調査（対日本企業向け質問票）

調査目的

本調査はルワンダの技術教育及び訓練（TVET）セクターで、高度スキル人材育成を進めるために必要な TVET 機関における ICT 利活用の促進、およびイノベーション機能の強化に係る制度構築について、その課題と実施に向けた具体的方策を整理し、今後の JICA による支援を検討する上で必要な情報収集を行うことを目的としている。なお、本質問票で答えた内容、企業名とその他の付帯情報、担当者名などは一切公表されない。

実施方法

オンラインによる聞き取り調査。ただし調査目的や質問項目への理解を得るため、本質問票を対象企業へ事前に送付し、聞き取りを行う。

日付: 2020 年　　月　　日	企業名:
住所:	電話番号:
Fax 番号:	URL アドレス:
担当者氏名:	所属部署:
E-mail :	
業種：□農林水産業 □鉱業 □建設業 □製造業 □電気・ガス・熱供給・水道業 □ 通信 □運輸，郵便 □卸・小売業 □金融・保険業 □不動産 □学術研究・専門・技術サービス □宿泊業・飲食サービス業 □生活関連サービス・娯楽業 □教育・学習支援業 □医療，福祉 □複合サービス事業 □その他サービス □公務 □その他＿＿＿＿＿＿＿＿	

調査団による事前準備

1. 基本的な企業情報（企業概要、売上高別主要製品等）については予めネット等により検索・調査し、活動状況・サービス内容を把握する。

2. 企業活動について、国内のみ、もしくは国内・海外両市場が対象か確認。

質問項目

3. アフリカ市場に対する関心はありますか？

4. 上記 3. で「ある」、または「高い」と回答された場合、その対象国や地域はどちらですか。

5. 既にアフリカ市場に参入している場合、その対象国、国の選定理由、事業内容、事業展開の経緯、事業運営の方法などをお聞かせください。

6. ルワンダ（国）についてお持ちの情報の内容、国に対するイメージ、市場参入への関心度をお聞かせください。

7. 既にルワンダ市場に参入している場合、参入の理由と経緯、事業内容、運営形態などをお聞かせください。

8. ルワンダにて現地従業員を採用されている場合、採用者の学歴（大学、または同等以上、短大、高等専門学校、高校、小・中学校）を職種別（管理系、事務系、技術系等）に教えてください。特に高等専門学校（IPRC）の卒業生を採用されている場合、その採用ルート、採用方法などについて概要をお聞かせください。

9. ルワンダの大学、短大、高等技術専門学校（IPRC）や職業訓練学校との研究・開発、人材交流分野などでの連携を検討されていらっしゃいますか。検討していらっしゃる場合、どのレベルの教育機関との連携を検討していますか。

10. ルワンダの教育機関と連携を検討されている場合、具体的にどの分野（ICT、電子等）での連携を検討していますか。また提携形態はどのような形で考えていますか（例：特定プロジェクトのための合同研究、製品の合同開発、現地側への委託開発、人材の相互交流（研修生の受入れ等含む）、研究資金の提供、開発ツール、モジュールの提供など）。

11. ルワンダの教育機関との連携について、実施方法（開始時期、人員体制、現地採用人員、国内からのバックアップ体制等）に係る現時点での計画をお聞かせください。

調査団からの情報共有

12. 市場参入や現地側教育機関との連携は行っていないが近い将来に検討を開始すると返答した企業に対してはルワンダの現状の概況、海外投資の状況、IPRC など教育機関の存在、RDB の存在などについて調査団側より説明を行う。

Appendix 4: Pictures

Photos

IPRC Tumba

Room for career guidance and mentorship

IPRC Musanze

Equipment to hold materials for fabrication which are used in the training of the Civil Engineering department

IPRC Musanze

Construction of new workshops and classrooms by Chinese government

IPRC Huye

ICT laboratory

IPRC Huye

Equipment for training on testing of construction materials of the Civil Engineering department

IPRC Huye

Equipment for training on house electrical installation of the Electrical and Electronics Engineering department

IPRC Kitabi

Conducting an interview with IPRC Kitabi

IPRC Karongi

Visiting Career Support Center of IPRC Karongi

Private company in tourism sector

Attraction Tours and Transport Ltd.

IPRC Tumba Graduate

Graduate of Electronics and Telecommunication Department

(Founder and CEO of Nyereka Tech Ltd)

Incubator

Impact Hub

Incubator

Fab Lab Rwanda


JICA
Japan International
Cooperation Agency