**Private Sector Federation
(PSF- Rwanda)**

SECTOR SPECIFIC SKILLS NEEDS ASSESSMENT
♣ AGRO-PROCESSING ♣

FINAL DRAFT REPORT

NOVEMBER, 2021

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LIST OF ABBREVIATIONS AND ACRONYMS

BPR		Business Process Reengineering
CAADP		Comprehensive Africa Agriculture Development Programme
EAC		East African Community
EDPRS		Economic Development Poverty Reduction Strategy
EPAs		Economic Partnership Agreements
EU		European Union
FFS FRW		Farmer Field School Rwandan Franc
GDP GoR		Gross Domestic Product Government of Rwanda
HACCP		Hazard Analysis Critical Control Point
HCoE		Horticulture Center of Excellence
IPRCs		Integrated Polytechnic Regional Colleges
MINAGRI		Ministry of Agriculture
MINECOFIN		Ministry of Finance and Economic Planning
NAEB		National Agricultural Export Development Board
NGOs		Non-Government Organizations
NST1 NSDEPS		National Strategy for Transformation National Skills Development and Employment Promotion Strategy
PSF		Private Sector Federation
PSTA		Strategic Plan for the Agricultural Sector
RAB		Rwanda Agriculture Board
RALIS		Office Agriculture and Livestock Inspection and Certification Services
RDB		Rwanda Development Board
RMT		Rwanda Mountain Tea
ROI		Return Of Investment
RSB		Rwanda Standards Board
SDG		Sustainable Development Goals
SME		Small and Medium-sized Enterprises
TBEA		Tea Brokers East Africa
TOT		Training of Trainers
TVETs		Technical and vocational education, Vocational education and training
UR		University of Rwanda
WEO		World Economic Outlook

EXECUTIVE SUMMARY

This report documents the findings of the Agro - processing skills profile, commissioned by the Private Sector Federation. The recommendations and conclusion of this work will allow the Federation of the Private Sector of Rwanda to have a relatively more precise overview of the problems related to skills experienced by its members and which are among other obstacles to their competitiveness. The report includes information on the agro-processing sector and its interest has been brought to the agricultural value chain as a whole, instead of being limited to the Agro-processing segment while its performance is impacted by upstream activities, in particular the pesticides choice and dosage, harvest and post-harvest process.

The main objective of the study is to assess the skills requirements of the Agro processing sector in Rwanda over the period 2020-2030 and formulate policy recommendations to ensure that the skills requirements of the Agro processing sector can be addressed out to 2030, and propose further education and training disciplines that may need to be introduced or expanded upon.

To carry out a comprehensive, credible and informative agro-processing skills profile for Private sector companies, a holistic and inclusive method which includes the full agricultural chain value was used. The profiling was carried out nationwide, in 4 provinces as well as the City of Kigali. Among other approaches used, consultant met with representatives and board of directors of companies, senior managers, PSF Chambers, public and private training institutions, policy makers, public agencies that the PSF to gather relevant information from various stakeholders.

To develop the skills profile of the sector, it is important to clearly define the scope of the work and to use a methodology that makes it possible to identify real skills, which are different from qualifications and expertise. As a reminder, skill is an ability that someone has to accomplish a task correctly, in a timely manner, in compliance with norms, processing process and standards. In short, it is referring to skill, when someone can do something well. Qualification consists of fulfilling the requirements for a job. For its part, expertise consists of having both knowledge, through education and intense practices that confirm proven experience in a particular field.

In addition meetings held with different stakeholders of agro-processing sector, the consultant used the literature review, interviews with both private sector actors and agents of public institutions, as well as the online questionnaire. All these technics were useful to capture the status of skills and knowledge in the agro-processing sector, to identify both skills gap and skills shortage in this key sector of the national economy.

The agricultural sector of Rwanda has so many untapped potentials because of productive skills shortages and skills gap across the value chain. The sector could only rapidly transforms in the next five years if the recommendations are looked into and implemented but the country therefore also increase its GDP thanks to the agricultural sector.

The agricultural sector in general is a component that weighs heavily in the economy of Rwanda in terms of its GDP contribution and as well as in terms of jobs. For example, in Rwanda accounted for 28% of GDP in the first quarter of 2019, which is the second biggest contribution after services. Moreover, this sector is the largest employer. In 2001, the agricultural sector had employed 88.6% of the Rwandan population; in 2010, it accounted for 71.6% and 68% of the labor force in 2014.

The agricultural sector of Rwanda has many untapped potentials due to lack skills shortages and skills gap to increase and improve productions across all steps the value chain. The sector could transform in the next five years if formulated recommendations are considered, assessed and implemented.

Lessons learned from this study highlight that skills development proves to be the bedrock of productivity in agro-business to close the skills gap, which are the main findings of this study. According to the primary and secondary data collected and analysed, the critical skills gaps relate to crop planting techniques; harvest and post-harvest; compliance with the rules, principles and measures required in food processing; conditioning ; knowledge of the laws, rules and regulations of the target markets and knowledge of the rate of change of coffee stocks.

The recommendations to make the agro-processing sector more competitive are spread over three main periods:

Short-term

- Set up a platform driven by the PSF for interaction between companies on the one hand and university educational institutions, IPRCs and TVETs on the other hand, which allows both parties to collaborate permanently in order to rethink on teaching systems that meet business expectations;
- Support companies invested in agro-processing to set up effective organizational structures;
- Encourage private companies to set up research and innovation units to help them constantly improve the qualities of their products, diversify their products among others, or by also creating by-products instead of exporting only raw or semi-processed materials;
- Train entrepreneurs in the agro-processing sector in prospecting techniques for the markets they target.

Medium-term

- Identify promising agricultural products that can be more competitive for export once processed;
- Train on cultivation, harvesting, post harvesting and processing of promising agricultural products;
- Train entrepreneurs on packaging and the design of brands of processed products.

Long-term

- Have brands of traditional export products, coffee and tea;
- Train coffee operators in the negotiation of the Coffee exchange rate;
- Train in high value-added processing for traditional export products, especially coffee.

CHAPTER ONE: INTRODUCTION

1.1 Background and Context

Agriculture is a major economic sector for the people of Rwanda, employing about 70% of the total population. The industry contributes about 31% to GDP, and it stands out as one of the most strategic sectors in Rwanda's development. It accounts for a more significant part of the foreign exchange earnings from the exports of products, including; coffee, tea, hides and skins, pyrethrum, and horticulture. 75% of Rwanda's agricultural production comes from smallholder farmers. Thus, the Government of Rwanda (GoR) is highly focused on agricultural growth, and budgeted 154.1 billion RWF (153.4 million EUR) directly to agriculture in 2019/20 alone as part of the 2.7 trillion RWF (2.7 billion EUR) proposed for the agriculture strategic plan 2018-2024, projecting to scale up productivity and exports. The growth will focus on moving up the agribusiness value chain, and transforming the agriculture sector towards increased value-addition, specialization, and trade. The private sector is expected to contribute significantly to this development[1].

The agricultural sector in Rwanda accounted for 28 % of GDP in the first quarter of 2019, which is the second biggest contribution after services. The sector grows at an annual rate of 4 % and represents over 70 % of export revenue, and about 72 % of employment. The main sub-sectors are food crops, forestry and livestock. Exports are dominated by mainly unprocessed coffee and tea, as well as vegetables, with flowers emerging as a new commodity. Agro-processing exports constituted 18 % of formal exports in 2016. The agro-processing sector (including food and beverages) is the largest industrial sector in Rwanda's economy (after construction)[2].

The agro-processing sector consists of processing locally available raw materials to produce products such as wine, beer, soft drinks, flour, rice, cheese, honey, cooking oil among others. There is an increasing diversification to new innovative products such as Stevia and essential oils which have increased the agro-processing export base recently[3].

In Rwandan economy, it is unequivocally the biggest employer of labour when compared with other sectors of the economy. It is rather sad, that despite the importance and the undeniable relevance of the agricultural sector to the Rwandan economy, it remains the industry with the most unskilled employees in terms of skills acquisition. In 2001, the agricultural sector was said to have employed 88.6% of the Rwandan population; in 2010, the Rwanda agricultural sector accounted for 71.6% of the labour force and 68% of the labour force in 2014[4]. It should however be noted that the Rwandan agricultural workforce is unevenly distributed across the needed spectrums. Independent farmers represent 65% of the workforce in agriculture while

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[1] Rwanda Development Board (RDB), Invest in Remarkable Rwanda. April 2019
[2] GIZ, Partnership Ready Rwanda: Food- and Agro-processing
[3] National Institute of Statistics of Rwanda, National Accounts (2016)
[4] MINAGRI, Strategic Plan for Agriculture Transformation (2018-24), June 2018

hired wage farmers represent 35%[5]. Furthermore, it should be noted that 66% of the agriculture workforce are women. It can be highlighted that generally, men occupy more paid jobs in agriculture (25%) against (17%) of women[6]. On the other hand, there are more women (42.1%) against men (40%) in paid non-farm employment[7].

According to the 2016 annual Agriculture survey, 26.1% of farming households in Rwanda are headed by someone who is 55 years and above; and women are the majority in that age group. For one reason or another, the agricultural sector attracts the majority of youth in rural areas. At least 50% of rural youth in the age group of 16-24 years are still working in farms in 2016 but unfortunately, many of them are under-employed.

With the objective of improving food security and the nutritional status of the population, and increasing income levels of the rural households, the government issued the national Agricultural Policy in 2004. Firstly, the policy focuses on promoting "intensification" to increase productivity through the application of more advanced technologies. The main aim of the Agricultural Policy 2004 was to increase animal production, modernize farming, reduce poverty, ensure food security and have surplus for the market.

Industrial policy approved in 2011 indicate potential industrial subsectors that are to be focused on for quick development of industrial sector in Rwanda; these are agro-processing, construction materials, pharmaceuticals, chemical products, biodegradable packaging and high tech industries.

In agriculture, the GoR focuses on supporting large public investments, such as hillside irrigation for horticulture. The government also subsidizes access to seed and fertilizer, and runs an export focused packing house, with professional management through International Finance Corporation (World Bank Group). Public funding has been used to establish large agricultural processors in dairy and pyrethrum processing. The Ministry of Trade and Industry has also installed various "Community Processing Centres", aiming at improving the competitiveness of SME agriculture clusters through processing.

Private sector participation is limited across the agribusiness value chain. A number of challenges currently hinder agro processing in Rwanda, and constitute opportunities for the private sector.
With a strong private sector and a well-managed public - private sector partnership, Rwanda will be able to achieve an industrial growth needed to become a middle-income country. In recognition of this, the Government of Rwanda found necessary to develop Industrial Master Plan for the Agro-industrial sub-sector.

Both supply and demand incentives have played an important role in attracting private sector investment.

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[5] ttps://tradingeconomics.com/rwanda/employment-in-agriculture-percent-of- total-employment-wb-data.html
[6] Manufacturing Global Drivers of Change
[7] The World Bank Group, Future Drivers of Growth in Rwanda (2019), International Bank for Reconstruction and Development, Washington, DC 20433 Telephone: 202-473-1000; Internet: www.worldbank.org

Agro-input supply firms are incentivized by the critical mass of consumers at the community level, well-organized producer organizations and possible tax reductions.

Producers require stable prices, technical expertise, infrastructure, efficient tractor services, warehouses and cold storage facilities, access to credit, improved agro inputs, land, and rural infrastructure are fundamental incentives to producers. Similarly, long term financing with lower cost of borrowing, macro-economic stability, strategic government investment in specific value chains, access to regional markets, reduced cross border challenges, development of trade corridor infrastructure, rural infrastructure and supply of energy underlie the key incentives for agro-processing firms and supermarkets[8].

Rwanda is party to the Comprehensive African Agriculture Development Programme (CAADP) as reinforced in the 2014 Malabo Declaration[9] which aims to improve nutrition and food security, enhance private sector involvement, and strengthen public-private partnerships that include smallholder farmers. At the regional level, Rwanda has subscribed to the East African Community's Vision 2050[10] which aims to enhance agricultural productivity for food security and a transformed rural economy under its pillar on Agriculture, Food Security and Rural development. The Sustainable Development Goals (SDG)[11] give a central place to agriculture with their focus on sustaining natural resources and on overcoming hunger, malnutrition, and food insecurity. Rwanda's commitment to combating climate change through agriculture is set out in its Nationally Determined Contributions (NDCs) under the 2015 Paris Climate Change Declaration[12].

1.2 Rationale

Strategic and sustained investment in skills development requires credible and comprehensive labor market data and information in the private sector and training institutions. Presently, there is inadequate data and information on skills gaps in the private sector and the match and/or mismatch between the supply of skills by various training institutions (TVET and university institutions) and the labor market demand particularly in the priority sectors.

In addition, though RDB has a Labor Market Information system (LMIS), it is still new and hence difficult to know the actual skills needs and gaps of various sectors of development let alone identifying the labor/skills challenges and opportunities the various sectors are facing/having. It is also not possible to conduct medium and long-term labor force forecasting for the various sub-sectors in the private sector. This is mainly because of lack of a series of cumulative credible

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[8] UNDP, The roles and opportunities for the private sector in Africa's agro-food industry

[9] https://au.int/en/documents/31247/malabo-declaration-201411-26 Declaration on Accelerated Agricultural Growth and Transformation for Shared Prosperity and Improved Livelihoods, adopted in 2014 during the 23rd Ordinary Session of the African Unions Heads of State and Government, constitutes the agricultural component of the first 10 years' implementation plan of African Union 2063 Agenda. https://au.int/en/agenda2063

[10] www.eac.int/sites/default/files/docs/eac_vision_2050-_web.pdf

[11] In September 2015 world leaders agreed on 17 global goals for sustainable development. These came into force 1 January 2016.

[12] The multilateral agreement setting a global action plan to avoid dangerous climate change by limiting global warming below 2OC.

data and limited use of robust methodological approaches. This skills survey is a strategic start towards building a credible skills database for decision making and planning.

The study focuses on a critical concern for policymakers in recent years, skill mismatch in Rwanda, mainly in the agriculture sector.

1.3 Objective and Scope of the Assignment

The main objective of the study is to assess the skills requirements of the Agro processing sector in Rwanda over the period 2020-2030 and formulate policy recommendations to ensure that the skills requirements of the Agro processing sector can be addressed out to 2030, and propose further education and training disciplines that may need to be introduced or expanded upon.

More specifically, the study aims to:

1. Study the global drivers of change in the Agro processing industry and their skills implications;
2. Provide economic assessment and labour profile of the sector, particularly concerning current employment and human capital characteristics;
3. Examine skills along the Agro processing value chain and document the current status (potential skills gaps against the skills needs; reasons for skills gaps; anticipated demand and skills gaps by 2030, and appropriate responses to anticipated skills shortages);
4. Assess Supply Skills to the Agro processing sector from the education and training system, and review of in-employment education and training;
5. Review and propose best practices and international approaches that can be a response to findings, particularly in competitor countries, of VET and Continual Vocational Training systems and possible learning for the Rwanda context;
6. Forecasting the skills for the Agro processing sector up to 2030 based on mid and long-term national development and specific targets to deliver on;
7. Develop profiles of the future skills requirements of the key occupations within the Agro processing sector;
8. Make recommendations to ensure that the skills requirements of the Agro processing sector can be addressed out to 2030, and propose further education and training disciplines that may need to be introduced or expanded upon.

1.4 Methodology

To carry out a comprehensive, credible and informative agro-processing skills profile for Private sector companies, a holistic and inclusive method which includes the full agricultural chain value was used. The profiling was carried out nationwide, in 4 provinces as well as the City of Kigali.

In this project, the consultant used a holistic approach. Among other methods, this project engaged in meetings separately with representatives and board of directors of companies,

senior managers, PSF Chambers, public and private training institutions, policy makers, public agencies that the PSF deemed relevant for the success of this project.

To develop the skills profile of the Agro processing sector, an assignment commissioned by PSF, it is important to clearly define the scope of the work and to use a methodology that makes it possible to identify real skills, which are different from qualifications and expertise.

As a reminder, skill is an ability that someone has to accomplish a task correctly, in a timely manner, in compliance with norms and standards. In short, we are referring to skill, when someone can do something well. Qualification consists of fulfilling the requirements for a job. For its part, expertise consists of having both knowledge, through education and intense practices that confirm proven experience in a particular field.

1.4.1 Evidence-based quantitative and qualitative data

In order to produce an evidence-based report, the consultant team embraced a sequential qualitative research approach by developing a questionnaire and an interview guide. The core questions asked in the research instruments are centered around recruitment and talent acquisition issues, skills gaps, resources for capacity building, apprenticeships, coaching/mentoring, management skills and future skills needed. The issues were adopted and adapted from international skill survey instruments.

Questionnaires and interviews were helpful in gathering primary data related to the status of skills in a sector and in highlighting the skills gap in the same sector.

Targeted Source of information was aiming to capture Primary data and Secondary data. Secondary data were gathered from a variety of published literature (policy documents, strategies and statistics, companies' business plans…) and reports of various institutions, while primary data were gathered through interviews with key informants from companies and institutional stakeholders, and from questionnaire administrated to establishments which face day to day skills issues.

1.4.2 Primary data Collection

Design of the skills assessment in the agro-processing sector was based on consultations with sector stakeholders and consensus building among sector specialists and experts. Based on the Consultants' knowledge and expertise, the data was collected and analyzed from both secondary and primary sources. The team used mixed method approach, applying both qualitative and quantitative techniques in the skills assessment. Data collection was done in March and August 2020.

The process took much time because of COVID-19 happened when it started. Working from home through teleworking and the application of other barrier measures to avoid the circulation of the coronavirus virus did not facilitate interviews with stakeholders in the sector,

thus affecting data collection from certain key stakeholders. To fill in the interviews that were suddenly stopped, an online questionnaire was launched. Indeed, this made it possible to collect several data directly provided by players in the sector.

Study population comprised exclusively private companies operating in agro-processing sector and its subsectors, including the horticulture, vegetable and fruits processing subsector[13], animal production processing subsectors[14] and traditional commodities processing subsector[15] to which the questionnaire was addressed while interviews were conducted both with public institutions and private operators. At the inception phase, it was established that 20 establishments operating in Agro-processing would be consulted. About more than 60 questionnaires were sent to private companies, 26 respondents replied[16]. Their answers were completed with information collected from interviews conducted with 13 both private and public institutions[17] whose list is annexed to the report. The survey covered the identified categories or a representative sample of the agro-processing sector.
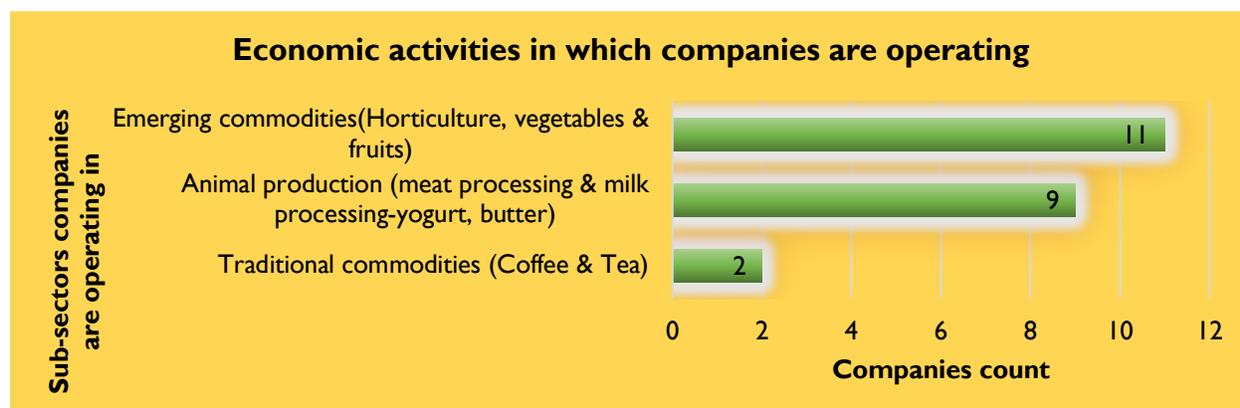
Figure 1: Workforce framework

1.4.3 Secondary data collection

The literature review was useful for collecting secondary data which greatly informed the Consultant in the skills assessment. The planning documents and strategies of Rwandan Government and studies conducted in the same field in Rwanda as in other countries have been reviewed.

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[13] COVOFGA, SINA GERALD ENTERPRISE URWIBUTSO, UTAS, SHEMA FRUITS, SHEKINA, TALIA Ltd, KIGALI FIRMS Ltd, AGRI BUSINESS KAMALI Ltd, SORWATOM, SOYCO, CASSACA KINAZI.
[14] NAMELY BURANGA GENERAL BUSINESS Ltd, FROMAGERIE LA LUMIERE, SABAN Ltd, KIME Ltd, RWACOF EXPORTS Ltd, SOSOMA INDUSTRIES Ltd, ROYAL AGROVET Ltd, MUKAMIRA DAIRY Ltd, BURANGA GENERAL BUSINESS, H2O VENTURES, CARREFOUR VETERNAIRE ET AGRICOLE, KIGALI HIDES AND SKINS, ABCD Ltd.
[15] MOUNT MERUI PLANT, AFRICHEM RWANDA Ltd, SARURA AGROVET SERVICES Ltd.

[17] PSF, RALIS, NAEB, FRIMAGERIE LS LUMIERE, COVAFGA, MINIMEX, UTAS Ltd, RWACOF, KIME, SABAN Ltd, KITABI TEAN COMPANY, NYABIHU TEA FACTORY, HCOF.

The Consultant reviewed national planning tools such as Vision 2050, NST1, Strategic Plan for Agriculture Transformation-PSTA to find planned targets and appreciate skills required to reach targeted objectives.

Documents such as: World Bank Rwanda Investor Perceptions Survey Final Report, The Future of Work in Agriculture, Futures Drivers of Growth in Rwanda, Rwanda Skills Survey 2012 were reviewed in order to look for findings of previous similar duties.

1.4.4 Assessment Process

The assessment was conducted through the process that was guided by systematic conduction of steps that led to obtaining data that shaded light to the real situation in terms of skill in the sector. The assessment process is illustrated in the graph bellow.

Consultation meetings with PSF	• Sectors's Picture • Key stakeholders
Stakeholders mapping	• Sub-Sectors/activities • Profile of the sector
Data collection	• Quantative data • Qualitative data
Data analysi	• Findings • Ways • Recommandations
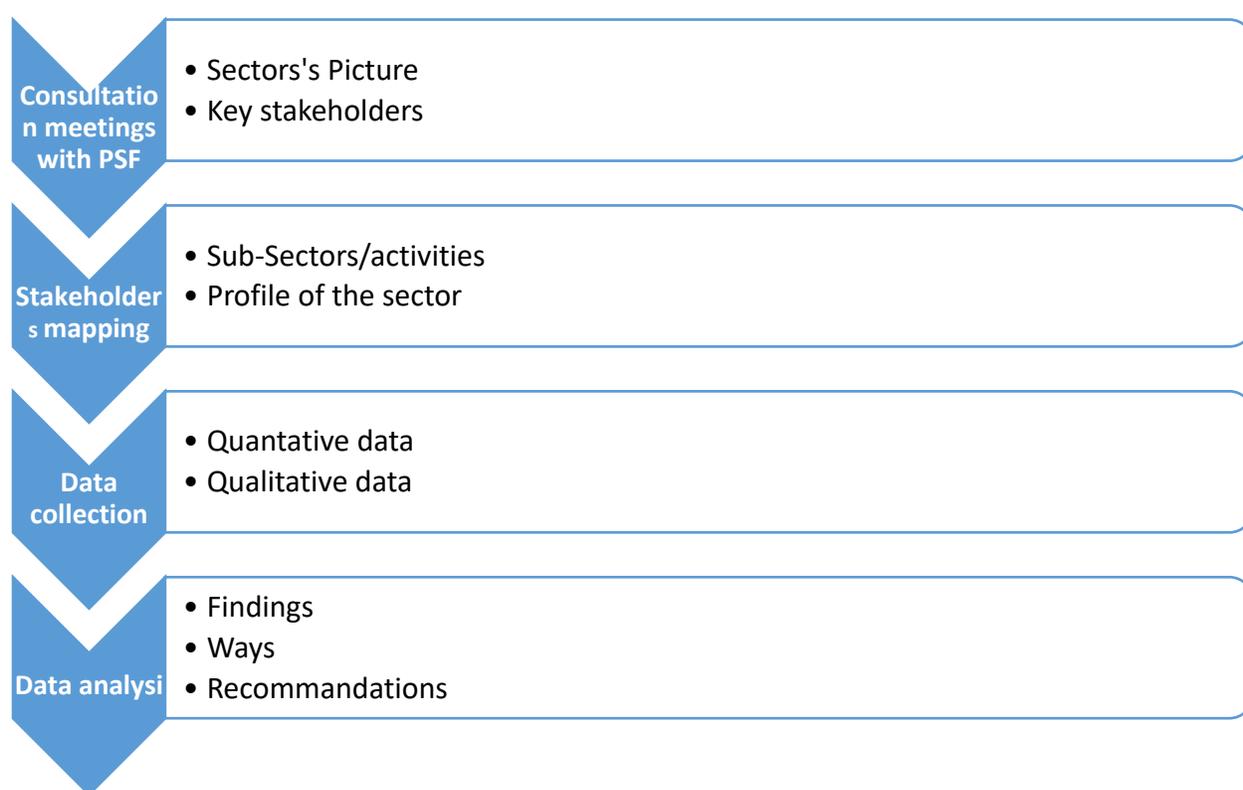
1.5 Layout of Agro-Processing Sector Report

The sector skills needs assessment has six chapters:

➢ Chapter 1 illustrates the overriding principles and methodology of the document elaboration.
➢ Chapter 2 provides a brief overview of Rwanda's agro processing sector, focusing on the sector profile and its subsectors, size, and characteristics. The chapter further tackles the agro processing sector occupational profile.
➢ Chapter 3 sets out the drivers of change and their skills implications, which include;

- o   Population explosion,
- o   Technological dynamics,
- o   Climate change,
- o   Workforce in agricultural sector,
- o   Market requirements and
- o   Growing need for organic food

➢ Chapter 4 outlines the agro processing skills status. The chapter further tackles the current skills demand and supply, skills gaps, anticipated skills demand, and their policy interventions by 2030, and ends up with the main barriers to closing skills gaps.

➢ Chapter 5 addresses skill response to the identified skills gaps.

➢ Finally, the last chapter presents the conclusion and key recommendations of the assessment report.

CHAPTER TWO: AGRO PROCESSING SECTOR PROFILE IN RWANDA

2.1 Introduction

Agro processing can better be looked at from the perspective of the importance and role of agriculture in Rwanda. Agriculture in Rwanda accounts for a third of GDP's country; constitutes the main economic activity for the rural households (especially women) and remains their main source of income. Today, the agricultural population is estimated to be a little less than 80% of the total population. The sector meets 90% of the national food needs and generates more than 70% of the country's export revenues[18]. According to the Country's second Economic Development and Poverty Reduction Strategy (EDPRS II), there are a number of programs in the agriculture sector to enhance productivity geared towards commercializing agriculture through agro processing.

This section provides more details about the statistical profile of the agro processing sector at global level, in Africa, at regional level as well as at the country level. The objective is to assemble a picture of trends in the agro processing sector in Rwanda with a particular emphasis on changing employment and skills needs in the labour market.

2.2 Agro processing Sector Profile

2.2.1 The global and regional context

In many countries, the food processing industry is a major contributor to the health of the national economy. In the same way too, the sector is impacted by both the local economy where it manufactures as well as by the global economy in terms of food logistics and imports and exports.

Shifts and changes in regional economies, population size, food consumption, and the food and drinks industry in general all have significant implications for food processing.

According to the European Food and Drink Industry there are three leading production regions worldwide. It goes without saying that Africa's share in this sector is negligible. The share of each region is distributed as follows:

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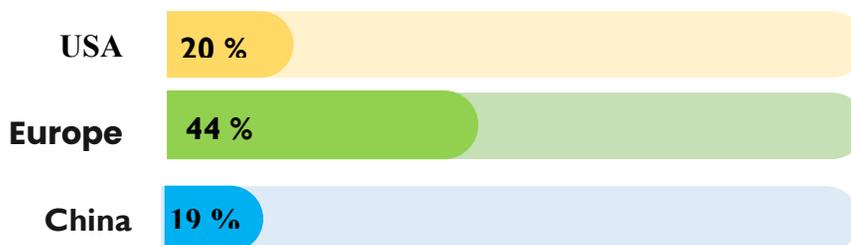
[18] Rwanda development Board (RDB) website at http://www.rdb/departments/agriculture.html on November 5th, 2021

The turnover of the EU food & drink processing industry alone is double that of the USA and China. However, this will change significantly in the next few decades. By 2050, two thirds of the world population will be living in cities, increasing demand for processed foods and meat protein in Asia. Thus, it is expected that protein consumption will have grown by 128%. The growth in demand and high growth of both exports and imports in key emerging markets is making food safety and hygiene in this sector a priority.

2.2.2 Performance of Agro-processing Sector in Rwanda

The Agro-processing sector is part of the value chain of the agricultural sector and the manufacturing industry sector. It is indeed a sector which is impacted both by the policies, know-how and processes of the agricultural sector; and by policies, know-how and processes of the manufacturing sector. The competitiveness of agro-processing benefits from the double comparative advantage of the high skills of the farmers who provide the raw material for the agro-processing as well as the innovation level of the manufacturing industry. These two ingredients result from basic training, supported by ongoing training that farmers receive as well as the on-the-job training that managers and employees of agricultural processing industries receive for more productivity and improvement of the quality of finished products.

Agriculture with its two components, agricultural production and agro-processing remain the most important employer in Rwanda. According to the 2017 Agriculture Household Survey (AHS), during the Agricultural year September 2016 - June 2017, Rwanda had an estimated 2.1 million agricultural households. This constitutes about 80.2 percent of total estimated households of the country, many of which are the responsibility of women. Out of total agricultural households, 27.8 percent were headed by female[19].

To increase both production quantity and quality of agriculture production, agricultural householders benefit capacity development programs. For instance, the Agricultural household survey 2017 report, conducted by NISR found that 29.6 percent of agricultural households have benefited to agricultural extension services through Twigire Muhinzi program and stated that 13 percent of agricultural households in Rwanda belong to Twigire Muhinzi, that allowed to 4.2 percent of all agricultural households to have contract farming[20].

The mechanism of capacity development in agriculture practices at household level through Twigire Muhinzi program, is very helpful for improving agriculture know how of traditional famers who did never learn agriculture at school. With specific goals targeted by this program which are: maintain national food security, improve productivity, increase income and improve livelihoods rural famers, even those who do not know neither read nor writing, acquire critical basic skills to perform their work better than before joining the program.

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[19] NISR, Agricultural household survey, annual report 2018
[20] NISR, Agricultural household survey, annual report 2017

Even if manufacturing industry and Service sectors increase their share of the Rwandan labor market; the agricultural sector remains the largest employer in Rwanda.

The survey conducted by the National Institute of Statistics of Rwanda in 2018 states that at least 55.3 % (3,855,029 people) of working age population engaging in agriculture activity either in subsistence or market oriented in 2018[21].

2.3 Agro processing sector Occupational Profile

According to the 2020 annual results, the working-age population (16 years and older) was 7,472,601, with 4,212,972 (56.4 percentage) in the labour force and 3,259,630 not working. For those in the labour force, 3,460,860 were employed, while 752,112 were unemployed. Among those outside the labour force, 1,801,596 were engaged wholly or mostly in subsistence foodstuff production, which is not classified as employment according to the 2013 international standards on statistics of work, employment, and labour underutilization[22].

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[21] NISR, Labour force survey, annual report 2018
[22] Ibid

Table 1: Labour force profile in Rwanda

	Total	Labour force status				LFP. rate (%)	E. Pop. ratio (%)	U. rate (%)
		Labour force	Employed	Unemployed	Outside labour force			
Total Pop.16 yrs. <	7,472,601	4,212,972	3,460,860	752,112	3,259,630	56.4	46.3	17.9
16-24 yrs.	2,309,913	1,080,767	828,459	252,308	1,229,146	46.8	35.9	23.3
25-34 yrs.	1,874,035	1,356,005	1,098,949	257,056	518,030	72.4	58.6	19.0
35-54 yrs.	2,195,647	1,427,063	1,230,818	196,245	768,584	65.0	56.1	13.8
55-64 yrs.	617,306	271,530	233,426	38,104	345,775	44.0	37.8	14.0
65+ yrs.	475,700	77,605	69,206	8,399	398,095	16.3	14.5	10.8
*LFP. = Labour Force Participation *E. Pop. = Employment Population *U. = Unemployment *yrs. = years								

In 2020, employment was distributed among the three primary sectors of economic activity as follows: the share of industry accounted for 20.4 % with services accounted for 40.5 % while agriculture accounting 39.1 %; whereas agriculture forest and fishing increased by 12% (from 1,252,214 in 2017 to 1,399,907 in 2020)[23]. It is must be noted that, according to the current international standards, employment in agriculture only covers individuals who produce agricultural items primarily for sale or barter, as well as those who labour in agriculture for compensation.

Since 2017 till 2020, the accommodation and food service activity sector grew the fastest in terms of number of workers, with a 111 % increase. During this period agricultural and industry sectors have respectively increased have increased with scores of 3 and 1.8 percentage points[24].

The average number of weekly hours actually worked at the main job remained the same in 2020 as compared to previous year. The total volume of employment in terms of actually worked hours at all jobs in the reference week increased by 5 million from 107 million of hours in 2019 to 112 million of hours in 2020. In comparison with 2017, the number of weekly actuals worked hours increased by around 15 million hours in 2020[25].

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[23] NISR Labour force survey (RLFS), annual report 2020
[24] Ibid
[25] Ibid

Working age population 16 years old and over 7,472,601 persons				
Outside the labour force (Not employed nor unemployed) 3,259,630 persons		Labour force (The sum of employed and unemployed) 4,212,972 persons Labour force participation rate 56.4 %		
Subsistence Agriculture	Other outside Labour Force	**EMPLOYED** Those who work for pay and profit 3,460,860 persons Employment to population ratio: **46.3 %**	**UNEMPLOYED** All who is not employed but seeking 752,112 persons Unemployment rate: **17.8 %**	
55.3 %	44.6%			
		Agriculture excluding subsistence foodstuff production 39.1%	Industry 20,4%	Unemployed but engaged in subsistence agriculture 53.9%
				Other Unemployed 46,1%

Figure 2: Workforce framework

Source: NISR 2020

Table 2: employed population by sex/ agro processing sector

	Total	Employee, Paid apprentice/intern	Employer	Own-account worker	Member of cooperative
Employed population	3,460,860	2,292,976	46,221	968,858	5,792
Agriculture, forestry and fishing	1,399,907	1,048,570	14,644	245,082	1,860
Mining and quarrying	57,379	37,121	236	19,108	594
Manufacturing	201,554	88,408	3,039	103,152	780

	Total	Sex		Residential area		Participated in subsistence agriculture	Not participated in subsistence agriculture
		Male	Female	Urban	Rural		
Employed population	3,460,860	1,938,268	1,522,592	867,565	2,593,295	1,432,516	2,028,344
Agriculture, forestry and fishing	1,399,907	650,361	749,546	67,752	1,332,156	761,629	638,278
Manufacturing	201,554	119,607	81,947	57,026	144,528	78,650	122,904

Table 3: Occupations in agro-processing can be identified in reference to its value chain and to the agro-processing subsectors

N°	Occupation	Comments	Skills required
1	Cultivation	Is initial phase and one of decisive step of the whole value chain? The availability and choice of appropriate seeds, mastering technics of cultivation of the crop, rigorous monitoring of the crop grow, knowledge and strict respect of fertilizers, knowhow of pesticides application allow agro-processing industries to get raw materials which ultimately contributes to the competiveness of a finished product.	• Appropriate seeds; • Conditions of cultivation of different crops; • Swamp irrigation; • Steps of crops grow; • Fertilizer treatment • Type and nature of pesticides; • Norms of pesticides application; • How to avoid negative impact of pesticide to harvest; • Farm management; • Greenhouse management.
2	Post-harvest	The knowhow related to know the exact crop maturity and harvesting date, transport conditions of harvesting, the storage norms, sorting harvested crop for processing, cooling norms affect negatively or positively the product processed.	• Crop maturity and exact date of harvesting • Nature of crop which needs to be harvested before maturity or not; • Transport conditions for harvesting from the fields to the warehouse; • Storage norms of harvest; • Cooling norms for each harvest
3	Food processing	Food processing is subject to standards set by RSB, standards and standards set by target countries for export and product competitiveness in markets	• Raw material (fruits or other crop) sorting • Crop processing Techniques; • Know required inputs and their dosage in processing process; • Quality control cycle; • Machines operating; • Machine maintenance; • Quality management system; • Quality Control Cycle; • Research and innovation.
4	Cheese production	As required by the processing of all products of animal origin, the processing of cheese must comply with the previously defined protocol which must be strictly observed.	• Protocol of milk sub-products making process; • Respect of hygiene and sanitation at working place of milk process; • Basic Practices for Good Livestock Feeding by Breeders.

N°	Occupation	Comments	Skills required
	Coffee Washing Station	Infrastructure is critical for processing quality	• Coffee Washing Station standards construction
	Coffee processing	Roasting is the third part of a four-part work: cultivation, fermentation, roasting and preparation. Many coffee importers prefer to roast themselves the coffee produced in Rwanda. For many importers, the roasting knowhow is still lacking in Rwanda.	• Coffee processing • Coffee peel • Roasting technics
5	Marketing	The capacity of selling productions from a factory, mastering negotiation techniques, developing packing that attract consumers, knowing to conduct efficiently prospection of targeted market and mastering rules regulating international trade allow to sale fast, a lot at a remunerative price.	• Negotiation of Coffee exchange rate; • Export, import procedures and requirements of external market; • Standards required and regulations of targeted market; • Development of specific branding for Rwanda food products; • Market prospection and assessment; • Packaging ended product; • International rules for regulation.
6	Management	A company with effective Resources management, a Budget well prepared and Business plan that express the investment strategies allow it to build strong organization for a competitive business.	• Budget preparation and Business plan development; • Planning, research and innovations; • International rules and regulations of international trade.

Covering agriculture and manufacturing, both agriculture and processing occupations impact on the end products of agro-processing sector. When cultivation did not been complied with standards, norms and process required and if harvest and post-harvest have not been done in compliance with norms, the processing is negatively affected.

CHAPTER THREE: DRIVERS OF CHANGE AND THEIR SKILLS IMPLICATION

3.1 Introduction

There is a dynamic at the global, continental and national level which influences and determines the evolution of the agro-processing sector in any country of the world. The variables determining global change and trends in the agro-processing sector can be numerous but the most important are as follow:

3.1 Population explosion

The world's population is dynamic and continuously growing. According to the United Nations forecast, in 2017 the population was 7.6 billion, according to the United Nations projections, the world population in 2030 will be between 8.4 and 8.7 billion, in 2050 it will be between 9.4 and 10.2 billion[26].

As for the African continent in 2015, the population of the sub-Saharan part represented 12% of the world population. The forecasts predict that the population will represent 23% of the world population in 2050 and 36% of the world population will inhabit the sub-Saharan part by the end of the century[27].

If we stick to NSIR figures, in 2020 the total Rwandan population was expected to be 12,663,116, including 9,889,894 rural populations while the total population of Rwanda in 2030 will be 15,712,645, of which 11,210,972 are rural. These are only the average or median projections. The high projections are 16,141,033 total populations in 2030[28].

3.2 Technological dynamics

Agricultural technologies as well as the forces of global supply and demand, coupled with the challenges of labor, inputs and climate change, will require a continued focus on technology and investment in improving processes. New agricultural technologies are able to demonstrate significant value and convincing economic benefits for the producer. Thus, we see the significant development and adoption of technologies helping both the producer and the suppliers along the value chain. There is therefore an increased interest in investing in new technologies that reduce costs (labor, inputs, and climate change) and improve yields for agro-industries.

The challenge of agriculture is to sustainably feed a rapidly growing population without harming the environment. Farmers are using technology to meet the growing demand for food. The way to optimize the production of variable inputs is through precision farming. Investment in precision agriculture:

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[26] World Population Prospects, Booklet, United Nations, 2017 Revision
[27] The future of work in African agriculture: Trends and drivers of change, ILO, December 2017
[28] Fourth Population and Housing Census, Rwanda, National Institute of Statistics of Rwanda, January 2014

- Autonomous equipment: the agricultural industry is undergoing widespread automation. Self-contained equipment has the potential to improve both productivity and crop yields. Drone technology is also used to study large fields to find problems quickly and efficiently.
- Precision fertilizer application: Automatic determination of the optimum amount and type of fertilizer through software applications and machine learning
- Precision Planting and Irrigation: Using Data to Make the Right Seed Choices and Knowing the Exact Amount of Water to Apply to Each Acre of Land
- Long-term global population trends and a potential supply shortage continue to drive technological innovation in the sector.
  - Indeed, in many countries, technology is no longer a trend of the future. Technological advances in the food industry are being used to help bridge the gap between food demand and limited resources. More and more farmers are turning to mobile technology, RFID[29] tracking and livestock biometrics, equipment telematics and wireless crop and soil sensors to increase their profits and efficiency and improve daily farming operations. Thanks to this advanced technology, farmers now have greater control over their resource production.

3.3 Climate change

It involves environmental trends that affect the performance of agribusiness. So, high rainfall and extreme temperatures can prevent crops from growing. Floods and droughts are the main culprits that can damage crops, affect livestock, reduce yields and increase prices. Droughts will continue to be an ongoing challenge for the agri-food industry, and although many farmers invest money in irrigation systems, this is not always an option in areas where water supplies are available.

One the solution to mitigate climate changes effects is good management of water resources by using it effectively water for agriculture and livestock. Rwanda has developed its Irrigation Master Plan in 2010, in order to manage the impact of climate changes.

3.4 Workforce in agricultural sector

The entire agricultural sector, that covers the whole the agricultural value chain, is the most important employer, particularly in developing countries, including in Rwanda. Over and over as other economic sectors are developed, the workforce in agricultural sector gradually reduced in agricultural sector while it increases in manufacturing and services sectors. To join

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[29] RFID is an acronym for "radio-frequency identification" and refers to a technology whereby digital data encoded in RFID tags or smart labels are captured by a reader via radio waves. RFID is similar to barcoding in that data from a tag or label are captured by a device that stores the data in a database. RFID technology is employed in many industries to perform such tasks as: Asset tracking, controlling access to restricted areas, Counterfeit prevention.

this classic trend, the entire chain of the agricultural sector must be modernized to employ only professionals really skilled.

Already, the trend of some data show how Rwanda agriculture workforce doesn't escape to this rule. As noted in previous lines, the labour force in agricultural sector has lost its importance in terms of numbers as follows: in 2001, the agricultural sector was employing 88.6%, in 2010 its rate of employability was reduced to 71.6%, in 2014 to 68% and to 62.41 % in 2019[30].

3.5 Market requirements

Specifies of a market are defined by norms and standards that regulate agro-processing. Each national or regional market can put in place quality rules and standards those agro-pastoral products that producers and processing industries must observe. These rules and standards are restrictive with regard to some locally produced products, and much more stringent for imported products. They are in fact the non-tariff barriers erected by a country to protect its market or by an economic region including many countries to protect their market, as well as to protect its or their citizens against under qualified products or dangerous for public health.

Any processed product that does not comply with the rules, norms and standards of a certain national or regional market cannot be exported to the market. Knowledge of the rules, norms and standards of the different markets targeted by an agricultural processing industry is imperative to plan to sell its products there.

For its competitiveness, the Rwanda the agricultural value chain in general, and the agro-processing sector in particular, must follow the trends outlined above.

3.6 Growing need for organic food

Consumer preferences for certain varieties coupled with organic tailwinds are pushing growers and processors to continually add new varieties and food products across the value chain to respond to the healthy food demand that increase constantly. The food and beverage industry is still experiencing significant pull from consumers for new healthy products. For growers, converting land to meet organic specification is both time and capital intensive. This is further complicated due to long waits and shortages for appropriate seeds of varieties more resistant to insects and that don't require absolutely chemical fertilizers.

For growers, converting land to meet organic specification is both time and capital intensive. This is further complicated due to long waits and shortages for appropriate seeds of varieties more resistant to insects and that don't require absolutely chemical fertilizers. This new trend which is more demanding is winning several markets, local and international, so much so that farmers and establishments operating in the agro-processing sector are forced to adapt to the new requirements of the organic products market.

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[30] ttps://tradingeconomics.com/rwanda/employment-in-agriculture-percent-of-total-employment-wb-data.html

CHAPTER FOUR: SKILLS STATUS IN RWANDAN AGRO PROCESSING SECTOR

4.1Introduction

In this chapter address the skills status in Rwanda by considering the sector skills specifics (current skills demand against skills supply and their specific future economic implication Anticipated Demand and skills gaps by 2030 and Scenarios of Projected Skills Demand 2020 – 2030.

The current skills situation in the agro-processing sector is described and analysed in the following lines, with a focus on the skills gap, shortage skills, mechanisms for strengthening and developing existing skills, current solutions, and future projections to address the challenges of a skills shortage.

4.1.1Certification requirements and Agro-processing improvements in Rwanda

Existing certification requirements and their impact on products, as well as their impact on the opening of a product on a national, regional, or international market, are determining factors for the promotion of Rwandan agro-industrial products. For example, S Mark allows an agricultural product processed in Rwanda to be marketed on the national market, HCCP for the regional market, and ISO for the international market. By making an effort to comply with the requirements of these certifications, the Rwanda agro-processing industry can raise its level of production in terms of quality.

Standard certificates your products have

Figure 3: Certified products of Rwanda Agro-processing industries

Note:
The trend of acquiring certificates awarded by RSB is reassuring. Many agro-processing industries strive to have certificates for their products. The most modest certificate, the S Mark, is targeted by even small agro-processors due to the awareness campaign of state agencies, notably the campaign led by the RSB. Once the S Mark is obtained, the company often tries to obtain the HACCP certificate in order to be able to export easily. The awareness of the relevance by the company of the certification of the products is obliged to the skills as well individual as organizational.

4.2 Current Skills Demand and Specific Future Economic Implication

Skills required to meet S-Mark standards not currently met by the company
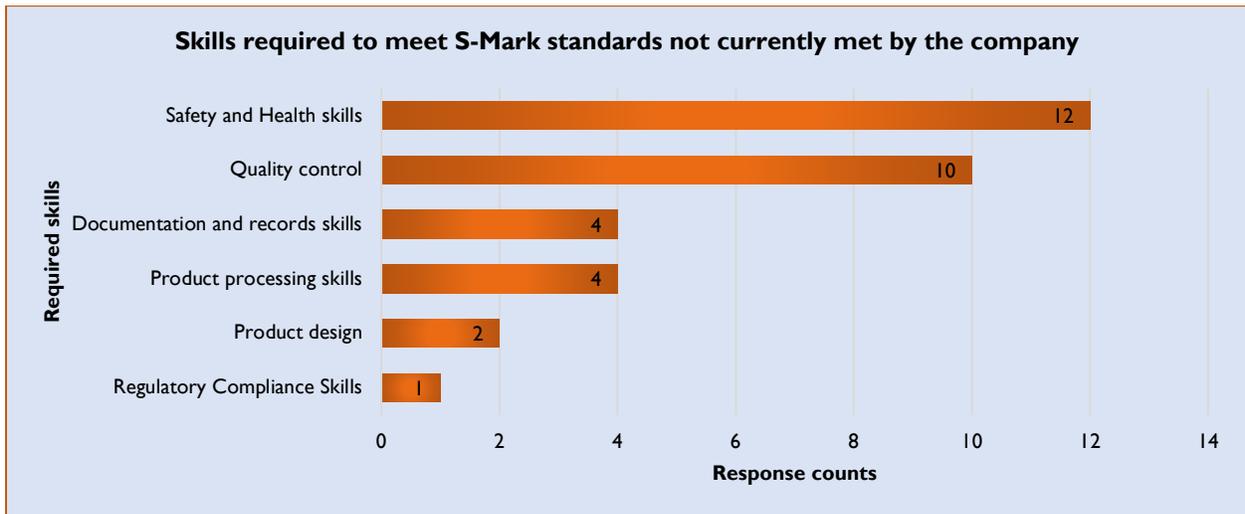
Figure 4: Skills to meet S-Mark standards

To the question of which skills is required to meet S-Mark standards for product certification requirement that is not currently met by your company, out 33 responses, 12 responses were about "safety and health skills", 10 about "quality control", 4 about "documentation and records skills" and 4 about "product processing skills" which are not met by the companies.

In reality, the skills that constitute obstacles to accessing the S-Mark certificate are not necessarily skills that must be permanent in the company. They can be either subcontracted or partially contracted. If this is not the case in several companies visited during the interview, it is an organisational and leadership problem that must be resolved.

Desired skills to meet haccp certification not currently met by the company

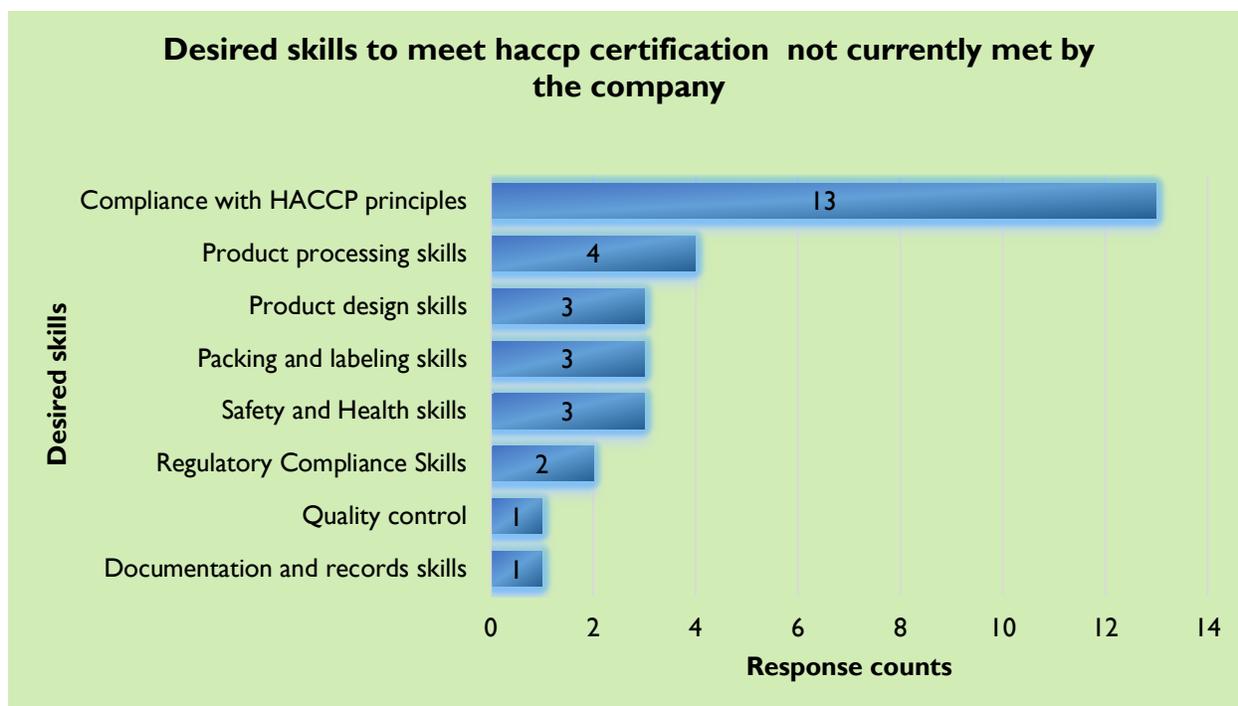| Desired skills	Response counts
Compliance with HACCP principles	13
Product processing skills	4
Product design skills	3
Packing and labeling skills	3
Safety and Health skills	3
Regulatory Compliance Skills	2
Quality control	1
Documentation and records skills	1

Figure 5: Skills to meet HACCP standards

Out of 30 responses, 13 answers highlighted that "***Compliance with HACCP principles***" is the biggest barrier to accessing the HACCP certificate. HACCP is a difficult standard to meet, and compliance is really a matter of organization and BPR; they do not require permanent staff. The HACCP principles are: (1) Conduct a Hazard Analysis, (2) Identify the Critical Control Points, (3) Establish Critical Limits, (4) Monitor CCP, (5) Establish Corrective Action, (6) Verification, and (7) Recordkeeping[31].

4.3 Skills Supply for Agro-Processing Sector

Qualified employees required in agro processing companies are all young graduates trained in TVEs, in IPRC, in public and private Universities. Except management jobs which are held by Financial specialists, Human resources specialists, procurement specialists, Store keeping management and lawyers trained by private or public universities, key jobs of Agro processing graduates are produced by University of Rwanda (UR) and IPRCs.

Agro processing companies recruit for jobs related to their core business such as agronomists, food scientists, mechanics, electric and electro mechanics engineers. Those engineers are assisted by Secondary school diploma holders of TVTs trained in electricity, plumbing, mechanics and electro-mechanics. These graduates from schools and academic institutions in Rwanda are, in terms of their basic training, generally well appreciated by employers.

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[31] https://food.unl.edu/seven-principles-haccp

Fresh from school, the agronomists don't have specialization in areas of specific crops, such as tea or coffee, to name only these two crops. Trained in the same conditions and education system, the food scientists don't have knowhow of processing a particular crop at the beginning of career in a company. As other new graduates, mostly young engineers are discovering at the first time the specific machinery when they are recruited in the industries. This situation is detrimental to the food industries which are obliged to train new recruited for months.

Some companies such as RMT, have signed an agreement with UR, Busogo campus. At the end of each academic year, RMT recruits around 80 interns for six months' professional internship. After six months of internship, according to the performance of one or another, the company recruits the best among them, for indefinite periods. The company finds this approach very efficient to get best employees.

Likewise, even without agreement, the young graduates from KIST campus and IPRCs, are recruited by RMT for internship of six months, at the end the best of them are recruited for long period.

To produce graduates who should in short time be productive in an industry, it is required to rethink the education system in the country.

Except for school visits, the Rwandan education system offers the opportunity of more or less a month of internship to students who are in their final year. This period is so short that a new graduate finishes his studies without a minimum of know-how that he mastered, because without enough luggage of practical knowledge and without knowledge of the professional environment in which he is called to evolve the rest of his life.

One of the efficient solutions to provide prepare well student for the work environment which waiting to receive them, is rapprochement between the fields of education and economics.

4.3.1 Courses provided by Higher Learning Institutions (HLIs) in Rwanda

The courses for the agro-processing qualifications are available with academic competitive standards and the number of graduates is sufficient enough to fill the labour market gap. Below are the academic courses offered by different universities/Higher Learning Institutions (HLIs) to qualify graduates in terms of degree possession and qualification[32].

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[32] Economics, Finance, Accounting, Commerce, Business Administration, Monetary economics, International economics, Economics & Mathematics, Statistics & applied mathematics, Actuarial sciences, Demography, Economic statistics, Commercial engineering, Microfinance, Banking, Insurance, Taxation, Credit management, Money & Banking, Human Resource Management, Marketing, Information Technology, Business Information Technology, Software engineering, Network & Communication system, Information management, Computer Sciences, Computer engineering, Commercial engineering, Machine intelligence, Law, Private law, International economic law, and Public International law.

4.3.2 Development of on-the-job skills

Once on the job, skills development actions are conducted by different stakeholders. Except for the company which can identify training needs assessment and then organise training for it or hire external training companies according to its expertise; there are many trainings which are organised by either public agencies, ONGs, or any other stakeholder. As described above, skills providers in the agricultural sector are simply enumerated below.

► *Public agencies, providers of skills development*

Rwanda's Decentralization Policy has entrusted the training mission of capacity development to public agencies. Each one therefore has responsibilities for developing a public or private actor whose domain of intervention links to its mission. Thus, RAB, NAEB, and RALIS each conduct skills assessments and training according to their field of intervention.

Some of these agencies have specialised structures for skills development. This is the case of RAB with Farmer Field School (FFS) and the Horticulture Center of Excellence (HCoE), whose interventions were developed in the previous chapter.

► *Other skills development partners*

In addition to public agencies, especially for traditional commodities like tea and coffee, they benefit from skills development interventions initiated and implemented by regional or international associations and NGOs. Thus, the Tea Brokers East Africa (TBEA) based in Kenya organises training for tea makers in different tea factories in Rwanda, while the Farmer Support Center provides support in terms of skills development to coffee processors in Rwanda.
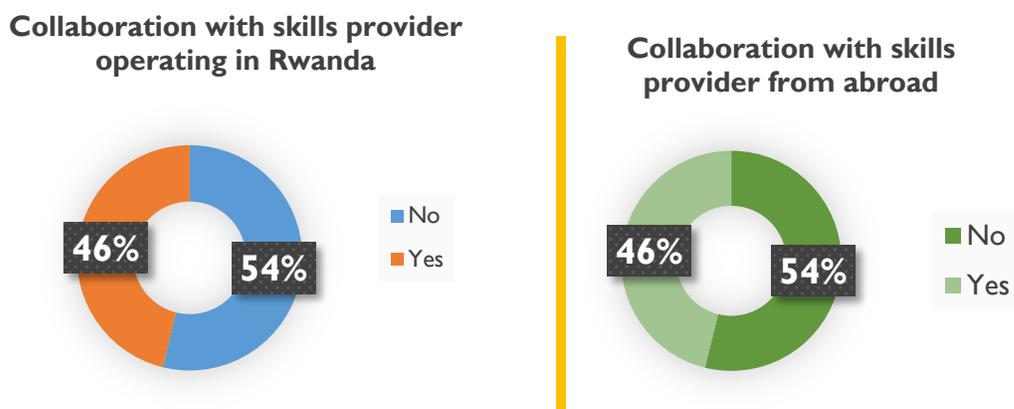

Figure 6: Collaboration with skills providers

On view of percentages above, the skills development does not appear as a critical investment which requires particular attention with hope of return of investment.

4.3.3 Existing Skills Development Mechanisms for Agro-processing sector

In the agro-processing industry, there are three levels of involvement for capacity building. As a result, government agencies, agro processing enterprises/companies, and stakeholders at the national, regional, and worldwide levels are all involved. Each of the three capacity-building players in the agro-processing business plans its intervention according to its mission and charter of being.

4.3.4 Existing structures and tools for continuous skills development

There are many and various structures that provide continuous capacity development services to agribusiness industries. Through a decentralisation policy launched in 2021, the Rwandan government has devoted capacity building to public agencies and policy making to ministries. For the agriculture sector, the main public agencies with responsibilities for the capacity development of farmers and other actors are RAB and NAEB. However, other agencies such as RALIS can train people or companies involved in the export or import of food products.

Rwanda Agriculture Board (RAB)

RAB has a mandate to promote the cultivation of food crops and horticulture. Therefore, it develops the capacities of individual farmers as well as farmers grouped into cooperatives. Two structures are under the supervision of RAB for the capacity development of farmers' FFS and the Horticulture Center of Excellence (HCoE).

Farmer's Field School (FFS)

There is one farmer field school facilitator per territorial sector. He works mostly and easily with cooperative farmers and land-consolidated farmers. Indeed, they also work with single farmers regrouped within their different groups. To become an FFS facilitator, someone must be selected among other farmers and trained for some months to build up their technical and facilitation skills. Headed by the FFS Master Trainer, the two trainings of FFS facilitators and farmers are organised as follows:

- **Training of FFS Facilitators**
    - FFS facilitators are organised into "Training of Trainers (TOT)" groups;
    - Qualified FFS Master Trainers train the FFS Facilitators;
    - Learning takes place in the TOT learning plot;
    - FFS facilitators work together in the TOT learning plot;
    - Season-long procedure;

- 1 to 2 weeks of training per month.
- ↻ **Training of Farmers**
  - FFS farmers are organised into FFS groups;
  - FFS facilitators train the farmers;
  - Learning takes place in the FFS learning plot;
  - Group members work together on the FFS plot;
  - Season-long procedure;
  - Half a day of training per week.

In the long term, the structure of FFS will contribute to the development of Rwandan agricultural know-how in order to become a Rwandan cultural heritage in the future.

Horticulture Center of Excellence (HCoE)

Based in Mulindi, in Gasabo District, City of Kigali, the Horticulture Center of Excellence is a centre of excellence of cooperation between Rwanda and Israel. It is a structure under the supervision of RAB with the mandate of capacity building for farmers who are investing in horticulture.

This centre delivers training specifically to cooperatives and large farmers. Thus, the Center plans to set up a demonstrative pilot of capacity development for each cooperative and big farmer.

The following expertise and skills can be highlighted based on its interaction with cooperatives and large farmers:

1. Skills for supply chain management
2. Knowledge of the time between the application of pesticides and the time of harvest
3. Knowing when to harvest
4. Knowledge of the equipment recommended for the transport of each harvested crop
5. Knowledge of the harvest which must pass through the cold room and the temperature indicated as well as the harvest which does not pass through the cold room
6. Knowledge and analysis of updated prices on the regional and international market
7. Harvesting techniques and time

National Export Agriculture Development Board (NAEB)

The National Agriculture Export Development Board usually organizes training for agro-processing industries in order to improve quality and quantity of horticultures products. Training needs are identified according to difficulty to export, such as these linked to non-tariff barriers faced by products from Rwandan products faced to be exported.

4.4 Skills Gaps, Anticipated Skills Demand, and their Policy Interventions by 2030

The following *figures* indicate the skills gaps demand in the agro-processing sector.

Needed skills to implement company's business strategies
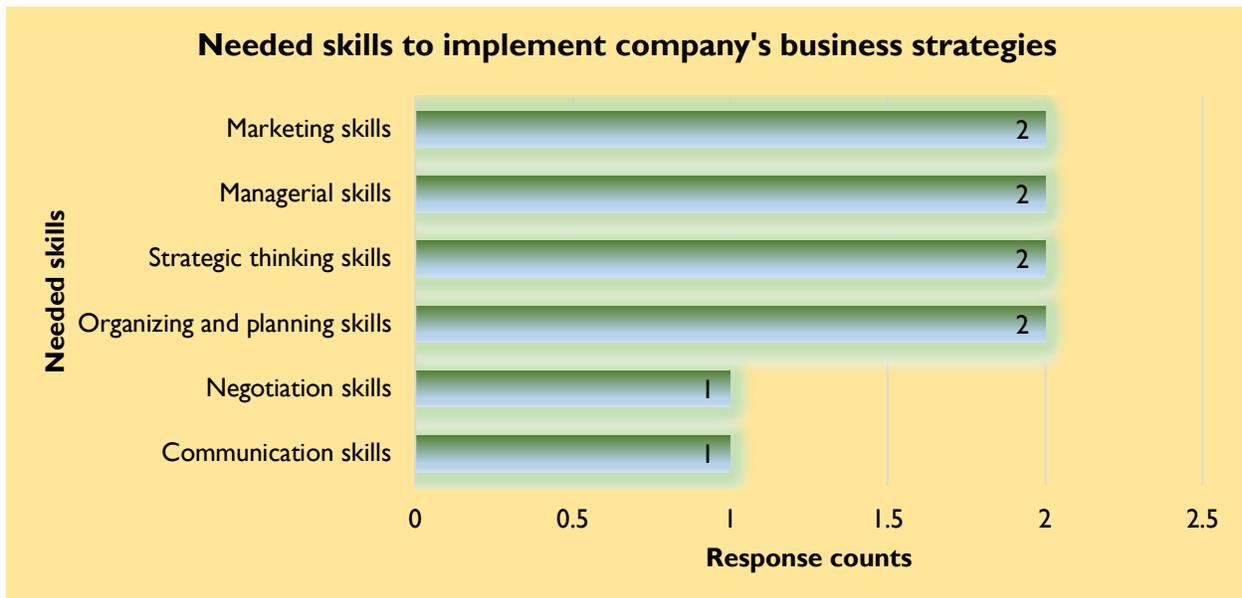

Figure 7: Needed soft skills gap

The four soft skills listed in the figure above are critical for the growth of the company. Without "skills marketing, managerial, strategic, organizing, and planning ", no company can increase its level of competitiveness.

Categories of positions that are not easily filled on the rwanda labor market

Figure 8: Positions not easy to fill

It is curious to find that agro-processing companies are more sensitive to soft skills gaps than to technical skills gaps. This is because an establishment usually sensitive to consequences of an inefficient management. Indeed a company has more chance grow when it is able to adapt to changes, deal easily with clients, it has strong planning and management tools and manage effectively its different resources (human, financial and materials).
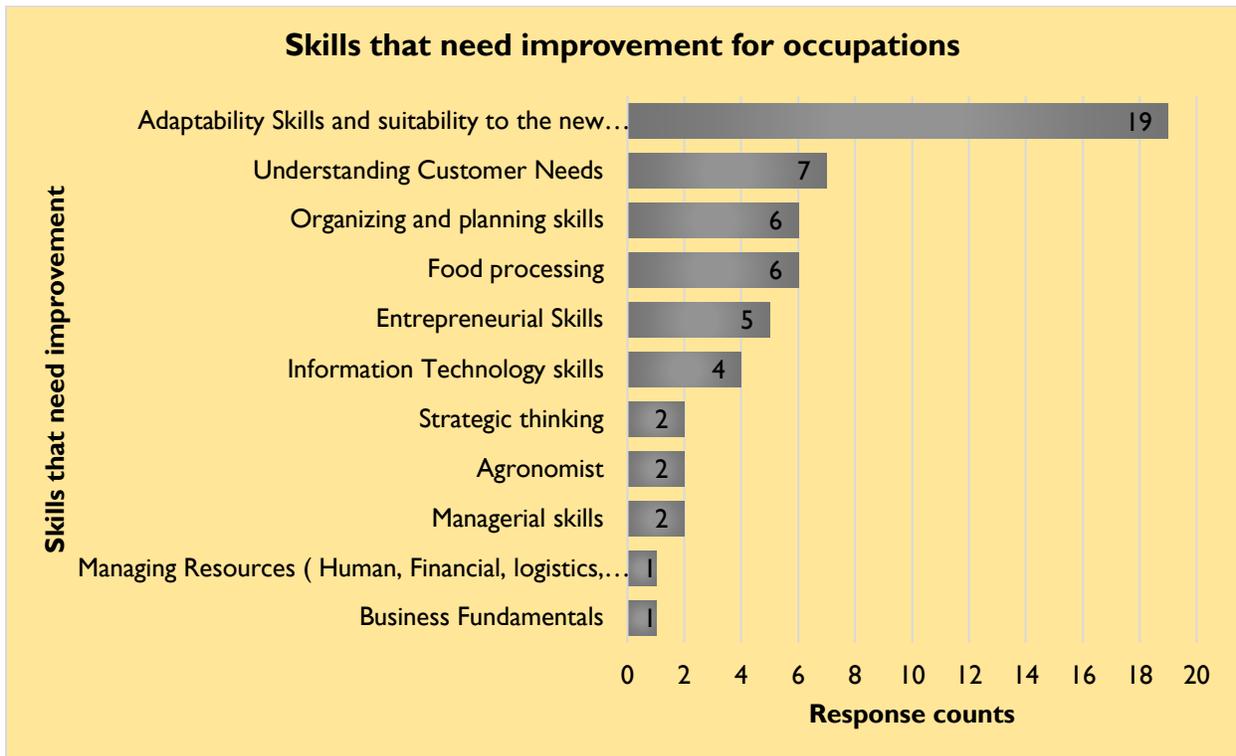
Skills that need improvement for occupations

Skill	Response count
Adaptability Skills and suitability to the new…	19
Understanding Customer Needs	7
Organizing and planning skills	6
Food processing	6
Entrepreneurial Skills	5
Information Technology skills	4
Strategic thinking	2
Agronomist	2
Managerial skills	2
Managing Resources (Human, Financial, logistics,…	1
Business Fundamentals	1

Figure 9: Skills need improvement in agro-processing

The above fields have been identified as the domains in which skills gaps must be bridged and skills shortages must be filled in the agro-processing sector. However, it will be essential to conduct a deep skills need assessment for different fields. For example, it will inevitable to go deeply assess in agronomy, food processing, strategic skills, which specific skills are needed to transform the agro-processing sector.

4.4.1Knowledge and Skills Gaps

The following knowledge and skills gaps were informed by the questionnaire, interviews, and literature review.

Table 3: Knowledge and skills gaps identified

N⁰	Gap	Description of the gap
1	Agricultural inputs	Important gaps identified: ♦ Seeds & Planting material ♦ Fertilizers application ♦ Farm equipment ♦ Micro Irrigation ♦ Regulation
2	Cultivation	Important gaps identified: ♦ Conditions of cultivation of different crops; ♦ Swamp irrigation; ♦ Know steps of crops grow; ♦ Fertilizer treatment; ♦ Know the types of pesticides and know the period of its application so as not to damage the harvest; ♦ Farm management; ♦ Greenhouse management.
3	Production	Important gaps identified: ♦ Production of Vegetables for export and Domestic use ♦ Production of Fruits for export and Local consumption ♦ Ornamental plants
4	Post-harvest	Important gaps identified: ♦ Picking with the stem supported the fruit; ♦ Know the maturity of the crop to be harvested; ♦ Know if the crop is recommendable to be harvested before maturity or at maturity; ♦ Transport conditions for harvesting from the fields to the warehouse; ♦ Know the crops that must pass through a cold room and the temperatures indicated for the conservation of each crop.
5	Food processing	Important gaps identified are: ♦ Raw material (fruits or other crop) sorting ♦ Crop processing Techniques; ♦ Know required inputs and their dosage in processing process; ♦ Quality control cycle; ♦ Machines operating; ♦ Machine maintenance; ♦ Quality management system; ♦ Lack of research and innovation.
6	Processing	Important gaps identified:

N⁰	Gap	Description of the gap
	and storage	♦ Warehousing ♦ Drying ♦ Freezing ♦ Preservation ♦ Fermentation ♦ Trimming &washing ♦ Grading& Sorting ♦ Rolling &withering
7	Cheese production	Important gaps identified: ♦ Strict adherence to protocol of milk sub-products making process; ♦ Strict respect of hygiene and sanitation at working place of milk process; ♦ Basic Practices for Good Livestock Feeding by Breeders.
8	Coffee Washing Station	Important gaps identified: ♦ Inexistence of Coffee Washing Station standards construction
9	Coffee processing	Important gaps identified: ♦ Coffee peel ♦ Coffee roasting
10	Marketing	Important gaps identified: ♦ Negotiation of Coffee exchange rate; ♦ Ignorance of Export, import procedures and requirements of external market; ♦ Ignorance of targeted market in terms of standards requirement and regulations; ♦ Inexistence of branding for many products made in Rwanda; ♦ Market prospection and assessment; ♦ Weakness of Packaging ended product; ♦ International rules for regulation.
11	Management	Important gaps identified: ♦ Weakness in Budget preparation; ♦ Planning, research and innovations; ♦ Weakness in development of Business plan; ♦ Not enough informed about rules and regulations governing their area of interventions; ♦ Ignorance of international rules and regulations, and of international trade or commerce

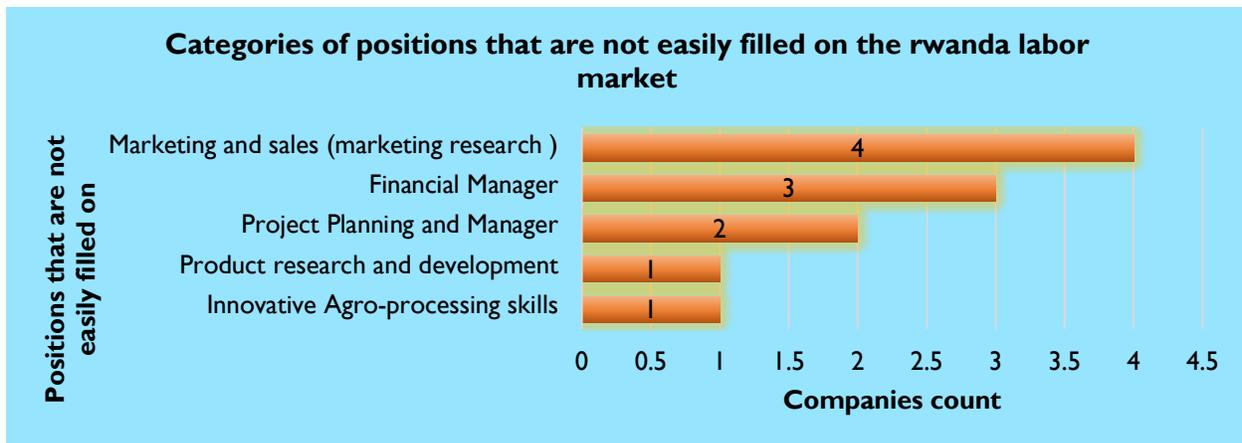**Categories of positions that are not easily filled on the rwanda labor market**

Figure 10: Categories of positions that are not easily filled in Rwanda labour market

Desired skills to meet haccp certification not currently met by the company
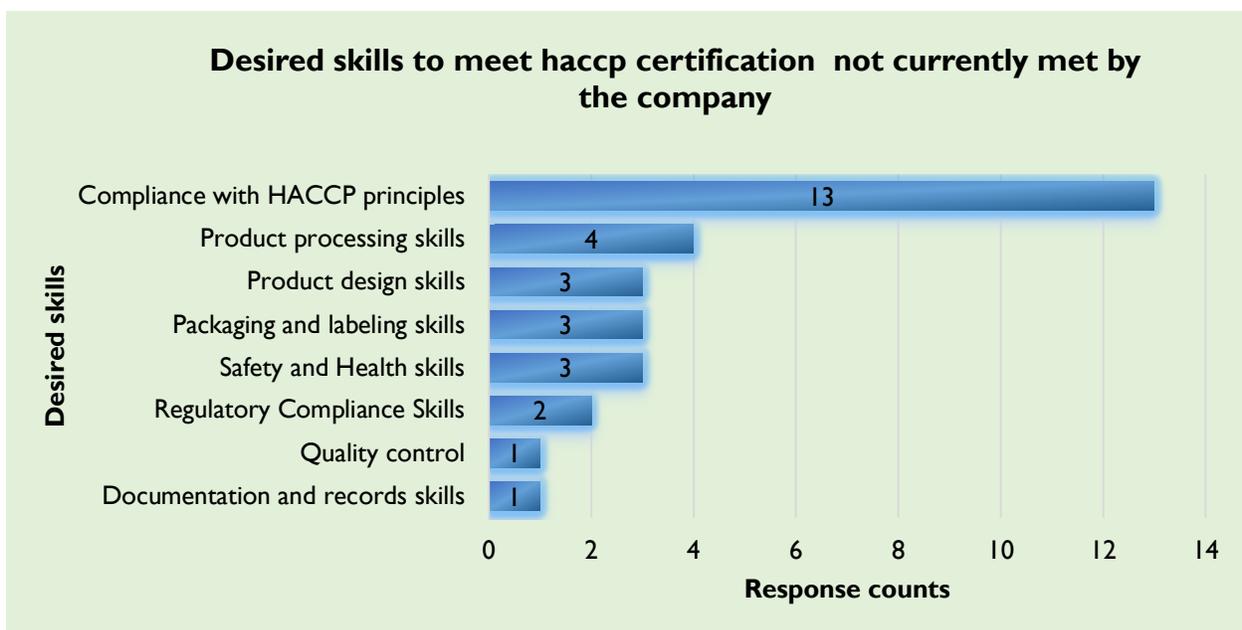
Figure 11: Desired skills to meet HACCP certification not currently met by the company

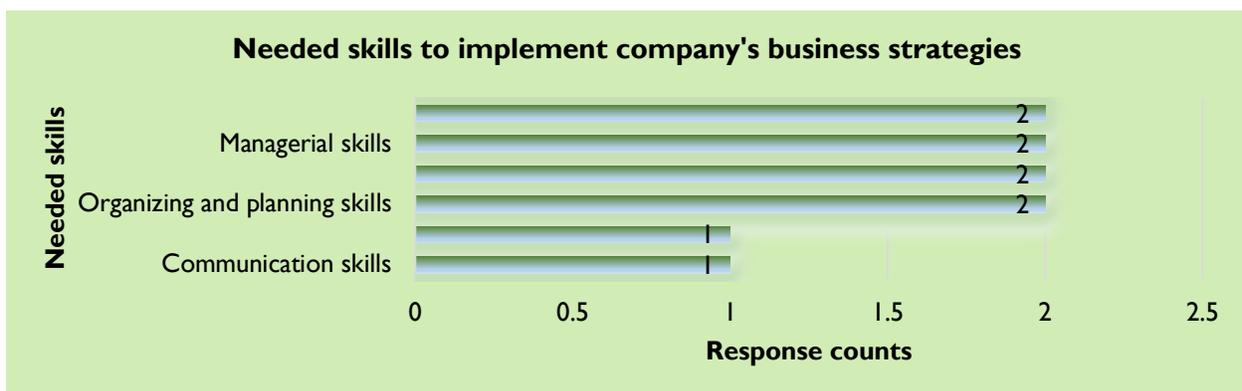**Needed skills to implement company's business strategies**

Figure 12: Needed skills to implement company's business strategies

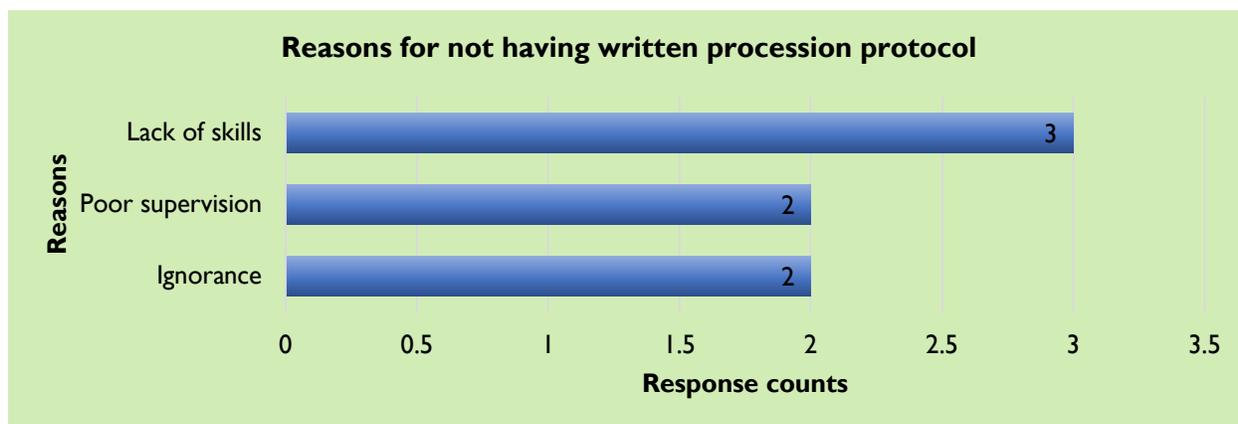## 4.5 Main barriers to the closing skills gaps

Figure 13: Reason for not having written procession protocol

CHAPTER FIVE: SECTOR SKILLS RESPONSE TO ADDRESS THE IDENTIFIED SKILLS GAP

5.1 Introduction

Individual skills can mean abilities and know-how that result from the skills and knowledge that a person has that allow them to easily carry out their work and professional obligations. Much more emphasis will be placed on skills and, to a lesser extent, knowledge. Knowledge is the foundation that facilitates the easy acquisition of skills that allow each person to improve the quality of their work. During data collection, it was interesting to discover that the very small agro-processing factory processors are the ones unaware and unconscious of knowledge and skills gaps that are germane to their development. It is rather surprising, for example, to discover that the management team of a cooperative or of a small company does not know the meaning of the "S" on the RSB certificate. It was also strange to find that a cooperative of fruit juice processors cannot understand that bachelor's degree holders cannot contribute to the quality of their end products. Some juice processors testified that the bachelor's degree holders in food sciences provided by RDB failed to help the said companies improve the quality of their products. If their assertion is correct, the underperformance of food science graduates may be explained by the lack of an internship period or by a poor and counterproductive work environment that could not favour for creativity. The following is the data and information curated from the interviews and surveys administered on the knowledge and skills gap.

► *Management Instrument*

An establishment with management tools, especially planning instruments, has the skills needed to meet the ambiance targets fixed in the short, middle, and long term periods. If 96% of respondents have business strategies to plan their future for showing to banks for negotiation of loans, this portends a bright future for agro-processing establishments in Rwanda. Unfortunately, as shown in Figure 15, 92% of respondents confess not having the skills to implement the business strategies.
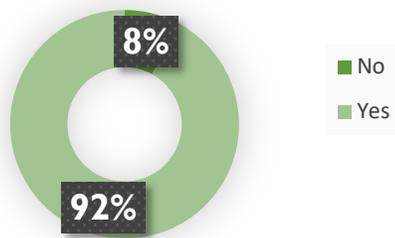

have business strategies?

4%

No

Yes

96%

Very good score to have 96% of agro-processing companies with Business strategies for their business growth.

Figure 14: Business strategy

► *Individual skills*

The performance of an establishment depends on financial, material and human resources. All of these resources are critical for establishment success. However, the human resources are the most important pillar for the establishment growth. In those conditions, it is essential to note that soft skills are very important for an establishment as are technical skills too. No one of both skills can be neglected. When a company is weak managed financially or when it lacks skills in negotiation, marketing, strategic thinking or planning, its future is absolutely mortgaged. The figures 16 and 17 highlight the gap of soft skills and enumerate exclusively the soft skills which are lacking while the figures 18 and 19 combine lacking soft and technical skills.

Have sufficient skills to deliver on business strategies?

■ No
■ Yes

Strange situation and critical where at 92%, companies admit to do not have skills to deliver Business strategies.

Figure 15: Soft skills gap in percentage
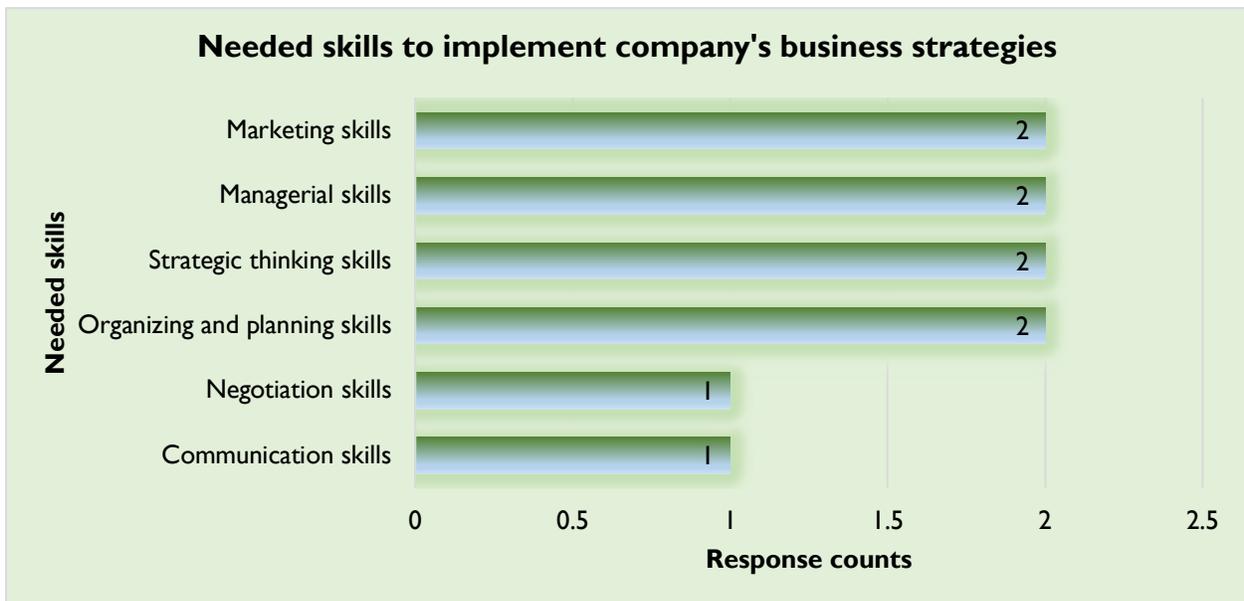
Figure 16: Needed soft skills gap

The four soft skills listed in the figure above are critical for the growth of the company. Without "Marketing, Managerial, Strategic thinking, organizing and planning skills", no one company can increase it level of competitiveness.

CATEGORIES OF POSITIONS THAT ARE NOT EASILY FILLED ON THE RWANDA LABOR MARKET
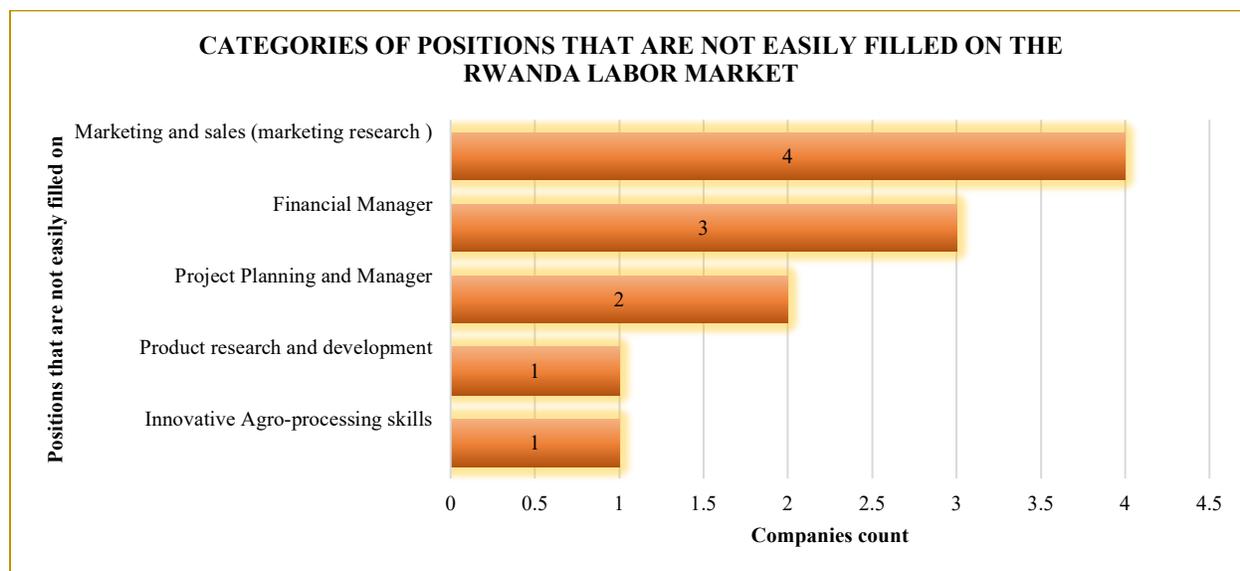
Figure 17: Positions not easy to fill

Interestingly, agribusinesses are more sensitive to soft skills gaps than to technical skills gaps. The concern for their soft skills is due to the fact that agribusinesses find their competitiveness suffers from gaps in strategic planning and strategic management to drive the development of their businesses.

Skills that need improvement for occupations

Figure 18: Skills need improvement in agro-processing

For agro-processing sector the fields above are identified as the domains in which skills gap shall be bridged and where skills shortage required to be full field. However, a thorough skills needs assessment for different areas will be essential. For example, it will be inevitable to deepen the assessment in agronomy skills, food processing skills, strategic skills, what specific skills are needed to transform the agro-industrial sector.

5.2 Proposed Ways to Bridge the Skills Gaps

Discover the proposal of best practices and international approaches that can bridge the skills gap in the agribusiness sector.
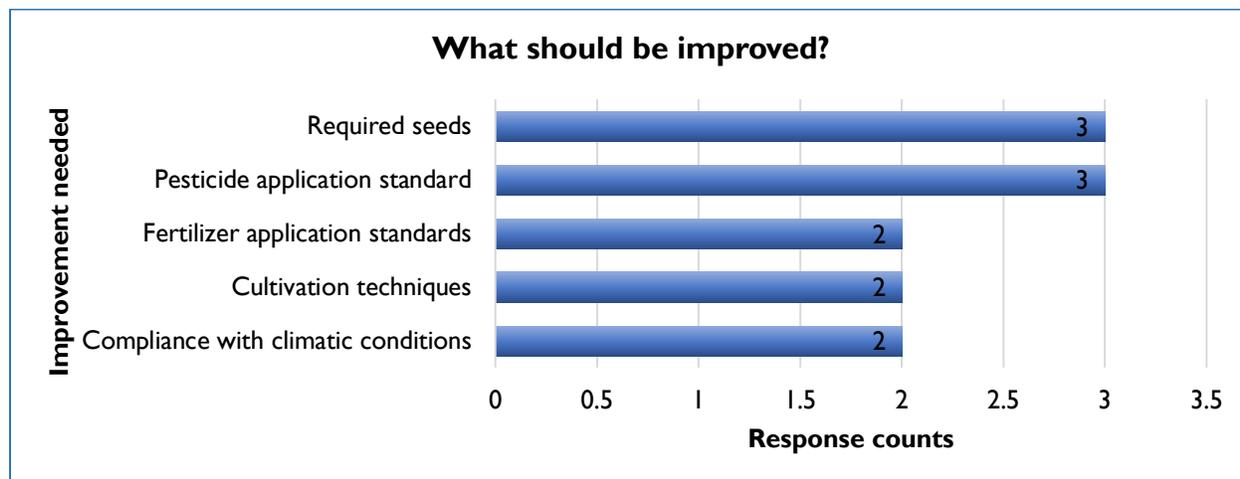

Figure 19: Proposed ways to bridge the skills gaps

5.3 Agro-processing Sector Benchmarking

Knowledge, skills and know-how are acquired from training or by copying the practices of people who know or have more proven experiences than the learner. For agro-processing sector, it will be benchmarked the African countries which have many similarities with Rwanda in terms geographical location or countries that have experienced colonization, etc. Where possible, the countries of the region will be the best references. Benchmark is structured according to crop and where possible, the regional countries are privileged as best references to Rwanda.

► **Tea**

Without claiming to be exhaustive in relation to the countries that can serve as case studies to Rwanda, this country can learn from:

■ **Kenya** can be reference to Rwanda in terms of developing research in tea cultivation, especially Rwanda can learn from Kenya how to organize tea sector. The Kenyan tea supply is supported by a number or organizations, such as: Tea Board of Kenya, Kenya Tea Development Agency Ltd (KTDA), Kenya Tea Growers Association (KTGA), East African

Tea Trade Association (EATTA), Tea Brokers and The Mombasa Tea Auction[33]. Combining their efforts, all these structure contribute at lot to promote tea sector in Kenya, even in the region for organizations with region vocation.

▪ **Morocco** imports 99% of its green tea from China, which is estimated around 2 kg per individual and per year. But this country process and produce at least 400 brands of tea, among these the most known are: Raji Frères, Siti, Somathes and Sultan[34].

▪ **Sri Lanka** is the only country within the tea growing nations which manufactures all type of teas which includes CTC, Rotorvane, Orthodox and Green tea[35]. Like other many growing countries, Rwanda manufactures CTC, Orthodox and Green tea.

► **Coffee**

Without claiming to be exhaustive in relation to the countries that can serve as case studies for Rwanda, this country can learn from:

▪ **Ethiopia can set a good example for Rwanda by producing organic coffee**. Farmers have increased yields through better use of leguminous shade trees, fertilisers (compost and manure), and weeding. In addition, in Ethiopian, a selective method has resulted in a more homogenous and higher quality coffee, as has an increase in post-harvest wet washing of coffee cherries (the fruit that holds the coffee bean), and improvements in drying methods . In addition, Rwanda has to learn from Ethiopians how to develop its own coffee brands and market them around the world. Ethiopia has its own many of coffee brands and has had success in making them known in many countries around the world.

► **Avocado**

Without claiming to be exhaustive in relation to the countries that can serve as case studies for Rwanda, this country can learn from:

▪ **Kenya** ranks as the sixth-largest avocado exporter to Europe. The Kenyan avocado industry faces a major challenge related to a lack of suitable transport equipment. Exports to Europe were only possible through expensive air shipments. Alternatively, transporting by sea was only feasible for the more proximate Middle East, where avocados sell for much less than in Europe. To reduce the cost of export transport and sell them at a profitable export price, Kenya has invested in the infrastructure to send avocados by road, then by sea. The country first invested in refrigerated transport containers and in the repair of Mombasa road. By investing in sea freight while complying with European standards, the Kenyan avocado value chain has proven to be more profitable than when avocados were exported by air.

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[33] Analysis of incentives and disincentives for tea in Kenya, FAO, 2013

[34] www.boisson-sans-alcool.com › marques_ the-Morocco, 2018

[35]   Sri Lankan Tea Industry, Journal f Research Technology and Engineering, Vol 1, Issue 1, January 2020

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

This report has been able to curate in detail, the skills assessment result of the agro processing industry of Rwanda and the identified skills gaps that will be needing attention. Recommendations were given on what needs to be done to bridge these identified gaps for short terms and long terms.

Since skill is seen as the learned ability to achieve predetermined results often with a minimum of time, energy or both; it is necessary that after identifying the skills required in a specific sector, to curry out individual skills needs assessment in different establishments operating in the sector in order to have the actual number of people who need to be trained for specific skills required.

The agricultural sector of Rwanda has so many untapped potentials because of productive skills shortages across the value chain.

The lesson points from this study highlights how skills development is revealed to be the bedrock of productivity in any industry of the economy.

6.2 Recommendations

The implementation of the recommendations will be coordinated by PSF. To make the agro-processing sector more competitive, the recommendations made are spread over three main periods:

I. Short-term	
Activities/Actions	**Responsible**
Set up a platform driven by the PSF for interaction between companies on the one hand and university educational institutions, IPRCs and TVETs on the other hand, which allows both parties to collaborate permanently in order to rethink on teaching systems that meet business expectations	Learning institutions and Establishments
Train managers agro-processing companies to Organizational Skills and support them to set up effective organizational structures	MINICOM and Establishments
Bring private companies to set up research and innovation units to help them constantly improve the qualities of their products, diversify their products among others, or by also creating by-products instead of exporting only raw or semi-processed materials	MINICOM and Establishments
Conduct training need assessment for famers of promise agricultural products on cultivation, harvesting, post harvesting and products' processing	RAB, NAEB and Establishments
Conduct training needs assessment on skills of negotiation of the Coffee exchange rates, of market prospection, packaging and brand design	PSF, RAB, NAEB and Establishments
Train entrepreneurs in the agro-processing sector in prospecting techniques for the markets they target	RALIS and Establishments
Put in place a framework of exchange visits between small, middle and big SMEs for sharing experiences	MINICOM
Strengthen the "Twigire Muhinzi" program to increasingly extend the knowledge of agricultural techniques among the population living on agriculture, which is the majority in Rwanda, in order to continuously increase agricultural production.	MINAGRI
II. Medium-term	
Identify promising agricultural products that can be more competitive for export once processed	RAB and NAEB
Train on cultivation, harvesting, post harvesting and processing of promising agricultural products	RAB, NAEB and training institutions
Train entrepreneurs on packaging and the design of brands of processed products	RAB, NAEB and training institutions
III. Long-term	
Have brands of traditional export products, coffee and tea	RAB and NAEB
Train coffee operators in the negotiation of the Coffee exchange rate	NAEB and training institutions
Train in high value-added processing for traditional export products, especially	PSF, NAEB and training institutions

coffee	

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ANNEXES

Annex 1: Respondents to the Questionnaire

N°	COMPANY	RESPONDENT	LOCATION	SUB SECTOR
1	Buranga General Business Ltd	Managing Director (MD)	City of Kigali/ Kicukiro	Animal production (meat processing & milk processing-yogurt, butter)
2	Frmagerie la lumiere	Production Manager	Northern Province/ Musanze	Animal production (meat processing & milk processing-yogurt, butter)
3	SABAN LTD	Vice-director	City of Kigali/ Nyarugenge	Animal production (meat processing & milk processing-yogurt, butter)
4	KIME LTD	Sales manager	City of Kigali/ Nyarugenge	Animal production (meat processing & milk processing-yogurt, butter)
5	Mukamira Dairy ltd	District manager	Western Province/ Nyabihu	Animal production (meat processing & milk processing-yogurt, butter)
6	BURANGA General Business	M.D	City of Kigali/ Kicukiro	Animal production (meat processing & milk processing-yogurt, butter)
7	H2O VENTURES	MD	City of Kigali/ Gasabo	Animal production (meat processing & omilk processing-yogurt, butter)
8	BURANGA General Business	M.D	City of Kigali/ Kicukiro	Animal production (meat processing & milk processing-yogurt, butter)
9	H2O VENTURES	MD	City of Kigali/ Gasabo	Animal production (meat processing & milk processing-yogurt, butter)
10	KIGALI HIDES AND SKINS	MD	City of Kigali/ Kicukiro	Animal production (meat processing & milk processing-yogurt, butter)
11	ABCD LTD	Chairperson	City of Kigali/ Nyarugenge	Animal production (meat processing & milk processing-yogurt, butter)
12	Royal AGROVET LIMITED	M.D	City of Kigali/ Nyarugenge	Animal Production
13	COVOFGA	Head of company	Northern Province/ Gakenke	Emerging commodities(Horticulture, vegetables & fruits)
14	SHEKINA	MD	Northern Province/ Rulindo	Emerging commodities(Horticulture, vegetables & fruits)
15	Talia Ltd	Managing Director	Eastern Province/ Bugesera	Emerging commodities(Horticulture, vegetables & fruits)
16	UTAS	Director	City of Kigali/ Kicukiro	Emerging commodities(Horticulture, vegetables & fruits)
17	Shema fruits	Worker	Southern Province/ Huye	Emerging commodities(Horticulture, vegetables & fruits)

N°	COMPANY	RESPONDENT	LOCATION	SUB SECTOR
18	Kigali firms ltd	Comptable	City of Kigali / Kicukiro	Emerging commodities(Horticulture, vegetables & fruits)
19	AGRI BUSINESS KAMALI	M.D	City of Kigali, Northern Province Nyarugenge & Gicumbi,	Emerging commodities(Horticulture, vegetables & fruits)
20	SORWATOM	ADMiN	City of Kigali/ Gasabo	Emerging commodities(Horticulture, vegetables & fruits)
21	Kinazi cassaca plant	Director	Southern Province/ Muhanga	Emerging commodities(Horticulture, vegetables & fruits)
22	SHEKINA	MD	Northern Province/ Rulindo	Emerging commodities(Horticulture, vegetables & fruits)
23	CARREFOUR VETERNAIRE ET AGRICOLE	MD	City of Kigali/ Nyarugenge	Emerging commodities(Horticulture, vegetables & fruits)
24	AFRICHEM Rwanda limited	M.D	City of Kigali/ Nyarugenge	Veterinary pharmacy
25	SARURA AGROVET SERVICES LTD	M.D	City of Kigali/ Nyarugenge	Agriculture and veterinary Pharmacy
26	Mount Meru soyco Ltd	Seller	Eastern Province/ Kayonza	Edible oil production

N°	COMPANY	SUB SECTOR
27	Skol brewery Ltd	Beer and soft drinks
28	Sorwatom	Tomato paste
29	Stevia life	Stevie dry leaves
30	The Apiary	Natural Honey
31	Rwashosco	Juice, Wine, bakery and pepper products,
32	La Galette	Bakery and Super Market
33	Rwanda nut company	Macadamia nuts
34	Rwanda Honey	beeswax candles
35	Seed Co International Rwanda Ltd	Seeds
36	Winnaz	Irish potatoes chips
37	Inyange Industries	Mineral water, juice and milk products

38	Multisector Investment Group (MIG SA)	Honey
39	COVEPAR	Cassava flour
40	Green Harvest	Chili sauce
41	Horizon Sopyrwa	Refined pyrethrum products
42	ICM Agribusiness Sarl	Rice
43	Ikirezi Natural	Geranium, Patchouli, Lemongrass, Eucalyptus and targeted oil
44	Africa Improved Foods	high-quality fortified nutritious foods from grains
45	Asil Natural oils	Moringa oil
47	Café connexion	Coffee
48	Bakressa GrainMill (AZAM)	Wheat flour