Food and Agriculture Organization
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RURAL EMPLOYMENT

KNOWLEDGE MATERIALS – VALUE CHAINS

Horticulture value chain analysis

Opportunities for youth employment in Rwanda

SNV

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Opportunities for youth employment in Rwanda

Rik van Keulen
Jean Muthamia-Mwenda
SNV Netherlands Development Organisation, the Netherlands

Philippe Rumenera
Gupta Banjara
SNV Netherlands Development Organisation, Rwanda

Marzio Colantuoni,
Consultant, Italy

Food and Agriculture Organization of the United Nations
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Abbreviations and acronyms

AfDB	Africa Development Bank
AFR	Access to Finance Rwanda
AGRIWIN	Agriculture with Innovation Company Ltd
AGYMS	Agriculture Gender and Youth Mainstreaming Strategy
AISSWG	Agri-Inputs Sub Sector Working Group
AMIR	Association of Microfinance Institutions in Rwanda
ATVET	Agriculture Technical and Vocational Education and Training BRD Development Bank of Rwanda
BDF	Business Development Fund
BK	Bank of Kigali
CAADP	Comprehensive Africa Agriculture Development Programme CAES Customized Agriculture Extension System
CAGR	Compound Annual Growth Rate COVID-19 Coronavirus Disease 2019
DRC	Democratic Republic of the Congo
EDP	Entrepreneurship Development Policy
EICV	Integrated Household Living Conditions Survey EU European Union
FAO	Food and Agriculture Organization of the United Nations
FCDO	Foreign, Commonwealth and Development Office
FGDs	Focus Group Discussions
FOB	Free on Board
FVC	Food Value Chains
GAP	Good Agriculture Gractices
GDP	Gross Domestic Product
GoR	Government of Rwanda
Ha	Hectare
HACCP	Hazard Analysis and Critical Control Point
HCoE	Horticulture Center of Excellence
HEAR	Horticultural Exporters Association of Rwanda
HoReCo	Horticulture in Reality Corporation
I&M Bank	Investments and Mortgages Bank
ICA	Integrated Country Approach for Boosting Decent Jobs for Youth in the Agri-food System
ICT	Information and Communications Technology
IFAD	International Fund for Agricultural Development
IFC	International Finance Corporation
ILO	International Labour Organization

IMSAR	Improving Market Systems for Agriculture in Rwanda (FCDO-Funded Project)
IPRC	Integrated Polytechnic Regional Centre
IT	Information Technology
KCB	Kenya Commercial Bank
KfW	German State-Owned Development Bank
Kg	Kilogram
KIIs	Key Informant Interviews
K-Lab	Knowledge Lab
LCF	Local Competitiveness Facility
LODA	Local Administrative Entities Development Agency
MFIs	Microfinance Institutions
MIFOTRA	Ministry of Public Service and Labour
MINAGRI	Ministry of Agriculture and Animal Resources
MINALOC	Ministry of Local Government
MINECOFIN	Ministry of Finance and Economic Planning
MINICOM	Ministry of Commerce, Trade and Industry
MSME	Micro, Small and Medium-Sized Enterprise
MYCULTURE	Ministry of Youth and Culture
NAEB	National Agriculture Export Development Board
NAP	National Agriculture Policy
NEET	Not in Employment, Education or Training
NEP	National Employment Programme
NGO	Non-Governmental Organization
NAIS	National Agriculture Insurance Scheme
NRIF	National Research and Innovation Fund
NISR	National Institute of Statistics of Rwanda
NYC	National Youth Council
NSDEPS	National Skills Development and Employment Promotion Strategy
NST1	National Strategy for Transformation
NUFFIC	Netherlands Universities Foundation for International Cooperation
OMMIS	Operation, Maintenance and Management of Irrigation Schemes
PPE	Personal Protective Equipment
PSDYE	Private Sector Development and Youth Employment Strategy
PSDYE SWG	Private Sector Development and Youth Employment Sector Working Group
PSF	Private Sector Federation
PSTA4	Strategic Plan for Agriculture Transformation IV
PWD	People with Disabilities

RAB	Rwanda Agriculture and Animal Resources Development Board
RAIDA	Rwanda Agriculture Inputs Dealers Association
RBS	Rwanda Bureau of Standards
RCA	Rwanda Cooperative Agency
RCSP	Rural Community Support Project
REMA	Rwanda Environmental Management Authority
RHIO	Rwanda Horticulture Inter-Professional Organization
RICA	Rwanda Inspectorate, Competition and Consumer Protection Authority
RSSP	Rural Sector Support Project
RSSP-LWH	RSSP Land Husbandry, Water Harvesting and Hillside Irrigation Project
RTDA	Rwanda Transport Development Agency
RWF	Rwanda Franc
RYAF	Rwanda Youth in Agribusiness Forum
SACCO	Savings and Credit Cooperative Organization
SAIP	Sustainable Agricultural Intensification and Food Security Project
SEAD	Strengthening Education for Agricultural Development
SFVC	Sustainable Food Value Chain
SIDA	Swedish International Development Cooperation Agency
SMEs	Small and Medium Enterprises
SNV	Netherlands Development Organization
SWOT S	trengths, Weaknesses, Opportunities and Threats
ToR	Terms of Reference
TVET TM	Technical and Vocational Education and Training Twigire Muhinzi (farmers as private extension)
UK	United Kingdom
UNDP	United Nations Development Programme
UR-CAVM	University of Rwanda College of Agriculture, Animal Sciences and Veterinary Medicine
USAID	United States Agency for International Development
USD	United States Dollar
VC	Value chain
WUR	Wageningen University and Research Centre
YPARD	Young Professionals for Agricultural Development

Exchange rates

EUR 1 = RWF 1 029 (May 2020)

USD 1 = RWF 909 (May 2020)

Executive summary

Rwanda has one of the world's youngest populations, with a median age of 20 years old. Youth, defined as those aged 16 to 30, make up 26.6 percent of the total population. The country is facing a big challenge regarding how to ensure employment for more than 200 000 young Rwandans entering the labour force every year. The nation's youth unemployment hovers around 20 percent, except during May 2020 when it jumped to

27.8 percent during the COVID-19 pandemic lockdown. For the age group 25–29, when most youth are out of college, 24.7 percent of male youth and 49.9 percent of female youth are not in employment, education or training (NEET).

The Government of Rwanda (GoR) has placed youth employment high on its agenda through various policies and programmes. The National Strategy for Transformation (NST1, 2017–2024) aims to create 214 000 decent and productive jobs each year.

The agriculture sector remains the backbone of the Rwandan economy, contributing 24.1 percent to the country's Gross Domestic Product (GDP) and 36 percent to employment, excluding self-employment in subsistence farming. Data from the National Institute of Statistics of Rwanda (NISR) show that agriculture is still a key sector for youth employment: Forty-five percent of employed youth are involved in independent farming while 16.3 percent are involved in wage farm labour, and for female youth, this is even higher at 53.2 percent and 17.7 percent, respectively. Not surprisingly, youth employment is also a priority for the Ministry of Agriculture and Animal Resources (MINAGRI). Its Strategic Plan for Agriculture Transformation 4 (PSTA4, 2018–2024) projects that 45 000 jobs would be created annually within the agri-food system. Of this, 28 000 jobs will be created in agricultural production, while the remaining 17 000 jobs will be created in the agriculture-linked value chains of agro-processing, agro-inputs, trade in agri-products, and hotels and restaurants using agri-products.

In line with PSTA4, MINAGRI and FAO are collaborating in the project "Integrated Country Approach (ICA) for boosting decent jobs for youth in the agri-food system (2019–2022)" to create a deeper understanding of where the opportunities for youth employment are in agriculture and how these opportunities can be harnessed. The horticulture sector was prioritised for a youth-centred value chain analysis, which will feed into a National Strategy for Youth Employment in Agri-food Systems. In fact, horticulture export is expected to increase from USD 23 million (2017/18) to 130 million (2023/24), vegetable market prices are increasing faster than other food items as this study shows, and smallholder producers are increasingly attracted by the high-value, short-duration horticulture crops.

SNV Rwanda was commissioned to undertake this analysis for four selected crops, namely, French beans, chilli, tomato and passion fruit, in the six districts of Gasabo, Karongi, Nyanza, Rubavu, Rulindo, and Rwamagana. The study followed the FAO's Sustainable Food Value Chain (SFVC) framework and was largely qualitative in nature, although quantitative data were used where available. The study distinguished between agripreneurship (self-employment) and employment by others (wage employment), and also between female and male youth.

The field work for the analysis took place from June 2020 to September 2020 and involved 78 focus group discussions (FGDs) and 93 key informant interviews (KIIs), together covering 20 cooperatives, 11 commercial farmers/exporters, 15 agrodealers, 3 youth organizations, 6 central government agencies, different officers at 6 district governments, 12 projects and NGOs, and 3 financial institutions. The online validation workshop and three other multi-stakeholder interactions were held in the beginning of 2021.

Key challenges for youth employment

The study encountered several key challenges for youth to engage in agripreneurship or to obtain employment, including youth having limited access to capital, as they are perceived as riskier clients for fi-

nancial institutions while at the same time often lacking collateral. Young women seem to face the same challenges faced by young men, even though their higher time commitments in the households might further limit their capacity to engage in productive and business activities. With Rwanda's high population density and resulting land fragmentation, access to land and water is another key hurdle for youth interested in starting farming. Inheritance requires them to wait; start-up capital to buy or rent land is often beyond reach; and sharecropping is only common for staples rather than for horticulture. Also, limited skills and knowledge remain an obstacle for agripreneurship and employment, whether on- or off-farm, as well as a general perception that youth are less dependable. At the same time, many youth are not attracted to the agriculture sector, nor to farming in particular, due to the image of hard work, low wages and traditional livelihoods. Nevertheless, as already stated, a majority of youth do engage in the sector; so accompanying them to enhance their livelihoods, profits and working conditions should be prioritized.

The four value chains

The study analysed the different nodes of the value chains of four selected crops, namely French beans, chilli, tomato and passion fruit, to identify employment opportunities. The input supply system is common to the four crops and is characterised by seven importers/wholesalers that do retail sales while also supplying to the 2 000 agroshops across the country. While a large variety of inputs are available in Kigali, both the variety of inputs and equipment available are limited in the districts. With the increasing number of agroshops and the good involvement of youth, agroshops show more potential for agripreneurship or employment for educated youth than do the input importers/wholesalers. Nevertheless, with the ambitious targets for employment in agriculture, and with only 3.1 jobs per agroshop, it will be difficult to realize large-scale employment through agroshops. Increasing the services portfolio of these agroshops (for example, mechanization services, spray services, pruning of orchards, private extension) – and thereby the employment per shop – is possible but will take more time to realize, as such services barely exist and many agroshops might be reluctant to introduce new services.

In general, the value chains of French beans and chilli receive substantial government and project support because of the strong growth in exports (around USD 3 million and USD 1 million, respectively, in 2019) and the attractive farm gate prices that producers receive. The study identified various interventions that support youth to access marshlands and rehabilitated lands for production, or that support access to irrigation, strengthening of the cooperatives, and provision of services for exporters to meet international market requirements.

French beans also show strong demand in DRC, although prices are around 40 percent lower than those for international export. French beans are an attractive crop because they mature early, harvested 45 days after sowing, and require minimal investment into production. Exporters have around a 20 percent rejection rate while sorting, but rejected French beans can be sold on the domestic market, keeping overall food losses low.

Chilli does not have significant regional markets but does have a good domestic demand. On the downside, domestic prices fluctuate substantially for chilli, but this could be turned into an advantage if supporting organizations would promote off-season production. Chilli is not only sensitive to pests and diseases; it also requires 50 percent more investment than French beans does. Several processors procure chilli, but the quantities are not significant compared to demand from the international and domestic markets. While export is currently focused on fresh chilli (red and green), there are expectations that the export of dried chilli to countries like China will take a bigger share in the near future.

Tomato is by far the largest crop in volume and value, and an import product across nearly all districts. Although yields are declining, farmers remain interested because of the good demand on the domestic market. Tomatoes are also sensitive to pests and diseases, and producers urgently need access to knowledge and skills on good agricultural practices to increase yields, to reduce production costs and to manage risks. There are few processors of tomato, but from a commercial perspective, large-scale processing

by importing tomato paste is more profitable. Tomato production costs and market prices are both still high in Rwanda, while processors require cheaper fresh tomatoes.

Passion fruit (with export reaching about USD 300 000 in 2019) has been identified with similar export potential as that of French beans and of chilli, but passion fruit export is still in its initial stages without stable customers. Nevertheless, it is a very profitable crop with a good domestic demand, and farmers are eagerly investing in it. For starting, cash- strapped youth farmers engaging in passion fruit production can see it more challenging, as it is a three-year crop with little or no gross margin (profit) in the first year. Domestic demand is good and there is substantial demand from two large and 12 small processors that make concentrates and ready-to-drink juices.

Female farmers form 44 percent of the cooperative membership across the four value chains. This is already very positive, yet gender equality should continue to be promoted systematically to ensure that women, including female youth, equally benefit from horticulture value chains and that gender transformational approaches are promoted along the value chain to sustainably keep gender equality standards. Cooperatives are found to provide different services to their members, including aggregation services which facilitate marketing. The domestic market-oriented value chains like chili and tomato involve more wholesalers, 24 and 30, respectively, compared to 6 for French beans, and many more retailers. During the time of the study, retail, cross-border traders and international exports were facing COVID-19-related shocks, and the situation is expected to rebound when the pandemic subsides. There have been losses in all four value chains, however, for chili and tomato, improvements are especially needed in production and in post-harvest handling to increase incomes and reduce food losses.

Youth employment potential

From a youth employment perspective, considering that the large number of jobs that the GoR wants to realize each year are in agriculture, different nodes of the value chains were analysed for their potentiality. As already presented, the agro-input sector provides opportunities to grow, but this will not lead to thousands of new jobs. Also, processing units require relatively fewer staff; even the two biggest processors are currently employing fewer than 100 staff to process tomatoes, chili and passion fruit, while the smaller processors are at the cottage-industry level and employing mostly family members. The study found no evidence that aggregation and wholesale will provide for thousands of new jobs, even with the increased volumes of business.

The opportunities entailing potentially large numbers of youth are found in agripreneurship and wage employment in production. Agripreneurship in production means for youth to start farming as a business, and, for those with little to invest, 1 000 m^2 of production area can be a good start. In particular, French bean is shorter in duration and requires less investment, so it is an accessible business opportunity for both educated/well-off and uneducated/more disadvantaged youth, and for both males and females. Other crops were also identified as having short duration and low investment (e.g. head cabbage, broccoli, cauliflower, cucumber, carrot, Swiss chard, beetroot, amaranth), which have good domestic and regional demand but were not further analysed in this study and also lack the attractions for international export. Support in access to land, finance, production knowledge and markets needs to be provided. While youth can mobilize some support from relatives or existing cooperatives, facilitating organizations need to identify gaps and organize additional support accordingly. Various projects and youth organizations are providing evidence that this is possible. With 20 to 40 new cooperatives organized with and for youth interested in farming while availing government land, a strong contribution can be made by horticulture to the government employment targets for agriculture, and more so if the other horticulture crops are also taken into account. Female youth can take their fair share in agripreneurship, and data show that female participation is already high in horticulture. Support organizations should nevertheless pay attention to whether or not their services are sufficiently gender-sensitive, and they should monitor how agripreneurship interface with the triple burden faced by female youth.

Cooperatives also provide employment (11.7 jobs on average, of which 76 percent are seasonal), which is a good sign of providing added value and services to their members. However, it was not clear how these

services and related jobs could be increased among a large number of cooperatives to such an extent that they would contribute substantially to the national level employment targets.

Medium-size farms, large commercial farms and exporters, who often also produce themselves, provide substantial employment opportunities for male youth in cultivation and logistics, and in harvesting, sorting and packaging for female youth. Unfortunately, more than 90 percent of the employment is seasonal and mainly for uneducated youth, and wages are low. Nevertheless, around a quarter of jobs currently available in this node are held by youth, and such additional cash income will be helpful to invest into their own production and to bridge the gap between harvests. Additionally, most exporters also buy from smallholders, and some provide inputs in advance as well as extension services. While this seems to work reasonably well at the moment in Rwanda, in other countries such as Kenya, exporters are reducing the supply from smallholders, as this has increased the risk of rejections by the EU and other European countries. In chilli export in particular, Rwanda is facing rejections from the EU, which warrants increased quality control. Also, certification requirements, which are costly and difficult for smallholders to fulfil, could put smallholder supply to exporters at risk in the future. The COVID-19 pandemic has also impacted exports and supplying smallholders, but there are signs of recovery.

The other employment opportunity identified was in retail: with RWF 10 000–30 000 investment per crop, youth can start retailing a few different crops. Pre-COVID-19, the volumes on the domestic markets were increasing, and space in the vegetable markets could be a limiting factor. In 2020 and thus far in 2021, COVID-19-related restrictions and economic downturn have reduced retail sales, thus such interventions require assessment of the situation in terms of specific opportunities for youth.

Recommendations

The study provides short-term (one to two years), medium-term (one to five years) and long-term (one- to ten years) recommendations. Short-term recommendations, directly focusing on creating youth jobs, include developing the intended National Employment Strategy in Agri-food Systems and improving the perception of youth towards agriculture, including informing youth about what support is already available. Mainstreaming youth employment is a key short-term opportunity; substantial funding is already going into the horticulture sector, so these investments should prioritize youth employment whenever possible. Large numbers of youth can initiate horticulture farming if the support is well- organized. Employability of youth by commercial farms and exporters can be increased, although it should be noted that wages are low and actors should discuss adequate living wages. Off-farm entrepreneurship can be promoted, especially in input supply and other services; this will not lead to large employment numbers but will support growth of the value chains. Internships for youth can be a good start to gain skills, experience and, equally important, inspiration that horticulture is an attractive, dynamic sector in which to work. In these recommendations, one should be sensitive to not increase the triple burden facing female youth and to take additional measures to reduce related challenges while empowering young women to productively engage in the value chain.

Medium-term and long-term strategies recommended by the study focus on growing the horticulture sector and thereby indirectly creating more opportunities for youth employment. These recommendations include strengthening the agricultural extension, including climate-smart agricultural technologies and integrated pest management; strengthening horticulture exports; and developing a service providers market for private extension, irrigation technologies, quality inputs, mechanization, etc. While the study identified most opportunities for employment at the production level in the short-term, employment in the medium and long term is likely to increase in the off-farm opportunities within the horticulture sector. The study also recommends developing more structural solutions for access to finance and access to land for youth. Such recommendations could be harnessed into a new, updated horticulture development policy, for which a draft from 2014 already exists.

The long-term strategies focus on the enabling conditions, including road access, stable and more affordable electricity, increased action-oriented horticulture research, and strengthening horticulture and agribusiness skills within the existing education, among others.

Chapter 1: Background and rationale of the study

1.1 Introduction

Rwanda is a landlocked country in Eastern Africa with a total population of 12 million. It is one of the fastest growing economies in Africa with a GDP growth of 9.3 percent in 2019. However, 39 percent of its population is still living in poverty and 69 percent is still primarily engaged in agriculture (NISR, 2015). There is a strong need for inclusive economic transformation, focusing on creating productive jobs for more than 200 000 young Rwandans entering the labour force every year (MINECOFIN, 2017).

The Food and Agriculture Organization of the United Nations (FAO) has been active in supporting the efforts of the Government of Rwanda (GoR) towards engaging youth in the agriculture sector through the project "Integrated Country Approach (ICA) for boosting decent jobs for youth in the agri-food system", funded by the Swedish International Development Cooperation Agency (Sida). Based on the findings of the ICA scoping mission conducted in Rwanda in June 2019, FAO and the ICA project in Rwanda agreed with the government on the following entry points: (1) support the development of a National Strategy for Youth Employment in agri-food systems; (2) promote a youth-centred value chain (VC) approach, aimed at engaging different groups of youth more successfully in priority VCs; and (3) provide technical support to ongoing efforts to boost youth access to agricultural finance in Rwanda.

The ICA programme aims to promote an integrated approach for decent youth employment which looks at the different nodes of agri-food VCs, as well as the employment opportunities and business models available for different youth groups. The horticulture sector is a priority sector for the government and offers a range of employment and income-earning opportunities for youth at all stages of the VC and associated services, not just at the production stage but especially also at post-harvest and agro-processing levels. This was recognized during the earlier FAO scoping mission for the design of the ICA country project, and it was agreed that specific VC analyses were required for a number of selected horticulture crops.

Against this background, FAO commissioned SNV Rwanda in April 2020 to conduct a "youth-centred value chain analysis of selected horticulture value chains in Rwanda". The analysis aims to identify employment opportunities and to propose strategies to enhance youth employment in the horticulture sector.

The report includes the following sections:

Chapter 1: Background and rationale of the study
Chapter 2: Methodology applied for this value chain analysis
Chapter 3: Overview of key policies, organizations and projects relevant to youth employment and horticulture development in Rwanda

Chapter 4: Presentation of findings of the value chain analysis of French beans, chilli, tomato and passion fruit, with special attention to youth employment opportunities

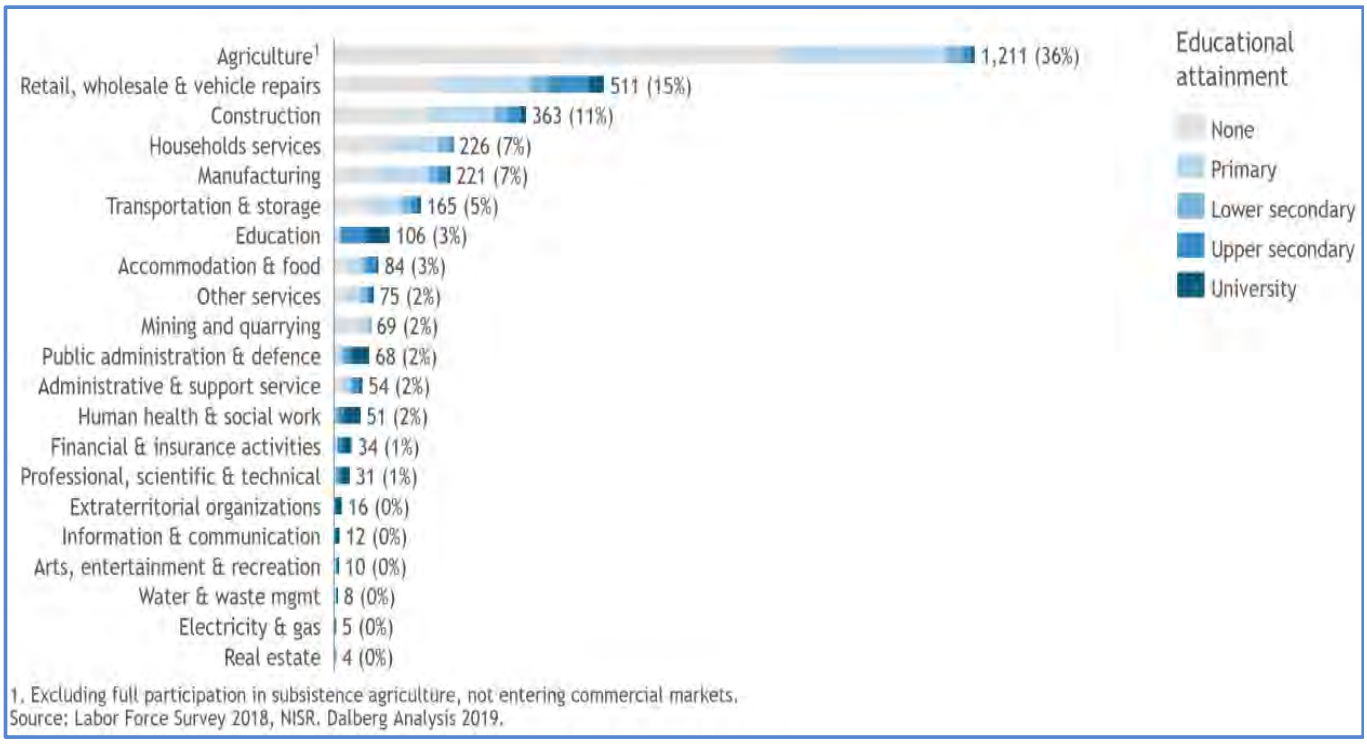
Chapter 5: Youth employment strategy development, the conclusions and recommendations.

1.2 Relevance of the study

Agriculture sector

Agriculture remains the backbone of the Rwandan economy, contributing to 24.1 percent to the GDP (MINECOFIN, 2017), albeit with a declining agricultural growth rate from 6.1 percent to 5.0 percent in 2018 and 2019, respectively. As shown in Figure 1, the agriculture sector remains the largest employer in Rwanda, giving employment to 36 percent of the population, excluding subsistence agriculture, and especially to the rural population where education levels are lower and employment opportunities are limited. Table 1 displays additional background statistics on the overall economic status situation in Rwanda, with over 60 percent of the population dependent on agriculture.

Figure 1: Employment by subsector and level of education
(In thousands)



Source: Dalberg Analysis, 2019. In: RDB, 2019.

Given the importance of the agriculture sector, the GoR has developed an ambitious national policy in the form of the Strategic Plan for Agriculture Transformation IV (PSTA4), which includes horticulture as one of the most prominent sectors to promote food security, reduce malnutrition and increase the national export volume.

Table 1: Key statistics for the Rwandan economy

	2018 Value	2019 Value
GDP (Current USD millions)	9 509	10 123
GDP growth	8.6%	9.4%
Population (millions)	12.30	12.37
Population growth rate	2.6%	n/a
GDP/Capita (Current USD)	783	802
Agriculture Sector Growth Rate	6.1%	5.0%
Contribution of agriculture sector to GDP	24.6%	24.1%
Population employed in agriculture	63.2%	62.4%
Inflation (CPI-based)	-0.31%	3.4%
Commercial lending rates	17.0%	16.5%
Commercial deposit rates	6.0%	5.4%
Exports (USD millions)	698	784
Imports (USD millions)	2 850	3 168
Exchange Rate (USD/RWF)	836–871	871–912

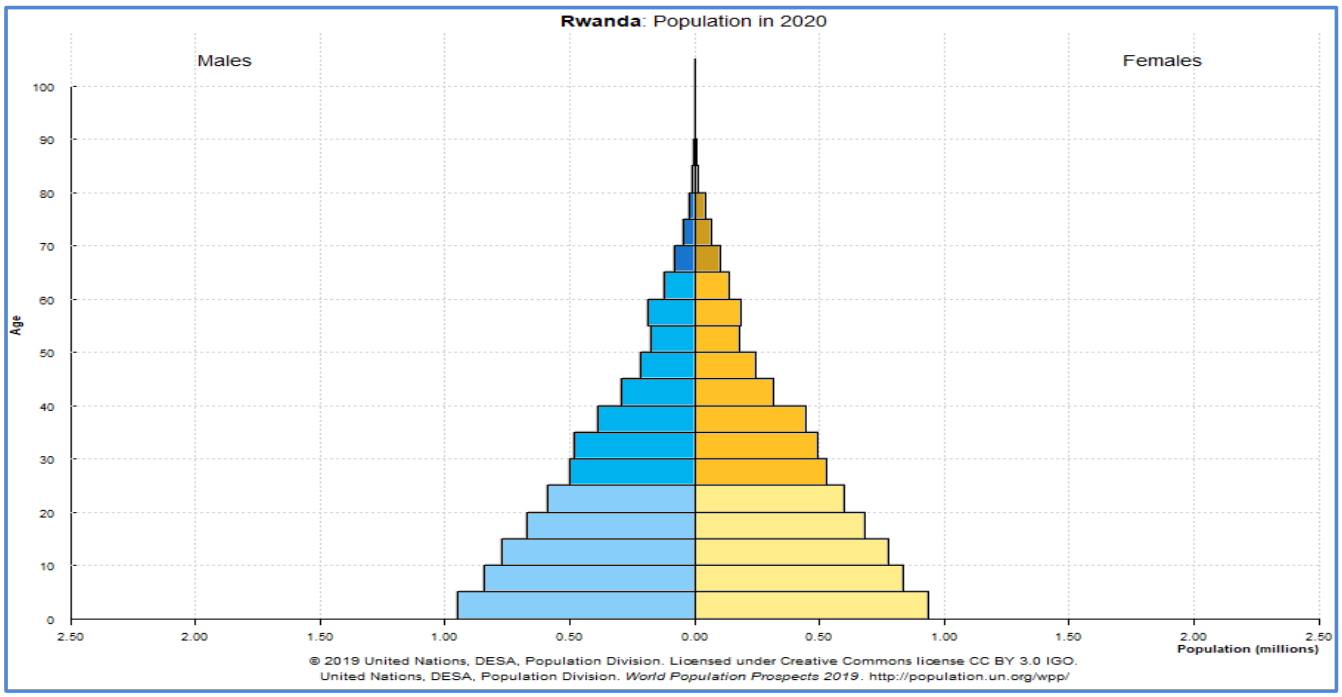
Source: World Bank data. In: LTS, 2020

Also, due to the growing requirement to earn forex, exports have been strongly promoted. The volume of Rwanda's agricultural exports has sharply increased in recent years, moving from USD 225 million in 2013/14 to USD 516 million in 2017/18, accounting for an annual growth rate of 22 percent and aiming to reach a total of USD 1 billion in export revenues by 2024. In order to achieve the planned objective, the horticulture sector needs to increase its production and offer international buyers reliable quantity and quality.

Youth

Rwanda has one of the world's youngest populations with a medium age of 20 years old (UN DESA, 2019). In fact, around 67 percent of the total population is younger than 30 years old and the youth, defined in Rwanda as those aged from 16 to 30, make up 26.6 percent of the total population (NIRS, 2018b). Figure 2 presents the overall situation, using a population age distribution pyramid, where one graphically sees the prominence of the cohort younger than 30 years old and the proportional smaller population groups above the age of 30.

Figure 2: 2020 Rwanda's population pyramide



Source: UN DESA. 2019. Population Division. World Population 2019. http://population.un.org/wpp/. [Cited 15 December 2020]

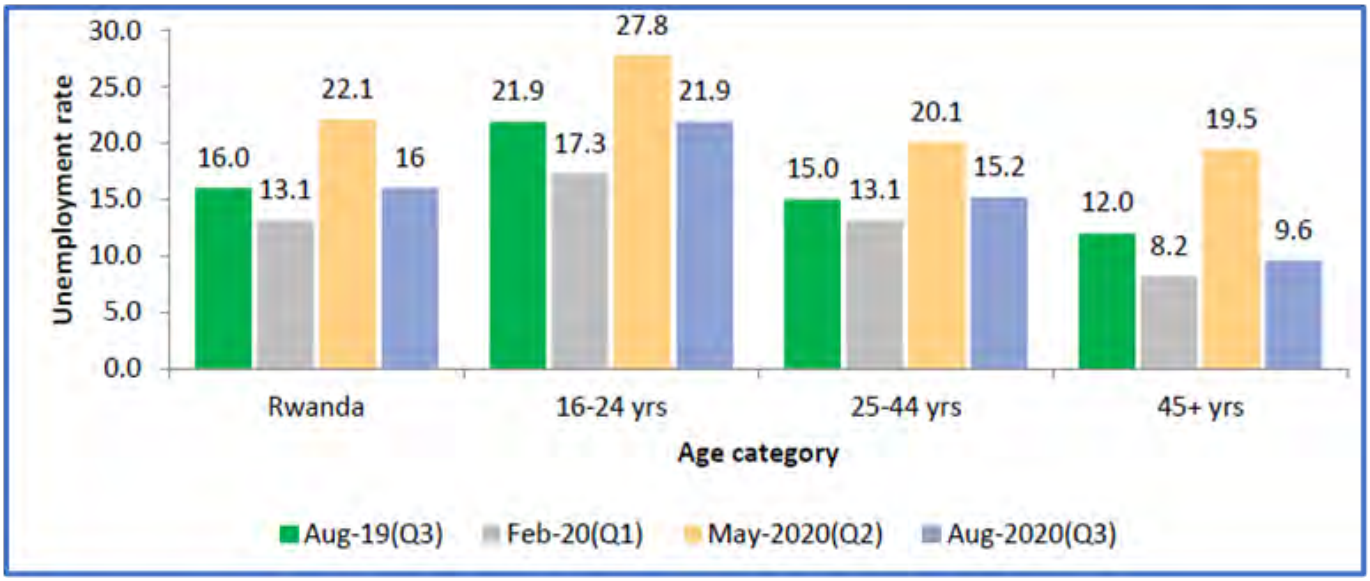
Table 2 shows that independent farming is still the biggest work status for youth, especially at younger ages, and more so for women, but reduces with increasing age. This highlights the feminization of agriculture in Rwanda. This also shows that these youth have access to land to be able to start farming. Interestingly, the farm wage labour is lower at younger ages for both men and women. Wage non-farm work increases with age for men but decreases for women, likely due to marriage and care responsibilities.

Work status	16–20		21–25		26–30		Total		
	Male	Female	Male	Female	Male	Female	Male	Female	Total
Wage farm	9.8	12.7	15.5	17.3	16.9	20.5	14.8	17.7	16.3
Wage non-farm	30.9	22.4	40.0	18.6	41.5	16.7	38.5	18.6	28.1
Independent farm	52.9	59.3	33.9	54.2	28.3	49.4	35.8	53.2	45
Independent non-farm	5.3	3.6	9.7	7.5	13.2	11.6	10.2	8.4	9.3
Unpaid non-farm	1.4	2.0	0.9	2.4	0.1	1.7	0.7	2.0	1.4
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Source: NISR, 2018b.

Figure 3 shows that youth unemployment fluctuates around 20 percent, except during May 2020, which was in the middle of the COVID-19 pandemic lockdown that started on 21 March 2020 and lasted for six weeks, and in specific districts until the end of June 2020. Note how quickly the unemployment decreased in August 2020, two to three months after the lockdown.

Figure 3: Unemployment rates by selected age groups



Source: NISR, August 2020

The following Figure 4 provides an overview of the employment indicators in absolute numbers. What stands out is that subsistence agriculture is still a livelihood for more than 1.5 million people in the working age population; about 1.2 million people find their employment or income in market-oriented agriculture; close to half (45.1 percent) of the job-seeking people are also relying on subsistence agriculture; and 56.3 percent of the total working age population fall under "labour underutilisation".

Figure 4: Employment indicators of Rwanda

<table>
<tr><td colspan="7">Working age population 16 years old and over
7,502,710persons</td></tr>
<tr><td colspan="3">Outside the labour force (Not employed nor unemployed)
3,137,889 persons</td><td colspan="4">Labour force (The sum of employed and unemployed)
4,364,821

persons
Labour force participation rate
58.2%</td></tr>
<tr><td rowspan="2">Subsistence agriculture</td><td rowspan="2">Exclusively students</td><td rowspan="2">Other outside LF (Elderly, disable, discouraged job seekers…)</td><td colspan="3">Employed
(All who worked for pay or profit)

3,667,611persons
Employment to population ratio: 48.9%</td><td colspan="2">Unemployed
(All not employed but seeking and available to work for pay or profit)
697,210persons
Unemployment rate:16.0%</td></tr>
<tr><td>Agriculture excluding subsistence foodstuff production</td><td>Industry</td><td>Services</td><td>Unemployed but engaged in subsistence agriculture</td><td>Other unemployed</td></tr>
<tr><td>50.4%</td><td>16.0%</td><td>33.6%</td><td>32.5%</td><td>26.1%</td><td>41.4 %</td><td>45.1%</td><td>54.9%</td></tr>
<tr><td colspan="2">Potential labour force
1,700,104</td><td colspan="2">Others
1,437,785</td><td>Time related underemployed
1,016,825</td><td colspan="2">Other employed
2,650,786</td><td></td></tr>
<tr><td colspan="7">Labour underutilization (3,414,140persons):
Unemployed (697,211) + Time-related underemployed (1,016,825) + Potential labour force (1,700,104)
Composite measure of labour underutilization (56.3%)</td></tr>
</table>

Source: NISR, August 2020.

Table 3 shows the prevalence of the youth that are neither in employment nor in education or training (NEET), which is higher for female youth in rural areas and for the less educated.

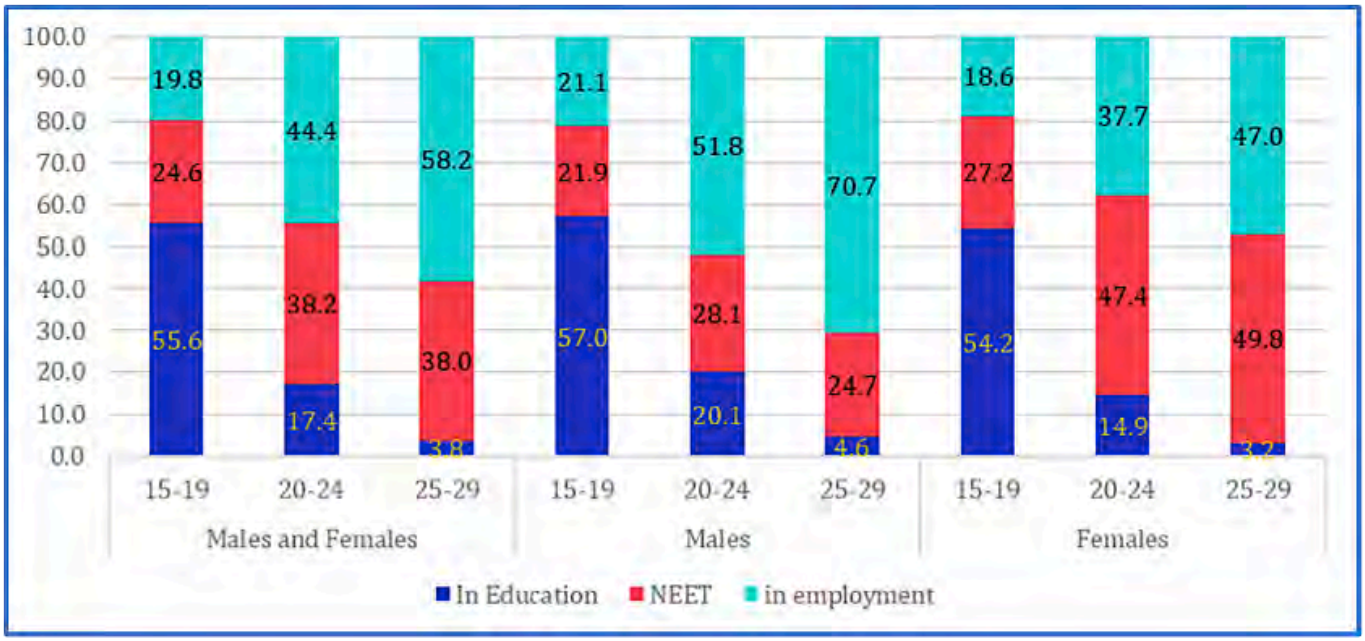
Table 3: Youth not in employment, education or training

Young not in employment nor in education (16-30 yrs)	Rwanda			Urban		Rural	
	Total	Male	Female	Male	Female	Male	Female
	1,100,349	387,264	713,085	63,908	113,329	323,356	599,756
16-19 yrs	260,983	117,932	143,051	8,961	11,587	108,971	131,464
20-24 yrs	406,380	140,327	266,053	23,377	48,887	116,950	217,166
25-30 yrs	432,986	129,005	303,981	31,570	52,855	97,435	251,125
None	401,116	148,346	252,770	10,440	17,531	137,906	235,240
Primary	416,796	149,738	267,058	8,507	29,162	141,232	237,897
Lower secondary	91,907	19,883	72,023	9,287	16,878	10,597	55,145
Upper secondary	162,730	56,925	105,805	25,223	37,836	31,702	67,969
University	27,800	12,371	15,428	10,451	11,923	1,921	3,506

Source: NISR, 2020

An important distinction between the rates by age of male youth and female youth not in employment, education or training (NEET) is also evident in Figure 5. Whereas for male youth, NEET rates are lower for youth in their late twenties than in their early twenties, the opposite is true for female youth. This reflects a pattern often seen throughout the world, particularly in low- and middle-income countries; whereas for male youth, being NEET is a relatively transitory state, it easily becomes permanent for female youth (ILO, 2020).

Figure 5: Youth status in Rwanda by age and sex, 2018



Source: Calculated from ILO SWT Micro-databse. In: ILO, 2020

Box 1: Required shift in mindset of youth

"We require a rapid shift in the mindset of our young people towards agriculture as a career choice. With the knowledge and technology available, there has never been a better time for young Africans to get involved in agriculture and agribusiness, and create wealth and well-being, for society as a whole."

H.E. Paul Kagame, speaking at the Africa Green Revolution Forum, Kigali, 2018

1.3 Rationale and objective of the study

With one million youth being NEET (NISR, 2020a), 200 000 new youth entering the labour market each year, and the government's target of creating 214 000 jobs annually (MINECOFIN, 2017), which includes 45 000 jobs per year within the agri-food system (28 000 jobs in agricultural production and 17 000 in the agriculture-linked value chains: agro-processing, agro-inputs, trade in agri-products, and hotels and restaurants using agri-products [MINAGRI, 2018]), Rwanda is facing considerable challenges. Moreover, female youth are facing more challenges than their male peers: they are overrepresented among the NEET, and the gap between female and male youth unemployment is increasing as their age increases.

This context provides a good rationale for the analysis of selected horticulture value chains; horticulture appears to be a subsector with potential for export, food security and nutrition advantages and youth employment. It therefore warrants a detailed study to identify the opportunities and challenges in this subsector, as well as to develop strategies to galvanize economic participation among the youth. The overall objective of this assignment is to analyse the horticulture value chain and to identify employment opportunities for youth across different levels of the VC.

Specific objectives include:

- mapping of the VCs with a focus on the four selected horticulture crops: French beans, chilli, tomato and passion fruit;
- identifying opportunities for youth (self-) employment with a gender lens (specifically analysing accessibility, attractiveness and safety for female youth), and mapping market-based employability skills demand in relation to these opportunities;
- identifying constraints for youth employment across different nodes of the VC, both self-employment/entrepreneurship and wage employment;
- assessing potentials and comparative advantages of youth through different nodes of the VC, including input dealers, production, aggregation, processing, distribution and the VC support services; and
- identifying promising VC business and employment opportunities for male and female youth in each node of the VC, in the form of a validated upgrading strategy and action plan.

The next chapter will explain the applied methodologies to realize the objectives earlier mentioned.

Chapter 2: Methodology

This chapter describes the approach and methods used in collecting and analysing data from different sources, including primary and secondary data. More specifically, the chapter describes the selection approach not only for the study areas but also for different categories of respondents' key informant interviews (KIIs) and focus group discussions (FGDs) conducted among the different value chain actors.

2.1 Conceptual framework

The FAO Sustainable Food Value Chain (SFVC) framework[1] has been used for this research. It is a market-oriented and systems-based approach for measuring, analysing and improving the performance of food value chains (FVCs) in ways that help ensure their economic, social and environmental sustainability.

Using the SFVC framework, we conducted an intensive analysis of the core VC actors from production to the other levels of the VC; the functions of the VC (production, aggregation, processing, wholesale and retail, and exports) and the governance structure of the VC, analysing the nature of the horizontal and vertical linkages within the overall chain and the role of youth within those. Moreover, secondary actors were considered, including input suppliers and providers of support activities; and the wider enabling environment, including policy regulations, socio-cultural norms and organizations. The SFVC framework was applied towards identifying opportunities and challenges, and identifying and addressing the root causes of underperformance in the VC in order to spot the areas of greatest potential to improve its performance and to understand the areas with the greatest potential for youth inclusion.

2.2 Scope of the report

As agreed upon during multiple consultations between the research team and FAO's team, the report has been made on the basis of the following aspects as provided by the terms of reference (ToR) and further detailed in joint meetings:

Research target

The main focus of the research is on Rwandans between the ages of 16 and 30, according to the national definition of youth. The analysis, findings and implementation strategies also accounted for the different youth education levels, differentiating challenges and opportunities according to their education. Moreover, an additional lens is applied to youth in the age range of 16 to 17[2] and to children younger than 16 in order to assess the

[1] FAO maintains a Sustainable Food Value Chain Knowledge Platform: http://www.fao.org/sustainable-
[2] The youth aged 16 to 17 often find themselves in a vulnerable situation because they have already reached the minimum age for work (16 in Rwanda), but are still below 18 and should, therefore, enjoy special protection in the working world and in their school-to-work transition. For instance, until age 18,

current child labour situation in the Rwandan horticulture sector. Finally, the gender aspects have also been taken into consideration, and the analysis includes specific attention to assess the level of gender equality along the VC.

Value chain selection

In reference to the FAO scoping mission conducted in Rwanda in 2019, the proposed horticulture crops initially were carrots, onions, chillies, tomatoes, lettuce, cabbage and green beans, due to their significant potential to absorb a large number of unemployed youth in all of the VC nodes. As part of the selection and validation of the potential crops to be considered in the study, SNV in collaboration with FAO organized a stakeholder workshop in July 2020 to seek contribution from key stakeholders. During the workshop held in Kigali on 10 July 2020, the participants formed three groups to brainstorm about the crop selection for the study, and to discuss strengths and challenges of the youth employment in the Rwandan horticultural sector using a Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis. The SNV staff facilitated the meeting while respecting the prevalent COVID-19 social distancing measures.

The study team proposed guidelines to the workshop participants, including a list of potential horticulture crops and selection criteria, to facilitate the selection of the final four VCs. The criteria were as follows:

- Select the crops which currently employ a large number of youth, both male and female.
- Select the crop/VC with the highest potential to provide decent jobs to youth.
- Identify crops that hold the most positive economic dynamics (high yield, growing volumes, demand from the domestic, regional and international markets).
- Identify crops that are the most sustainable from a socio-economic and environmental perspective.

Using these guidelines, the three groups of experts, coming from the public and private sector (see Annex 1 for a list of participants), suggested two additional crops to the one shortlisted by the research team: passion fruit and macadamia nuts. However, in order to reach a consensus among the groups on the four VCs to be selected, the SNV and FAO team proposed additional voting to decide the top four crops. Onions, tomatoes, carrots, chillies, passion fruit, macadamia nuts, and green beans were shortlisted, and a final round of voting and further consultation among the experts resulted in the following four value chains: **chilli, green beans, tomatoes and passion fruit.** Finally, the definitive choice for the selection was passed through the final approval of the SNV's research team, and FAO's team confirmed the four crops proposed during the stakeholder workshop.

District selection

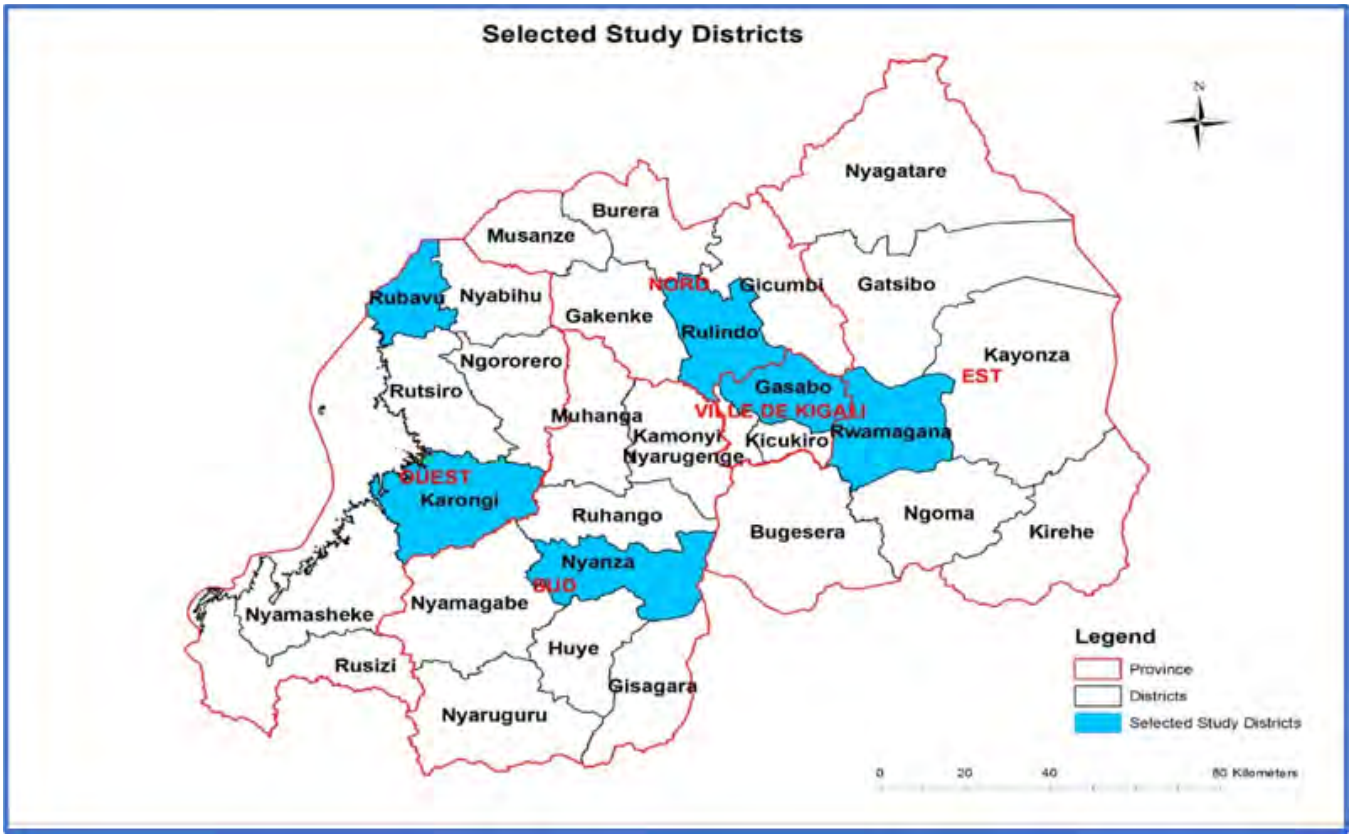
Rwanda is currently divided into five provinces (Southern, Northern, Eastern, Western and Kigali City), which contain 30 districts. In order to ensure an understanding of the existing

youth cannot engage in hazardous work; if this happens, it is considered child labour and is to be abolished.

diversity, six districts across the five provinces were selected for the in-depth study (see Figure 6). The district selection criteria were as follows:

- the districts' production capacity of horticulture products (see Table 8 with vegetable and fruit production per district in Section 4.1);
- the districts with more potential organizations (cooperatives, SMEs, clusters) engaged in horticulture production;
- the presence of horticulture processors and horticulture-related agribusinesses; and
- the availability of key actors, including youth organizations at the local/district level.

Figure 6: Selected districts for this study



Source: [base map], modified to comply with UN, 2022.

Table 4: Characteristics of selected districts

Province	Selected district	Comments
Eastern Province	Rwamagana	High production and presence of modern horticulture firms. Large cooperatives active in export and supported by youth organizations.
Southern Province	Nyanza	High production, growing all four targeted crops.
Northern Province	Rulindo	High production and presence of processing of horticulture. Large cooperatives active in export and supported by youth organizations.
Western Province	Rubavu	High production of horticulture crops and potential for export markets to DRC, HortInvest working district.

Table 4: Characteristics of selected districts

Province	Selected district	Comments
Western Province	Karongi	Purposely selected among the HortInvest project intervention districts and potential for export markets to DRC.
Kigali City	Gasabo District	High market potential for horticulture products. Biggest hub for processing, aggregation in Rwanda. Exporters and processors have their offices in Kigali.

Source: Authors' own computation based on survey data, 2020.

2.3 Detailed methodology

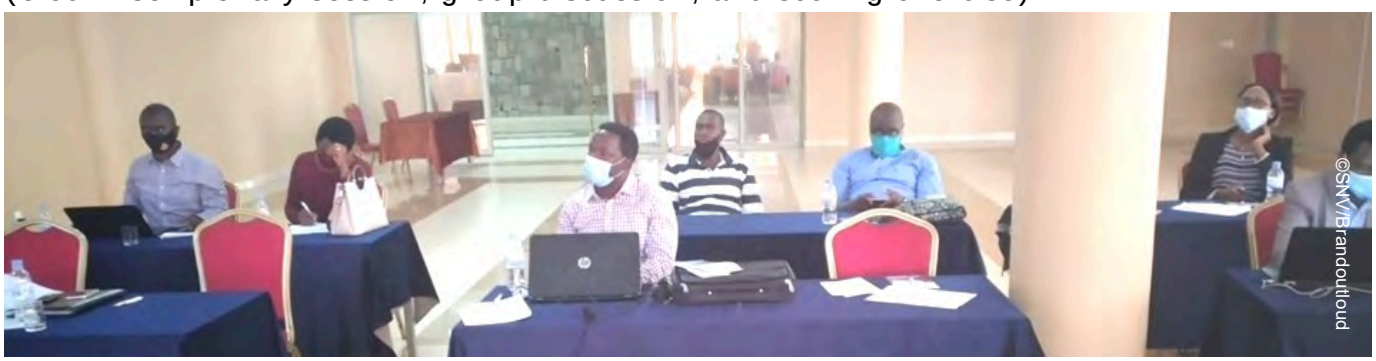
Key major phases of the methodology to deliver the expected objectives of the assignment included: (1) inception phase and stakeholder workshop; (2) collection of primary and secondary data; (3) data processing and draft report preparation; and (4) validation workshops and finalisation of the report. Accounting for the qualitative nature of the study, the research used customised KII and FGD questionnaires/checklists for each set of stakeholders, however the qualitative information was supplemented, where needed, with quantitative data from both primary and secondary sources. A team was formed to undertake the assignment, which included a team leader with VC expertise, an agronomist, a horticulture VC specialist, a data analyser, a youth employment specialist and eight enumerators.

Step 1: Inception

The research started with the draft of an inception report where the research team presented its strategies and ideas on how to deliver the youth-centred VC analysis. Afterwards, a stakeholders' consultative workshop was held on 10 July 2020 in Kigali. The event involved experts from different fields, from youth organizations to public and private sector institutions, farmers' umbrella organizations and development partners. The purposes of the workshop were to share the detailed methodology and work plan, and to get stakeholders' inputs, engagement, synergy and contribution in the implementation of the study. During the workshop, stakeholders played an important role in the selection of the four final VCs as presented earlier.

Figure 7: Inception workshop

(Clockwise: plenary session, group discussion, and scoring exercise)



Step 2: Data collection methods

Four techniques were used to collect data: a desk review, a questionnaire, FGDs and in-person semi-structured KIIs.

Desk review

During the desk review, the team reviewed existing documents, research and survey reports, plans, strategies and government policies and other stakeholders involved in the horticulture subsector with a focus on the selected crops and youth employment. These documents have been collected from relevant sources, such as the Ministry of Agriculture (MINAGRI), the National Agriculture Export Development Board (NAEB), the Ministry of Commerce, Trade and Industry (MINICOM), the Rwanda Agriculture and Animal Resources Development Board (RAB), the National Institute of Statistics of Rwanda (NISR), the Ministry of Finance and Economic Planning (MINECOFIN), the Ministry of Youth and Culture (MYCULTURE) and the Ministry of Labour; as well as secondary data already in possession of the SNV, HortInvest's team and FAO.

Field data collection

The research team from SNV developed a set of questionnaires for each node of the VC. Key informant and FGD interview question guides were designed with open questions customized to each type of respondent along the VC in order to maximize the collection of relevant information. Although guided by the question guides, the interviewers used probing question techniques to obtain all of the relevant information they could get. Probing and follow-up questions helped to clarify some statements made by the respondents, which increased the interviewer's understanding. In this regard, the FAO "workbook" data collection tools were used, which were customized to the objectives of assessing in detail the youth employment potential in the horticulture VC with inclusion of less skilled youth and gender dimension.

The interviews were mainly in *Kinyarwanda* and, when possible, in English, depending on the level of understanding of the foreign language. Moreover, the research teams hired a group of eight experienced enumerators for data collection. All of the enumerators were given a three-day training prior to the field work.

KII and FGD sampling procedures and sample size

Due to the largely qualitative nature of the study, the data collection used purposive sampling and snowball sampling techniques. The principle of data saturation was applied, by which sample size was determined to get to such a level that it could be reasonably assured that further data collection would yield similar results and that no new information would emerge. The sample was identified at various subgroups of respondents at different nodes of the horticulture VC.

The purposive sampling was particularly used to sample key respondents who were deemed able to provide relevant information on the horticulture VC and youth employment, such as government officials, youth themselves, primary actors in the VC and other key stakeholders. At the same time, it was ensured that all of the nodes of the VC were sufficiently covered.
At each node of the respective VC, two FGDs per district and per crop were organized for both primary farmers and youth FGDs, including a separate FGD exclusively for youth farmers and gender disaggregated FGDs with between 6 and 12 members participating in each meeting. The final sample is presented in Table 5.

Table 5: Number of respondents at each node of the VC per crop

Value chain node	Tomato	Chilli	French beans	Passion fruit	Male	Female	Total people interviewed
Inputs	16KIIs				13	3	16
Producers	11 FGDs ; 4 KIIs	6 FGDs ; 4 KIIs	9 FGDs ; 2 KIIs	3 FGDs; 4 KIIs	128	109	237
Processors	1 KII			3 KIIs	4		4
Aggregators	1 KII		1 KII	1 KII	3		3
Wholesalers	1 FGD	2 KIIs	1 FGD; 2 KIIs	1 KII	6	15	21
Retailers	7 FGDs; 3 KIIs	2 FGDs	6 FGDs ; 2 KIIs	3 FGDs	21	143	164
Exporters		3 KII	5 KIIs	2 KIIs	9	1	10
Youth related	11 FGDs ; 1 KII	6 FGDs ; 1 KII	8 FGDs	4 FGDs; 2 KIIs	94	109	203
Enabling environments	33				20	13	33
Total	78 FGDs and 93 KIIs				298	393	691

Source: Authors' own computation based on survey data, 2020

Through the KIIs and FGDs, the research team interviewed 20 cooperatives, 11 commercial farmers/exporters, 15 agrodealers, 3 youth organizations, 6 central government agencies, different officers at 6 district governments, 12 projects and non-governmental organizations (NGOs), and 3 financial institutions. See Annex 2 for a list of key informants and Annex 3 for a list of FGDs.

Figure 8: A focus group discussion in Nyanza district

Step 3: Data analysis and draft report preparation

After data collection, the information passed a round of data cleaning and was then analysed to derive the main trends and outcomes related to each node of the VC. As mentioned earlier, some of the data were pre-coded, especially that which related to ranking and multiple choice options. For some of the open-ended questions, post coding was done to categorize the answers and to understand the common trend among the respondents. To capture actual responses and actions by respondents, direct quotations from the participants, which are considered highly relevant or meaningful, were used in the preparation of the report.

Even though the data sample was too limited to be considered statistically representative of the entire population, some graphs and figures were produced based on interviewee answers and the quantitative information collected during the desk review.

Step 4: Validation workshop and finalisation of report

A PowerPoint Presentation was presented during the online validation workshop on 22 February 2021 with 42 participants. Since online workshops allow for less feedback that face-to-face ones, three additional smaller group interactions were organized to gather input from stakeholders. Group 1, with 12 participants, focused on the private sector (representing the demand side of the labour market); Group 2, with 10 participants, focused on youth organizations (representing the supply side); and Group 3, with 14 participants, focused on the supporting organizations and the enabling environment. The online interactions of Group 1 and 2 were held on 3 February 2021, and those of Group 3 were held on 4 February 2021. Annex 4 provides a list of the participants. The recommendations and inputs from all four interactions were taken into account when finalising the report, especially in the short-, medium- and long-term strategies presented in Chapter 5.

2.4 Collaboration and ethical considerations

SNV worked closely with the FAO project team and national stakeholders. Each step of the assessment was disclosed for verification and validation. Data collection was undertaken in close collaboration with local authorities. Regarding ethical considerations, the team requested for interview permission, ensured interviewee anonymity and, where deemed necessary, had interviewees give permission to use their names, for example for the illustrative cases. Similarly, authors have permission from the interviewees to use their photos in the document.

The COVID-19 measures set forth by the GoR were followed during the study, including maintaining social distancing during the stakeholder workshop, taking frequent temperature checks, washing hands and using face masks throughout all of the FGDs and KIIs.

2.5 Limitations and challenges of the study

Due to the qualitative nature of the study, it is not possible to make any definitive statements, and the conclusions can be considered only indicative and illustrative of the general situation at the national level. This should be taken into consideration when adopting any of the recommendations. Moreover, due to the underdeveloped Rwandan horticulture sector, some of the VC segments, for example processing, are very limited, and actors often fulfil different functions, making the disaggregation or quantification of information appear artificial. The study tried to represent different kinds of actors equally in the FGDs and KIIs, but this was not always possible, for example some districts do not have processors.

Another limitation was that for the FGDs with farmers, the team relied on cooperatives well-known for the production of one of the four crops. These cooperatives often have access to marshlands and are connected to exporters, so they are relatively well off. Therefore, this does not provide a complete view as there are many scattered and disorganized farmers growing the same crop. However, focusing on cooperatives provided the opportunity to understand more advanced production and marketing systems, with hopefully more attractive opportunities for youth.

A key limitation of the VC approach is that it focuses on a key crop, while the farming system likely involves different crops and even different animals. Especially in vegetable production, rotation is key due to the susceptibility of pests and diseases, and the rotation crops should have good market opportunities and be profitable. This aspect gets lost in a VC approach. In Rwanda, there is less attention paid on good rotation schemes.

COVID-19 measures

The GoR enacted strict COVID-19 measures beginning on 22 March 2020, which stopped all field work. At the time of team's field work, the measures were relaxed, but they still included limited travel among the provinces, curfews at 7 p.m. (later relaxed to 9 p.m.),

social distancing, handwashing and the mandatory use of face masks. Trying to distil trends and opportunities in the horticulture VCs in such turbulent and unpredictable times naturally has its limitations. Although at the time of the writing of this report, horticulture production and business had picked back up, it is still hard to forecast how the post-COVID-19 situation will be different from the pre-COVID-19 situation. This makes the formulation of recommendations and strategies more difficult. Nevertheless, with the current economic slowdown, youth are likely to experience more adverse effects, and therefore, the study in general remains of prime relevance.

In terms of field work and data collection, the study experienced several delays and adjustments due to the COVID-19 measures, including the following:

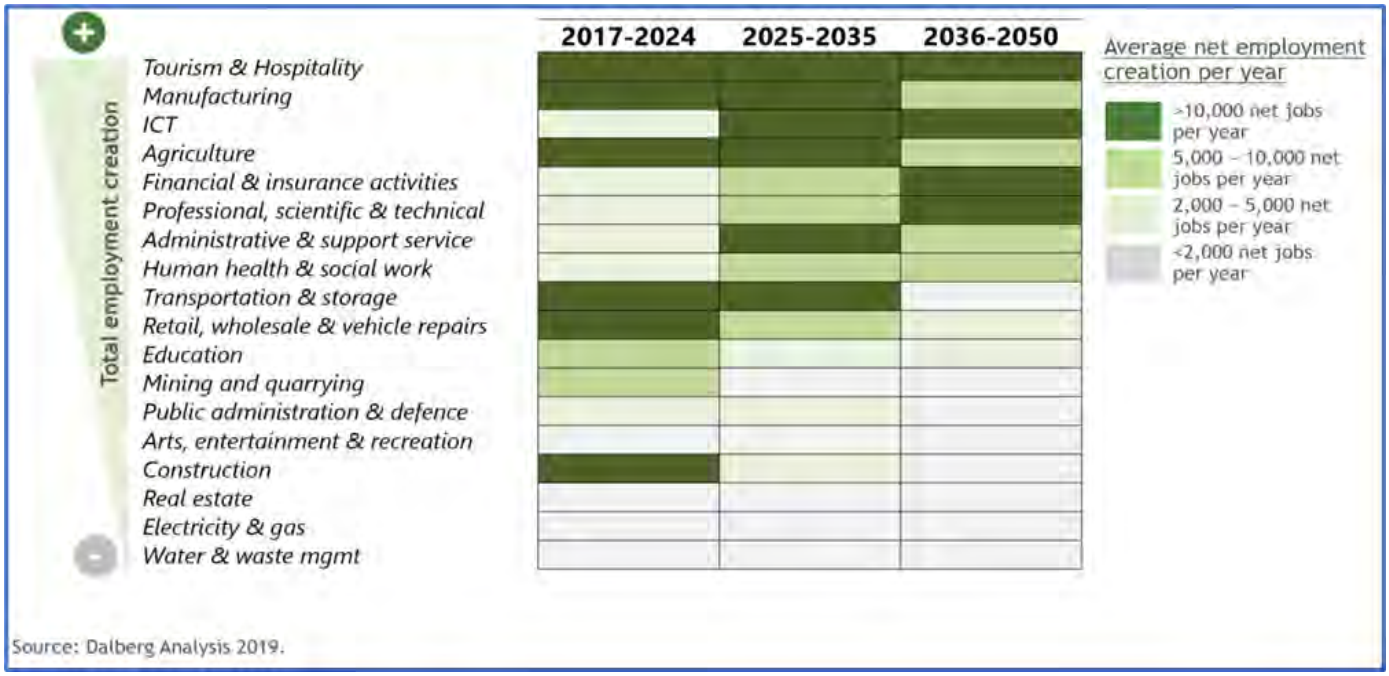
- In some districts, the research team had difficulties in meeting all the targeted respondents; some were not at their offices, and, in Rulindo, all intended respondents could not be met due to new positive cases in some villages.
- Owing to the social distancing measures, some FGDs were difficult to organize, for example at the marketplaces.
- There could be increased social bias from respondents, as people are increasingly seeking support in these tough times.
- The answers from the interviewees will likely be coloured by the COVID-19 measures and related economic slowdown. Many are less optimistic about their horticulture production and business opportunities than before the pandemic, which can mean that the results might not fully apply to a post-COVID-19 situation. The agriculture and economic sectors are going through turbulent times, and the future remains unpredictable.

Chapter 3: Policies, organizations and projects

Rwanda is at a crucial moment in its growth, as the country is currently upgrading its development strategy: from *Vision 2020* to *Vision 2050.* This 30-year plan is aiming, among others, to improve Rwanda's living standards; sustain food security; increase access to quality affordable services in education, finance and infrastructure; and include an additional 1.5 million workers in the national job market by 2024 (at a rate of 214 000 decent and productive jobs annually). Figure 9 shows, by subsector, the projection of net employment creation in Rwanda up to the year 2050: agriculture is projected to create more than 10 000 jobs each year until 2035, and between 5 000 and 10 000 jobs from 2036 to 2050. Despite creating net employment, the agriculture sector is expected to substantially reduce its share of employment, from about 37 percent in 2017 to less than 20 percent in 2050 (RDB, 2019).

Figure 9: Projected employment creation in Rwanda by sector

(Period 2017–2050)



Source: Dalberg Analysis, 2019. In: RDB. 2019

3.1 Policy framework on youth employment in Rwanda

Some of the key policies for supporting youth employment are presented as follows.

a) Vision 2050

This document[3] presents a vision for the overall development of Rwanda. It acknowledges that the agriculture sector has important implications for food and nutrition security and

[3] Available at: www.minecofin.gov.rw/fileadmin/templates/documents/NDPR/Vision_2050/Vision_2050_-31_Dec_2020.pdf

exports, and has backward and forward linkages to both industry and services sectors. The agriculture sector is credited with contributing about two-thirds to the poverty reduction that has occurred between 2000 and 2020. In terms of the agriculture sector's contribution to GDP, the document states that it is expected to decrease from 24 percent in 2019 to 16 percent in 2050. Expansion of agricultural land is hardly possible while Rwanda still has a high population growth. Vision 2050 mentions an agriculture land use increase from 10 949 km^2 (Baseline 2016/17) to 12 433 km^2 by 2050, only a 14 percent increase over 33 years. This will imply a further division of landownership through inheritance. In comparison with current farming in Rwanda, farms will be mechanized, fully irrigated and will use high-tech inputs in greater volumes. As a result, Rwandan farmers (men and women) will have larger plots, and smallholder farmers will be employed outside their farms.

At the same time, the GoR wants to reduce unemployment from 15.2 percent in 2019 to 5 percent in 2050, also considering a population increase to 22.1 million people by 2050, compared to 13 million in 2021. During this period, the share of the working age population is expected to grow from around 61 percent in 2021 to 65.7 percent in 2050 (MINECOFIN, 2020).

b) National Strategy for Transformation (NST1) 2017–2024

NST1[4] aims to create 214 000 decent and productive jobs annually, but without having a specific target for what should be realized within the agriculture sector and what should be realized specifically for (male and female) youth. In order to achieve this ambitious goal, the GoR is implementing the following activities:

- supporting the youth in business development services through financial incentives and businesses tutoring;
- promoting high potential subsectors such as agro-processing, horticulture, light manufacturing, mining, construction, tourism and hospitality, knowledge-based services, and creative arts, with special attention on youth inclusion in these activities;
- supporting rural village development with infrastructure that can create jobs for youth; and
- increasing Technical and Vocational Education and Training (TVET) enrolment and quality.

c) Strategic Plan for Agriculture Transformation 4 (PSTA4) 2018–2024

Rwanda's PSTA4[5] outlines priority investments in agriculture and estimates the required resources for the agriculture sector for the period 2018–2024. It is the implementation

[4] Available at www.minecofin.gov.rw/fileadmin/National_Strategy_For_Trsansformation_-NST1.pdf
[5] Also available at www.minagri.gov.rw/fileadmin/user_upload/webstore/PSTA_4_-_Strategic_Plan_for_Agriculture_Transformation___Planning_for_Wealth__2018-2024____Approved_by_Cabinet.pdf

plan of the National Agricultural Policy (NAP) and represents the agriculture sector's strategic document under Rwanda's NST1.
The PSTA4 is designed around four strategic impact areas that are in accordance with the Comprehensive Africa Agriculture Development Programme (CAADP) framework:

- increased wealth contribution;
- increased economic opportunity;
- improved food security; and
- increased resilience.

Impact will be measured by eight specific indicators, including the number of jobs related to agriculture compared to the baseline (gender-disaggregated), and the average income per smallholder farming household (gender-disaggregated). Also, cross-cutting areas of importance under PSTA4 include nutrition, gender, youth and resilience (climate and environment). Other decent work aspects are not explicitly addressed.

In terms of employment creation, the strategy states the following (MINAGRI, 2018):

> Decelerated job creation in agriculture is part of the ongoing structural transformation from subsistence farming toward off-farm sectors and increased mechanization in agriculture. With higher productivity in agriculture, relatively less labour will be required in agricultural production. Increased yields will have different effects on employment in various crop varieties. For example, with the projected productivity effects, export crop production will employ 20 percent more labourers, rice and wheat, 30–40 percent more labourers, and livestock, 30 percent more labourers. On the other hand, tubers and banana production will employ 20 percent fewer labourers. However, in general, productivity growth cause decelerated creation of on-farm jobs.
>
> On the other hand, increased agricultural production generates jobs along the agricultural VCs and in the wider economy; increased agricultural production leads to more jobs in food processing, food trade, and food preparation. It will also (all else equal) put downward pressure on the price of food, which in turn will have a positive effect on job creation in the non-farm economy.
>
> Consequently, in the PSTA4 scenario, with significant productivity growth in agriculture, it is projected that 45 000 jobs will be created within the agri-food system, a number that represents 21 percent of the jobs projected in NST1; 214 000 jobs per year. Furthermore, in the agri-food system, 28 000 jobs will be created in agricultural production, while the remaining 17 000 jobs will be created in the agriculture-linked VCs: agro-processing, agro-inputs, trade in agri-products, and hotels and restaurants using agri-products).

The targets are depicted in Table 6. There is no specification or elaboration on youth employment.

Table 6: Annual job creation resulting from PSTA4

Sector	000 Jobs per year
Agri-food system	45
Agriculture	28.3
Agro-processing	5.1
Agro-inputs	0.8
Trade in agr. Products	10.3
Hotel & restaurants using agro-prod.	0.4

Source: MINAGRI, 2018.

d) Customized Agriculture Extension System in Rwanda (CAES) 2021–2024

CAES was designed primarily to address problems with and gaps in the public extension system. The programme promotes institutional pluralism with active participation of the private sector, education and training institutions. CAES is built around five distinct components:

- development of customized extension packages across the value chain;
- capacity-building of extension service providers;
- extension and advisory service delivery to beneficiaries;
- coordination and monitoring of extension and reporting; and
- sustainable financing of agricultural extension.

CEAS was guided by the NAP of 2018 and the PSTA4, and has as its overall objective to bridge the gap of agricultural knowledge among Rwandans, with a special focus on the new generation workforce. Training and vocational education on smart agriculture practices and sustainable cropping are some of the activities that are planned to fulfil the aforementioned gap, and to foster a more efficient and inclusive way to do agriculture.

e) Private Sector Development and Youth Employment Strategy (PSDYES) 2018–2024

The PSDYES[6] is formulated by the PSDYE Sector Working Group Secretariat in 2017. This secretariat is a key coordinating forum where government stakeholders in private sector development and employment sectors coordinate with development partners. This working group is key for the successful implementation of different government and partner initiatives by leveraging development partner support and expertise, which is crucial for overall success.

[6] Available at www.minecofin.gov.rw/fileadmin/templates/documents/NDPR/Sector_Strategic_Plans/PSD_YE.pdf.

The PSDYES 2018–2024 has the overall goal of increasing the competitiveness of the Rwandan economy, with a focus on key VCs. It indicates that productive employment creation potential should be among the criteria for VC selection: the VC must be labour-intensive and demonstrate a clear potential to create a significant number of productive jobs throughout the various stages of the VC, especially low-skilled jobs and jobs for women and youth. Based on the selected criteria, the PSDYES prioritises, among others, the horticulture VC, together with agro-processing, namely for meat and dairy, milling products, sugar, soybeans and Irish potato.

f) National Youth Policy 2015

This policy,[7] under the Ministry of Youth and the Information and Communications Technology (ICT), is a revised version of the 2006 National Youth Policy. It updates the definition of youth from 14–35 years to 16–30 years. The main vision of this new policy is to achieve a Health, Aptitude/Attitude, Patriotism, Productivity and Innovation (HAPPI) generation. Through this policy, the GoR puts much focus on youth economic empowerment by addressing issues related to unemployment and underemployment, limited skills, low rate of access to finance and markets, mismatch of current education curriculum vis-à-vis skills required for both the local and the global labour market, and more. The policy emphasizes the need to promote a gender-inclusive and rights-based approach to all development of youth programmes. It seeks to promote decent work, gender equity and equality among Rwandan youth, both males and females.

Most agriculture-specific policy areas fall under the policy's Outcome 1, namely to: (1) develop sustainable savings mechanisms through youth group savings and investment groups; (2) ease youth financial inclusion by youth-friendly financial products, and facilitate start-ups or the operation of new businesses; (3) leverage opportunities provided in the agricultural, non-farming enterprises and technology sectors; and (4) promote youth in agribusiness/Farming is Cool campaign.

g) The National Skills Development and Employment Promotion Strategy (NSDEPS) 2019–2024

This policy[8] was approved by the GoR in 2019, with the main purpose of addressing the issue of unemployment, especially for youth, women and people with disabilities (PWDs). The NSDEPS (Rwanda Development Board, 2019) is a follow-up of the National Employment Program (NEP) that, in its five-year mandate, helped 23 000 youth and women through the provision of vocational trainings in different sectors, supported 60 000 micro-enterprises with business advisory services, and assisted 10 000 micro, small and medium-sized enterprises (MSMEs) to access finance mainly though guaranteed collateral support and the start-up toolkit loan facility.

[7] Available at www.nyc.gov.rw/fileadmin/templates/template_new/documents/National_Youth_Policy.pdf.
[8] Available at https://rdb.rw/wp-content/uploads/2019/07/NSDEPS.pdf

Using the achievements of the NEP as a starting point, the NSDEPS was built on three main pillars: (1) skills development; (2) employment promotion; and (3) matching the supply and demand of job opportunities (see Figure 10).

Figure 10: NSDEPS's three pillars

Source: RDB, 2019.

As the figure shows, the three pillars contain the following programmes:

Pillar 1: Skills development. It focuses on building market-relevant skills through both formal TVETs and targeted business-focused trainings. Under this pillar, the strategy incorporates the following three programmes:

1.1. **National Training and Education Excellence Programme**: Institutions are incentivized to deliver quality education, and excellence awards for TVETs and higher education are granted to the most effective programmes.

1.2. **Market-Led Education Initiative**: Private sector relevance and labour market practical skills must gain prominence in formal education.

1.3**. Capacity Development Programme**: (a) A select number of foreign and national investors are offered training support tailored to their needs, and alongside their investment, and (b) public servants receive on-demand training financed by the fund.

Pillar 2: Employment promotion. The main objective is the support of business growth and entrepreneurship to accelerate job creation. To achieve this objective, the GoR is facilitating access to both domestic and international markets, and supporting start-up firms with high growth potential that lack know-how. In this pillar, the following four programmes are included:

2.1. **Access to Markets Programme**: Businesses are supported to access domestic and international markets.

2.2. **Access to Adequate Capital Programme**: Firms can access appropriate finance, in line with their business potential, to grow and create employment.

2.3. **High-Quality Business Advisory Services Programme**: Assistance to private sector firms, increases productivity and unlocks their growth potential.

2.4. **Labour Market Analysis Programme**: Government institutions are informed by a specialist research unit about the impacts of existing and proposed policies regarding employment.

Pillar 3: Matching. The planning and matching between skill supply and demand will be prioritized through a data-driven approach, through a promotion of active linkages and through matching incentives per the private sector. The third pillar proposes four programmes:

3.1. **Evidence-Based Workforce Planning and Analysis:** Labour market insights and policy-making are driven through a comprehensive, aggregated understanding of the skills being produced and the demand in the market, leveraging a public sector database.

3.2. **Strengthening Employment Services and Career Guidance:** Career services are improved, and private and social matching providers are subsidised based on their performance.

3.3**. Graduate Labour Market Transition Programme:** An internship programme will be reinforced, helping youth to gain relevant skills and experience while firms and institutions can test their talent.

h) Gender and Youth Mainstreaming in Agriculture Strategy (GYMAS) 2019–2026)

GYMAS is built on the streamline of the previous gender- and youth-specific strategy of 2010. The strategy's main objective is to support the implementation of the PSTA4 (PSTA4, 2018) and the NAP (NAP, 2018), ensuring that women and men and youth benefit equally from policies, programmes and activities. The strategy will enable MINAGRI and its agencies to better mainstream gender and youth into programming, and to deliver on the mandate and commitments established in the PSTA4.

i) Entrepreneurship Development Policy (EDP)

The EDP is aligned with the national policies and strategies across all line ministries that promote private sector development and economic growth through social transformation (Vision 2050, NST1, PSDYE, and the "Made in Rwanda" Policy). Specifically, it supports NST1 priorities of empowering youth and female entrepreneurship. The main objectives supported by the EDP are: improving access to finance for entrepreneurs, developing skills, supporting innovation and technology firms, improving industry networks and business support services, developing competitive VCs and services sectors**,** increasing productivity

in agriculture, reducing the cost of doing business, facilitating trade, and increasing entrepreneurial motivation and risk taking.

Box 2: Reflection on youth employment policies

The International Labour Organization's Youth Country Brief (ILO, 2020) provides a good overview of relevant policies. One of its conclusions is that the country's youth employment strategy is almost entirely focused on skills and entrepreneurship development. The identification of the need to integrate education and training into youth employment promotion has served to focus attention on the former. Little emphasis has been placed on promoting macroeconomic and/or sectoral strategies to create wage employment opportunities for youth. Most of the provisions for youth employment are concerned with increasing the quantity and quality of education and training to match the (perceived) needs of the labour market.

Some policies that are relevant to horticulture development, and not directly focused on youth employment are presented here.

j) National Agriculture Policy (NAP)

Approved in 2018, this policy provides for the coherent mainstreaming of youth into the agriculture sector and strategy frameworks. The policy stipulates that there is a general perception among young people that farming is unprofitable and unattractive, and not desirable for those with higher levels of education. The policy, however, provides factors that are useful in attracting qualified youth to transform the Rwandan agri-food sector into one that is driven by genuine entrepreneurship.

The agriculture policy focuses on addressing constraints to accessing start-up capital, as well as targeting students in agri-sciences and increasing their levels of engagement in the sector at an early stage, through participation in extension and advisory activities, public private partnerships, and initiatives in the agri-food sector.

k) Cooperative Policy

Approved in 2019, the Cooperative Policy is intended to further the development of cooperatives and the cooperative movement by providing the necessary coherent and clear policy and legislative environment for cooperatives to grow and prosper. Special considerations have been made for youth entrepreneurship, women's empowerment, PWDs, and other special categories to make the cooperative movement more inclusive, and to enable people under these categories to participate effectively at all levels of the cooperative structure, including in decision-making bodies.

l) National Agriculture Export Development Board (NAEB) Strategic Plan 2019–2024

This strategic Plan[9] is owned by the NAEB and presents three strategic objectives:

- Support an increase in productivity and quality of prioritised agri-export VCs. This strategic objective will result in reduced post-harvest losses, a continuous supply of Rwanda agri-exports to the market, and increased demand for Rwandan products, and hence gain trust from buyers of respective products.
- Support increased value addition and market penetration of Rwanda agri-exports. This strategic objective will receive closer attention than usual and will lead to an increased contribution of agri-exports to the country's balance of payments and good visibility of prioritized Rwanda agri-export brands on international markets. The cost of engaging in international trade will also decrease as a result of intelligence studies, adopting the use of efficient and effective export logistics, market linkages and the adoption of online trading platforms.
- Enhance sector coordination and the enabling environment for sustainable growth of agri-exports. This strategic objective will lead to effective personnel and institutional coordination mechanisms in production, value addition and marketing services to grow the prioritized agri-exports.

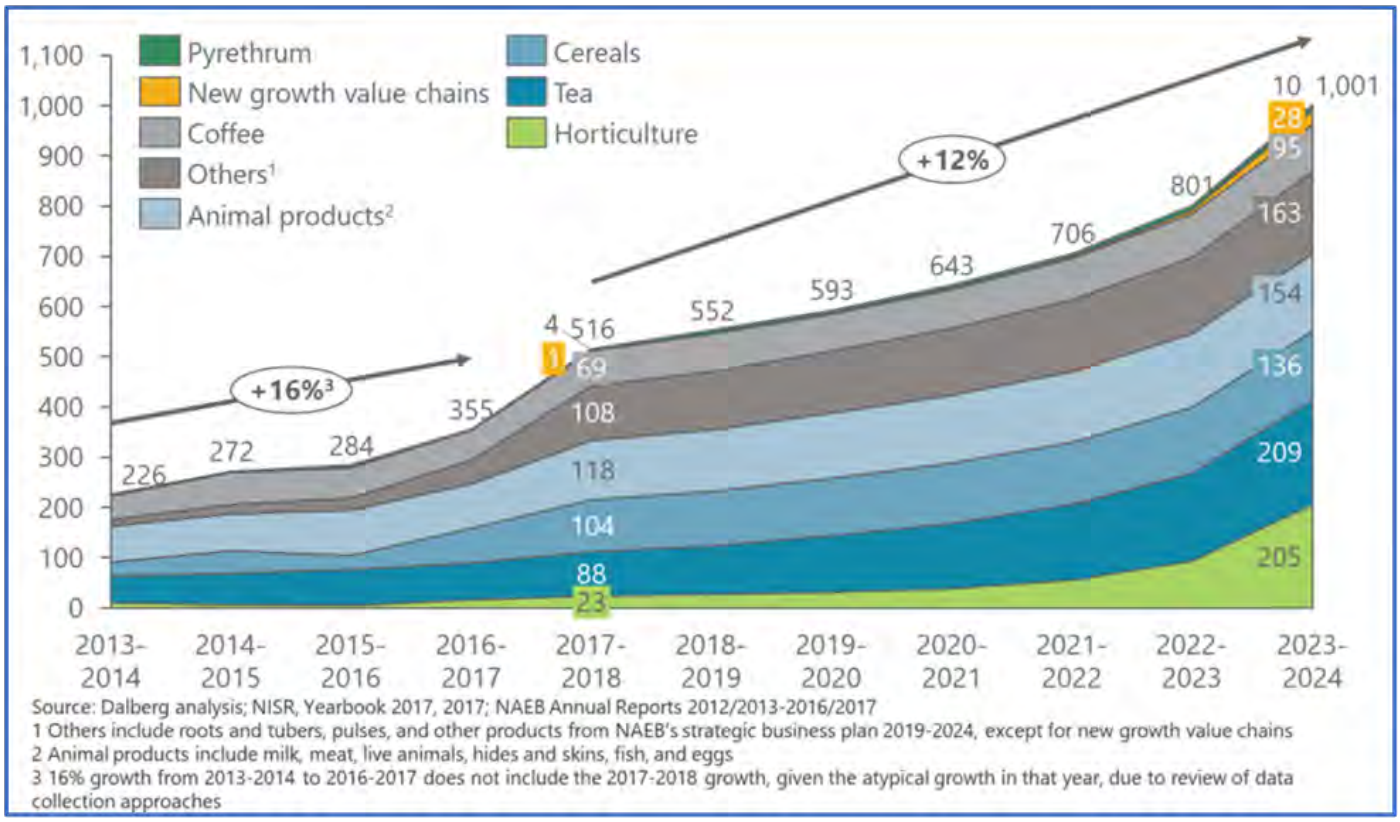
NAEB has also prioritised crops for export (NAEB, 2019):

- Exponential growth in horticulture high-value fresh products (French beans, snow peas, passion fruits, chillies, and cut flowers) mainly towards the European market, followed by the Middle East and the rest of Africa;
- Continued growth in tea as Rwanda increases its global market share and diversifies into specialty tea, therefore capturing higher value;
- Steady growth in coffee export value by increasing sales of specialty coffee; and
- Increased growth in pyrethrum export volumes and value by increasing productivity and diversifying into value addition.

Figure 11 shows how horticulture is among the late comers in the agricultural export commodities, but also that the GoR has prioritized its potential to grow exponentially. The GoR targeted up to USD 205 million or 92 500 tonnes of horticulture export by the fiscal year 2023/24. As a result, horticulture export promotion can expect its fair share of scarce government resources. Support activities for horticulture export will include support to market linkage, branding, attracting global operators, business incubation, improved productivity and quality management, and improved logistics and infrastructure (NAEB, 2019). Due to challenges of the COVID-19 pandemic and several rejections by the EU, the target of USD 205 million was later reduced to USD 130 million, which is still a substantial growth.

[9] Available at https://naeb.gov.rw/fileadmin/documents/191126%20NAEB%20Strategy%202019-2024_FINAL.pdf

Figure 11: Rwanda agriculture export value, past trends and projections
(In million USD)



Source: NAEB, 2019.

3.2 Youth promotion initiatives

The National Youth Policy reiterates Rwanda's commitment to undertake systematic youth programming through a multisectoral strategy involving partnerships between the GoR, development partners, the private sector, civil society organizations, and communities to join the efforts in terms of the creation of decent/productive jobs, entrepreneurship and innovation. The initiatives identified are presented as follows order:

a) AgriWin Ltd

Founded in 2018 as the Agriculture with Innovation Company Ltd, AgriWin is comprised of Rwandan youth agronomists and veterinarians trained in agriculture through a practical training programme at Kinneret College in Israel. Currently, AgriWin is perhaps the only private extension provider/youth enterprise which solely relies on fee-for-service for its advisory services, while other youth organizations are increasingly focused on the implementation of funded projects.

b) Harambee Youth Employment Accelerator

Harambee Youth Employment Accelerator is an independent, not-for-profit social enterprise to create jobs. It works with individual businesses, government agencies, local and international donors, industry sector associations, youth-serving organizations, assessment specialists, behaviour change experts, and technology providers.

c) Horticulture in Reality Cooperative (HoReCo)

This organization was established by 60 young agripreneurs from various domains[10] after an internship on smart agriculture in Israel. The organization is committed to developing the Rwandan agriculture by combining sustainable crop production with irrigation technologies. It currently has 102 staff, including 97 graduates comprising of irrigation engineers and agronomists. It was recruited by RAB to implement the Operation, Maintenance and Management of Irrigation Schemes (OMMIS) project to organize and maintain 76 irrigation schemes developed by the GoR, covering a total of 10 037 ha in 18 districts. In these schemes, around 54 000 farmers, 30 percent of which are youth, are organized into 66 farmer cooperatives.

Under OMMIS, HoReCo undertakes three key interventions:

- initiating and strengthening farmer cooperatives;
- extending Good Agricultural Practices (GAP) for various crops, making use of farmer field schools, which includes around 30 percent of export-focused horticulture and related VC development; and
- developing and maintaining irrigation schemes. For these trainings, the agronomists are living on location and are paid by RAB.

Irrigation makes use of large, mobile sprinkler systems that can irrigate about one hectare in 30 minutes. For commercial farmers, these "Irrigation Traveller Kits" cost between RWF 400 000 and 500 000 per hectare, depending on the total land, topography, slope, etc., of each.

HoReCo also implements the Seed Potato Production Project and provides commercial irrigation and agronomy services to 11 commercial farmers.

Box 3: Demand for irrigation kits
The potential for irrigation kits is enormous. With climate change, farmers can rely less on rainfall. Only the paying capacity of smallholders is weak.
Emmanuel Ishimwe, Chairperson, HoReCo

d) Rwanda Youth in Agribusiness Forum (RYAF)

RYAF was launched in 2016 to challenge and change the mindset among the youth, and to influence transformation of the agricultural business landscape. The mission of RYAF is to establish an effective, sustainable nationwide youth in agribusiness forum that promotes, informs, advocates and mobilizes Rwandan youth to engage in agribusiness, leveraging support and facilitation from stakeholders, resulting in a stable food market, decent jobs, and sustainable and inclusive development. The platform aims to change the old mindset among the youth *vis-à-vis* the agriculture sector in Rwanda, while orienting youth to reach

[10] Horticulture, agronomy, agribusiness, agriculture mechanization, soil and water management, irrigation and drainage, nutrition and food science.

out to other farming groups to raise awareness on the practice of business-oriented agriculture. Through farming cooperatives, youth are contributing to modernizing agriculture in different provinces and districts of Rwanda. It also showcases successful youth entrepreneurs.[11]

RYAF has a membership of 4 100 members all over the country, and employs 155 staff (35 percent of which are women, 95 percent of which are youth) for several projects[12] it is implementing.

e) Young Professionals for Agricultural Development (YPARD) Rwanda

YPARD Rwanda started in 2006 as a country chapter of the international YPARD network. This global online and offline communication and discussion platform aims to enable and empower young agricultural leaders around the world to shape sustainable food systems through thematic, political and strategical meetings and debates. The network organization promotes youth leadership in agriculture and in food systems. The Rwanda chapter also provides horticulture trainings to youth farmers.

f) Youth Connekt national programme

Youth Connekt was launched in 2012 by the GoR, in partnership with the United Nations Development Programme (UNDP), as a platform to connect youth with their peers, leaders, role models, and resources to promote employability, access to finance, civic engagement, political participation and entrepreneurship opportunities.

Since its inception, out of 8 309 jobs created by this program, 1 886 (22.6 percent) have been in the agriculture sector.

g) Youth Ecobrigade programme

This programme was initiated to create green jobs for youth while also addressing environmental issues in the areas of radical terraces, progressive terraces, riverbank protections, gully protections and tree-planting. It is implemented by the National Youth Council and focuses especially on youth cooperatives.

h) Youth Engagement in Agriculture Network (YEAN)

YEAN was created to facilitate the spread of agriculture-related information in the community, especially among youth, with the purpose of transforming traditional subsistence agriculture into semi-commercial farming and agribusiness. The organization calls itself an “agriculture extension social enterprise” and was born from the need of communities for information regarding knowledge and techniques required to develop

[11] For example, a 28-year-old woman producing French beans for export (http://ryaf.rw/?p=3599), or a 23-year-old women producing chilli for export (http://ryaf.rw/?p=3585).
[12] These employed staff are involved as secretariat staff, E-Soko Agents (interns), and in the Rwanda Dairy Development Project (RDDP), the Sustainable Agricultural Intensification and Food Security Project (SAIP), the Rural Youth Employment Opportunities (R-YES) Project, and the RYAF shop.

careers in the agriculture sector. The YEAN works as an open space, where young agripreneurs and aspiring ones can connect and share information with the aim of inspiring youth to lead the change in agriculture, and to develop skills to improve the living conditions in rural areas. The YEAN reports to have 12 000 active members on their social media platforms. The YEAN developed a digital system of extension information on its web-based platform, with 265 extension notes and articles available to network members. Extension staff and members also pose questions in the YEAN's WhatsApp groups, which have 913 participating farmers who receive advice and answers to their questions.

i) Knowledge Lab (K-Lab)

This is an open technology hub in Kigali where students, recent graduates, entrepreneurs and innovators gather to transform their ideas into real business models. The growing K-Lab community maintains experienced mentors who provide both technical and business assistance to members. It has among its interest areas the development of apps. For example, AgriGO of Go Ltd[13] is an app developed with K-Lab support to assist farmers with improving their productivity through a personalised advisory service on best farming practices. With the AgriGO app, farmers can create an account and get information on a large range of topics that directly concern their daily business. Moreover, AgriGO provides a management platform for agricultural cooperatives where they can share relevant information among their members.

3.3 Support organizations

An enabling environment includes policies, programmes and support organizations that play a role in the horticulture VCs, and possibly also in youth inclusion in those chains. These service providers are divided into the following categories: government agencies, youth organizations, NGO/development projects, sector organizations, financial service providers and others.

3.3.1 Government agencies

The GoR, through MINAGRI and the Rwanda Cooperative Agency (RCA), plays a supportive role in promoting the production of fruits and vegetables. Government policies and activities of these entities have helped shape the horticulture sector. A summarised description of the key agencies is provided as follows.

a) Ministry of Agriculture and Animal Resources (MINAGRI)

MINAGRI[14] has the mission of promoting the sustainable development of a modern, efficient and competitive agriculture and livestock sector, in order to ensure food security, agriculture export and diversification of the productions for the benefit of the farmer and the economy of the country. The vision of the Ministry, as defined by the National

[13] See also https://agrigo.rw/
[14] See https://www.minagri.gov.rw/ for more information.

Agricultural Policy (2018), is for Rwanda to become "a nation that enjoys food security, nutritional health and sustainable agricultural growth from a productive, green and market-led agriculture sector".

MINAGRI's key policy actions are organized under four policy pillars:

- enabling environment and responsive institutions;
- technological upgrading and skills development;
- productivity and sustainability; and
- inclusive markets and off-farm opportunities.

These policy actions are implemented through the PSTA4.

b) Rwanda Inspection and Competitiveness Agency (RICA)

In order to carry out the inspection and to promote the use of quality seeds and agrochemicals, the GoR, through an official gadget, approved the establishment of RICA[15] in July 2020. It has been assigned the following key responsibilities:

- to carry out inspection of quality and standards conformity for the agrochemicals and seeds;
- to establish quality management systems in accordance with regional or international standards;
- to ensure that imported or exported products falling within the mission of RICA comply with prescribed quality standards and other laws;
- to consider, inspect, register and issue licenses related to imports, exports and goods in connection with food products, plant pharmaceutical products and agrochemicals, plants, semen, fertilised eggs, seeds, seedlings, cuttings, animal food, other processed agricultural, animal and forest and other products;
- to receive, consider and respond to an application for the formation of trade association; and
- to advise the government on matters related to standardisation, competition and consumer protection.

c) National Agriculture Export Development Board (NAEB)

Part of MINAGRI, NAEB facilitates the growth and diversification of agriculture and livestock exports, and in line, provides different services towards the growth of the export businesses. Its responsibilities include, among others:[16]

- advising on the development of and implementing policies and strategies for developing exports of agricultural and livestock products that meet international market requirements;

[15] http://extwprlegs1.fao.org/docs/pdf/Rwa187904.pdf.
[16] See https://naeb.gov.rw/index.php?id=27 for more information. See also NAEB's Strategic Plan 2019–2024 under Section 3.1.

- working with stakeholders' networks and coordinating their activities in relation to the processing and exporting of agricultural and livestock products;
- providing timely and cost-effective support services required for enhanced international competitiveness of the private sector in agricultural and livestock exports;
- identifying and diversifying agricultural and livestock exports to sustain the growth of foreign currency revenues;
- issuing certificates of authenticity and origins of agricultural and livestock export commodities;
- enacting strategies designed to provide support and to train private operators and cooperatives involved in the export of agricultural and livestock products; and
- facilitating negotiations for setting and publishing minimum farm-gate prices for agricultural and livestock export commodities in collaboration with stakeholders.

Various divisions of NAEB provide technical support to farmers, and help connect traders and exporters with international demand. NAEB conducts its own research but typically does not publish or share these data externally. NAEB also supports the horticulture export with the Rwandafresh branding.

Figure 12: Rwandafresh brand

Source: https://naeb.gov.rw/index.php?id=102&L=

d) Rwanda Agriculture and Animal Resources Development Board (RAB)

This MINAGRI division is responsible for coordinating research and variety approval for the vegetable sector. More broadly, RAB is responsible for agricultural industry coordination, including the fertilizer subsidy programme (see Section 4.2.3).

RAB's Extension Services Department is responsible for providing training and extension services to farmers in Rwanda. This office manages a system of extension agents and Twigire Muhinzi (TM). In every district, a large number of farmers has been trained as Farmer Promoters or as Farmer (Field School) Facilitators. Farmer Promoters are involved in promoting the use of improved inputs and the provision of basic extension messages on the correct input usage, while Farmer Facilitators facilitate more intensive learning through Farmer Field School groups. The main role of the districts is to ensure that the agricultural extension activities are in line with the overall development plans of the district. Several projects hire these TM farmers for their village-level agricultural activities. After several years of unclarity on the position of TM, it now comes back strongly in the new CAES (CAES, see Section 3.1).Agricultural research is also under RAB.

e) Rwanda Cooperative Agency (RCA)

This agency oversees formal cooperatives throughout the country and provides technical support regarding cooperative management, including Savings and Credit Cooperative Organizations (SACCOs). Formal cooperatives must register with this agency to be formally recognized by the GoR.

The number of cooperatives is steadily increasing in Rwanda. For example, in 6 HortInvest operating districts,[17] 146 functioning coops were identified in 2019 that produced vegetables and fruits (among others), covering 20 779 members (including 45 percent female members and 1 percent youth members).

f) Rwanda Standards Board (RSB)

This is a government National Standards Body whose mandate is to develop and publish national standards, carry out research in the areas of standardisation, and disseminate information on standards, technical regulations related to standards and conformity assessment, metrology for the setting up of measurement standards, etc. Its inspections and certification are, for example, key in food processing, and RSB also undertakes quality controls of imports.

g) Ministry of Public Service and Labour (MIFOTRA)

Under this ministry, there is a Labour Research and Employment Promotion Unit whose main responsibility is to ensure a conducive working environment that is favourable to job creation and labour market development, to be achieved through:

- employment promotion
- increased youth employment creation
- increased female employment creation
- increased employment creation for PWDs.

This Ministry is leading the youth employment strategy, and it recognizes agriculture as a key pillar in the employment policy with the potential to employ more youth. However, youth employment in agriculture is left to other relevant agencies.

h) National Research and Innovation Fund (NRIF)

This initiative, launched by the GoR in 2020 under the National Council for Science and Technology (NCST), facilitates the national research and innovation agenda that its council established, with a strong focus on youth. The fund supports ideas that are aligned with Rwanda's priority areas of development, including agriculture, healthcare, energy, environment, ICT and manufacturing. The GoR also seeks to increase the number of researchers that the country has, as well as train Rwandans on how to develop efficient innovations that can contribute to the country's transformation. The fund also aims to help

[17] HortINVEST's working area includes the districts of Muhanga, Karongi, Rutsiro, Rubavu, Nyabihu and Ngororero.

the country attain research output of one percent of the total GDP in the next three to four years.

3.3.2 Programmes and projects

Here is an overview of programmes and projects initiated with multilateral or bilateral support or by NGOs:

a) Digital Opportunities Trust (DOT)

This project targets mostly youth, women and PWDs with the main purpose of creating job opportunities through digital education. It supports the digital transformation in Rwanda by providing trainings on digital services and connecting youth and women with possible employers. The project has already involved 62 000 people in Rwanda and has helped thousands to use their acquired skills in the agriculture sector.

b) Hinga Weze project 2017–2022

This is a USAID-funded project that aims to sustainably increase smallholder farmers' incomes, improve the nutritional status of women and children, and increase the resilience of Rwanda's agricultural and food systems to climate change. Key goals are to increase sustainable agriculture productivity and market access for 200 000 farmers, and to connect the agriculture development with improved nutrition for Rwandan communities and families. It supports youth that want to join agribusiness. Its working area includes the districts of Bugesera, Gatsibo, Karongi, Kayonza, Ngoma, Ngororero, Nyabihu, Nyamagabe, Nyamasheke and Rutsiro.

c) HortInvest 2017–2021

This is a four-year market-led project in the horticulture sector funded by the Dutch embassy in Kigali, with SNV Netherlands Development Organization as the lead implementer. Other implementing partners are Wageningen University and Research (WUR), Sustainable Trade Initiative (IDH), Agriterra, and Holland Greentech (HGT). Its overall objective is to increase the horticulture sector's relative contribution to the economy, and to improve the food and nutrition security of poor households in Rwanda. It is one of the main horticulture projects in Rwanda. Its main areas of intervention are: improving the market-led horticultural production and supply for domestic and regional markets, developing high-value horticultural exports, and creating an enabling environment for furthering commercial horticultural development. It supports about 20 businesses, including youth and smallholders, in their business operations. The project also aims to benefit 44 000 farmers in terms of increased yield and income. The project area includes the districts of Karongi, Muhanga, Ngororero, Nyabihu, Rubavu and Rutsiro.

The project also aims to strengthen horticulture cooperatives in the project area. HortInvest is working with more than 100 cooperatives and additional 130 farmer groups in districts it is being implemented. Consortium partner Agriterra supports cooperatives to create farmer-led government dialogues, provide technical assistance on farm sites, and provide training for farmers on different topics such as management, organization,

governance and business development. Since 2019, HortInvest has been supporting public-private consultation and coordination for horticulture sector development through two platforms, namely the Rwanda Horticulture Working Group and the Rwanda Potato Sector Platform. These two forums regularly meet to discuss key sector-related issues and to provide solutions and recommendations to concerned stakeholders, including the GoR and both private sector and development sector partners.

HortInvest organizes a large number of demonstration plots, which are used to pilot and demonstrate the best practices in the horticulture sector and to provide training to the farmers. Together with MINAGRI, HortInvest and other projects jointly developed four-page crop production leaflets for farmers, and a production guidelines book for agronomists covering 14 crops, including French beans, chilli and tomato, all in *Kinyarwanda*.

Figure 13: Production leaflets and guidelines book

Source: HortInvest project, Kigali, 2019.

d) Integrated Country Approach (ICA) project for boosting decent jobs for youth in the agri-food system 2019–2022

This FAO project supports countries in adopting and implementing youth-inclusive and employment-centred agri-food system development policies, strategies and programmes. Aligning with country and regional priorities, the ICA programme proposes an integrated approach structured in five main outputs:

- Inception phase, mappings and priority setting;
- Knowledge generation for evidence-based policy development;
- Awareness-raising and capacity-development for youth-inclusive and employment-centred planning.
- Policy and programme development, with a focus on agriterritorial processes of job creation.
- FAO tools and internal capacity-boosting to promote youth employment in agri-food systems in a gender-sensitive manner.

Since 2019, its operations in Rwanda have been funded by Sida.

e) One Acre Fund

This is a non-profit social enterprise, also known in Rwanda as Tubura, that supplies financing and training to help smallholder farmers grow with the objective of reducing poverty and hunger. Using a market-based approach, One Acre Fund facilitates activities and transactions at various levels of the VC, including seed sourcing and marketing support.[18] Its business model is structured around four main areas of concern:

- Asset-based loans: Farmers receive high-quality seeds and fertilizer on credit, with a flexible repayment system that allows them to pay back their loans in any amount throughout the loan term.
- Delivery: It delivers inputs to locations within walking distance of every farmer it serves.
- Training: Farmers receive training throughout the season on modern agricultural techniques.
- Market facilitation: It offers crop storage solutions and teaches farmers about market fluctuations so that farmers can time crop sales to maximize profits.

f) Strengthening Education for Agricultural Development (SEAD) 2015–2021

This project, funded by the Netherlands Universities Foundation for International Cooperation (NUFFIC), aims to contribute to achieving sustainable food security in Rwanda though improving education and training, research and community services in agricultural production, VC management, and land and water management. It brings together institutions from the Netherlands, South Africa and the Rwandan public and private sectors to provide sustainable solutions to food security. The project assists with the development of strong ties between the beneficiary institutes and the labour market through programme development and delivery, applied research and outreach services, and entrepreneurship, resulting in increased labour-market competence and orientation.

g) Rwanda–Israel Horticulture Center of Excellence (HCoE)

Rwanda-Israel Horticulture Center of Excellence (HCoE), opened in April 2019 in the Mulindi District, is a bilateral project between Rwanda and the State of Israel, jointly implemented by RAB and MASHAV-Israel's Agency for International Development. The HCoE was initiated in the context of contributing to the improvement of the horticultural production in Rwanda through the exchange of MASHAV's experience and knowledge, and by strengthening human capacity resources in Rwanda.

The project was designed in such a way that other development partners can be invited to contribute in order to create synergies and experience-sharing. The HCoE also serves as an applied research and development centre, demonstrating technologies relevant to different levels of farming, from smallholder to commercial scale. It provides technical assistance to farmers wishing to improve their production skills.

[18] Source: One Acre Fund. [Retrieved 10 October 2019]. https://oneacrefund.org/what-we-do/our-model/.

The primary purpose of the HCoE is to create a training and demonstration centre for horticulture production of new and modern Israeli horticulture technologies for efficient production methods, including different technologies (protected cultivation methods, drip and fertigation systems, modern nursery structures, fruit orchard management, etc.) and systems.

h) Rural Youth Employment Opportunities: Support to Integrated Agribusiness Hubs in Rwanda (R-YES) project

The R-YES project (June 2020–June 2024) is funded by the International Fund for Agricultural Development (IFAD) and the Federal Ministry for Economic Cooperation and Development (BMZ) and is implemented by Kilimo Trust. The goal of the R-YES project is to contribute to sustainable employment (self and decent wage) and income-generating opportunities for 1 200 youth in agriculture-related activities in Rwanda through an integrated agribusiness hub. The project has two specific objectives:

- Build integrated agribusiness capacities of rural youth by identifying strategic partnerships to develop a sustainable and innovative agribusiness hub.
- Generate empirical evidence of the developed and tested integrated agribusiness hub models to inform policy to drive scaling-up of the models to create jobs for youth.

An integrated agribusiness hub is presented as a mechanism to foster youth employment through applying combinations of innovative technologies, developing talent, building know-how, facilitating access to capital, enhancing business skills, and increasing access to finance and other services. Integrating these combinations in an agribusiness hub presents an opportunity to occupy the gaps that exist between mechanisms such as business development services, TVET services, technology parks, and other platforms for business development, by directing them towards gainful youth employment.

i) Sustainable Agricultural Intensification and Food Security Project (SAIP)

The SAIP (2019–2023) is funded under the Global Agriculture and Food Security Program (GAFSP) of the World Bank and implemented under RAB. The main objective of the SAIP is to increase agricultural productivity, market access, and food security of the targeted beneficiaries in the eight districts: Gatsibo, Karongi, Kayonza, Nyabihu, Nyanza, Rulindo, Rutsiro and Rwamagana. One of the four prioritized VCs is vegetables and fruits for domestic, regional and international markets. Specific emphasis will be placed on identifying and providing opportunities for income-generating activities for women and youth.

3.3.3 Sector organizations

Various sector organizations play a role in the horticulture sector. Some key organizations are presented as follows, in alphabetical order:

a) Association of Microfinance Institutions in Rwanda (AMIR)

AMIR is the only professional umbrella organization of microfinance institutions (MFIs) operating in Rwanda, with the core mission of supporting its members to become more professional and sustainable. It was created in 2007, and its membership has reached 342 licensed MFIs, including microfinance banks, limited companies, and savings and credit cooperatives. Its membership represents more than 90 percent of the microfinance sector in Rwanda.

b) Horticultural Exporters Association of Rwanda (HEAR)

This member-based umbrella organization was established in 2016 with 13 members and has grown to some 80 registered companies, of which 30 are active members. Its members include exporters of flowers, vegetables, fruits and nuts.

c) Private Sector Federation (PSF)

The PSF is an umbrella organization dedicated to promoting and representing the interests of the Rwandan business community, including those in agribusiness. It includes nine chambers: agriculture, industry, artists and artisans, commerce, finance, liberal professions, tourism, female entrepreneurs and youth entrepreneurs.

Moreover, the PSF plays an important role both as a promoter and a provider of trainings and exposure for the business community, with a view to uplifting the human capital in the country and to aligning training and skills development to meet the needs of enterprises.

d) Rwanda Agriculture Inputs Dealers Association (RAIDA)

RAIDA strengthens its members, advocates for appropriate regulations for importing inputs, and advocates against counterfeit inputs and unregistered businesses. It has 150 members.

e) Rwanda Horticulture Inter-Professional Organization (RHIO)

This organization promotes the horticulture sector through advocacy and networking with local, regional and international partners. Among others, the RHIO organizes horticulture expos and fairs to connect potential stakeholders with their associates.

Chapter 4: Results of the horticulture value chain analysis

In this chapter, the results of the youth-centred horticulture VC analysis are presented. The analysis focused on the four selected crops: French beans, chilli, tomato and passion fruit. Before this chapter presents the four selected crops, it provides an introduction to the Rwandan horticulture sector:

Section 4.1: Rwandan horticulture sector
Section 4.2: Youth-centred value chain analysis of French beans
Section 4.3: Youth-centred value chain analysis of chilli
Section 4.4: Youth-centred value chain analysis of tomato
Section 4.5: Youth-centred value chain analysis of passion fruit
Section 4.6: Child labour, Occupational Safety and Health (OSH), wages and COVID-19 impact

4.1 Rwandan horticulture sector

Why the horticulture sector?

In the Rwandan context, horticulture can be a lucrative sector and provide job opportunities for youth at various stages of the VC and associated services, contributing to the overall country target of creating 214 000 productive and decent jobs annually for the Rwandan population in all sectors, as stipulated by the NST1 (MINECOFIN, 2017), and to the 45 000 new jobs targeted in the agricultural sector (MINAGRI, 2018).

However, it is important to acknowledge that horticulture (especially vegetable production) has its risks and challenges, such as being prone to pests and diseases, being sensitive to extreme weather (floods, hailstorms, excessive rains), having a high rate of perishability and consequential price fluctuations. Nevertheless, there are several advantages to promoting horticulture and youth employment in horticulture, as shown in Figure 14.

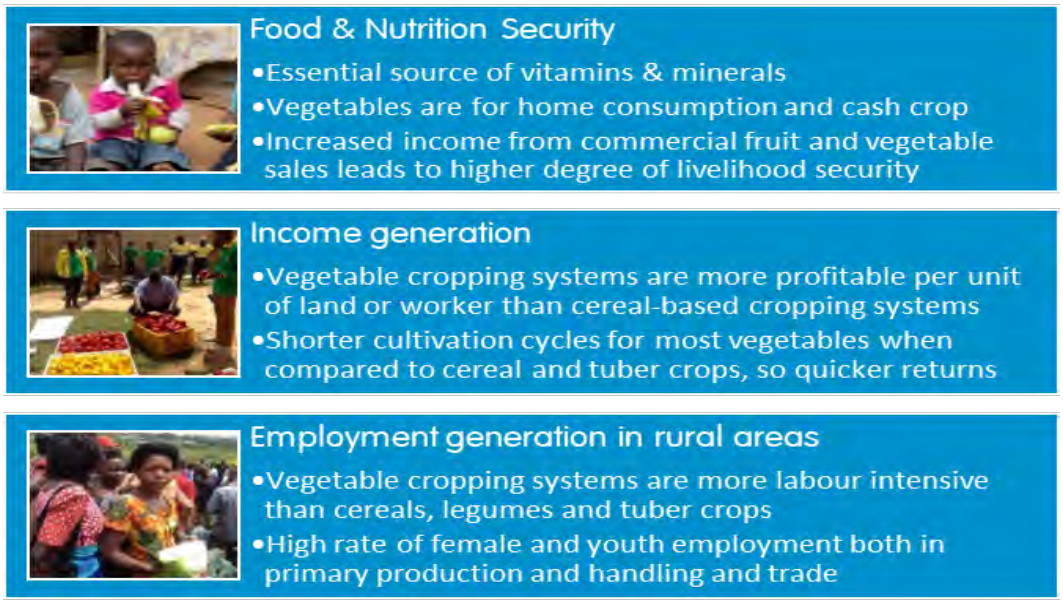


Figure 14: Advantages of the horticulture sector in Rwanda.

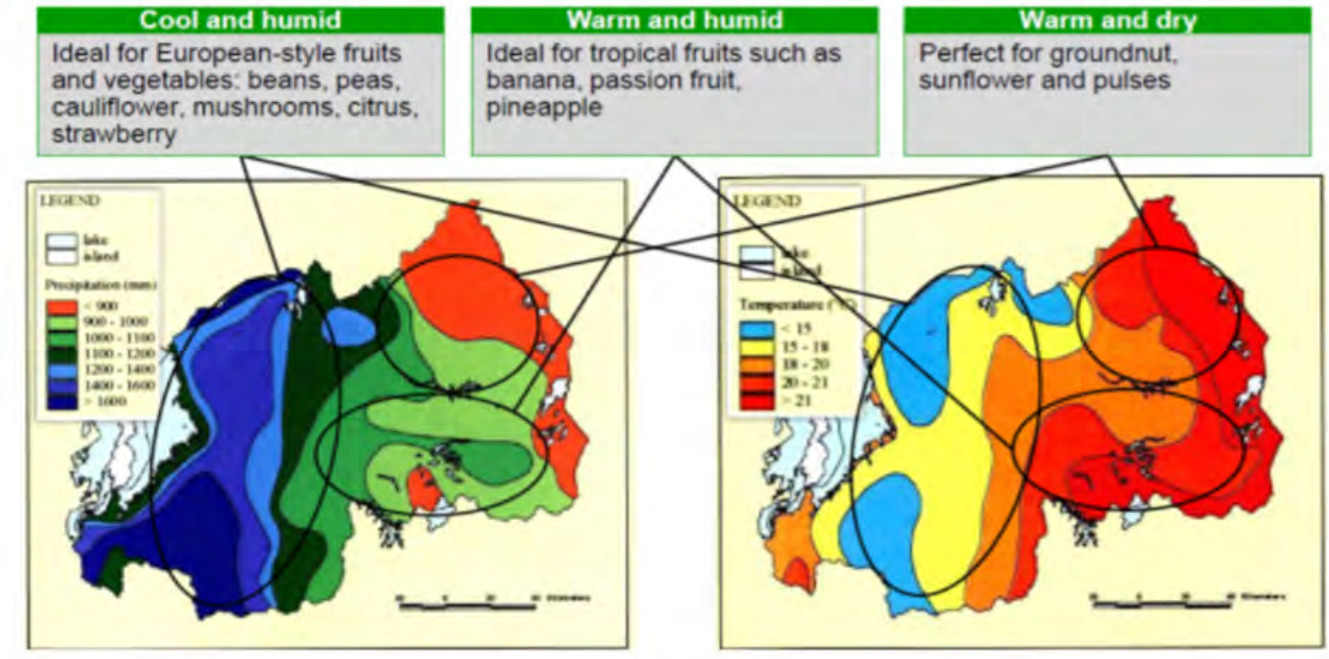
Source: HortInvest

4.1.1 Horticulture production

Agro-ecology

Rwanda contains various agro-ecological zones and, in general, offers good conditions for producing fruits and vegetables. The country has a temperate tropical climate, with an average temperature of 19 °C and an annual rainfall between 900 and 1 600 mm, depending on the location. Annual rainfall is generally heavier in the western and northwestern mountains than in the eastern savannahs. The relatively low average temperatures (18 °C and below) in the western districts are due to the relatively high altitudes. Due to the variety in climates, Rwanda has different suitable regions for the cultivation of temperate, tropical and subtropical horticultural crops (see Figure 15).

Figure 15: Climate zones and suitability for different horticulture crops

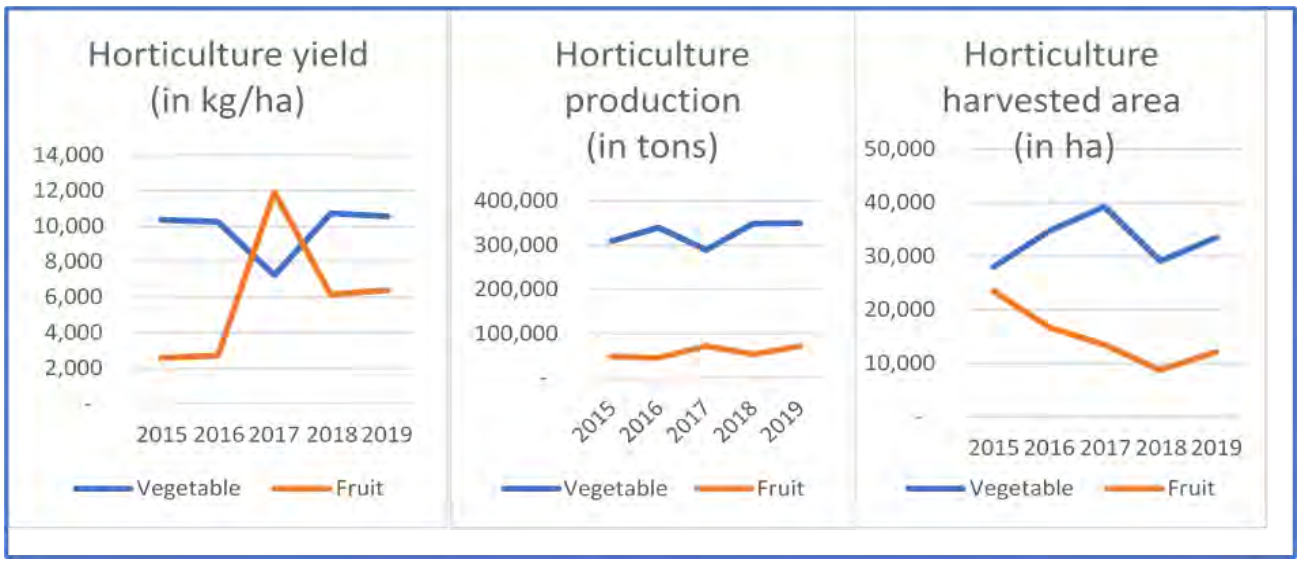


Source: Kerkhoven et al, 2013. In: Dijkxhoorn, Y., et al; 2016.

Production trends

The horticulture production trend for the period 2015–2019, disaggregated for fruits and vegetables, is summarised in Figure 16. Overall, vegetable production was more than five times that of fruit. As shown, the production, yield and harvested areas fluctuated over the five-year period, with minor growth in the overall production of both fruits and vegetables. The sector is still developing, and Rwanda is not exploiting the horticultural sector's full potential, even though the country boasts favourable conditions such as a mild climate, sufficient water, sufficient labour, and a growing demand for fruits and vegetables due to a growing middle class and urban population.

Figure 16: Horticulture production in Rwanda



Source: Authors' computation using data from FAO, 2020, FAOSTAT [online]. Rome. [Cited 15 September 2020]. www.fao.org/faostat/en

Table 7: Production of various vegetables and fruits in Rwanda

(From highest to lowest)

SN	Item	Production (tonnes)					Value of production (million USD current)				
		2014	2015	2016	2017	2018	2014	2015	2016	2017	2018
1.	Bananas	1 039 020	1 097 304	1 127 643	1 729 150	1 739 007	1 972.5	2 117.0	2 038.3	1 173.4	1 050.9
2.	Pumpkins, squash and gourds	248 285	251 330	251 948	256 145	258 154	112.2	112.3	78.6	77.3	65.5
3.	Tomatoes	117 415	118 570	118 774	97 426	93 062	64.2	66.7	58.3	49.2	50.1
4.	Cabbages and other brassicas	71 135	55 590	41 137	94 924	77 778	12.7	12.5	8.4	16.2	13.6
5.	Eggplants (aubergines)	51 154	37 867	22 743	20 000	53 277	25.9	26.1	8.7	6.8	19.3
6.	Pineapples	19 538	16 596	11 167	19 236	21 532	7.7	10.2	3.1	5.5	6.0
7.	Carrots and turnips	14 916	14 208	10 939	13 715	15 269	5.9	5.9	4.9	5.8	6.3
8.	Onions, dry	14 463	15 449	14 522	12 479	12 989	9.0	10.3	10.7	8.8	10.1
9.	French beans				7 364	7 597					
10.	Chillies and peppers, green	4 443	4 414	4 460	4 750	5 009		3.1	3.1	3.0	3.4
11.	Passion fruit				1 821	7 316					

Source: Authors' computation using data from FAO, 2020, FAOSTAT [online]. Rome. [Cited 20 November 2020]. www.fao.org/faostat/en. For passion fruit, French beans data have been used from the Seasonal Agricultural Surveys of NISR, 2017 and 2018.

Table 8 shows the production of vegetables and fruits per district. The six districts in bold are those that are included in this study.

Table 8: Production of vegetables and fruits per district

(Based on data from 2019)

District	Production (tonnes)		District	Production (tonnes)		District	Production (tonnes)	
	Veg.	Fruit		Veg.	Fruit		Veg.	Fruit
1. Bugesera	8 316	6 851	11. Kayonza	5 813	2104	21. Nyamasheke	6 527	871
2. Burera	12 436	2 793	12. Kicukiro	4 569	31	**22. Nyanza**	**18 121**	**453**
3. Gakenke	7 921	6 714	13. Kirehe	2 988	0	23. Nyarugenge	3 020	414
4. Gasabo	**9 965**	**447**	14. Muhanga	5 956	1 881	24. Nyaruguru	6 169	0
5. Gatsibo	13 772	42	15. Musanze	19 170	1 965	**25. Rubavu**	**49 081**	**294**
6. Gicumbi	13 524	1 269	16. Ngoma	7 649	12 259	26. Ruhango	9 164	5 834
7. Gisagara	10 193	105	17. Ngororero	3 578	2 395	**27. Rulindo**	**8 848**	**108**
8. Huye	6 264	178	18. Nyabihu	20 238	322	28. Rusizi	7 645	3 536
9. Kamonyi	18 274	2 536	19. Nyagatare	13 606	933	29. Rutsiro	9 921	3 085
10. Karongi	**4 575**	**193**	20. Nyamagabe	7 519	169	**30. Rwamagana**	**32 055**	**2 257**

Source: NISR, 2019b.

Arable land in Rwanda is fragmented and the plots are relatively small. This holds true for the horticulture sector, which is dominated by smallholder farmers. On average, a household cultivates a land of 60 ares (0.06 ha) (MINAGRI, 2018), often divided into three or four subplots.

MINAGRI uses the following definitions: smallholders have less than 0.5 ha, medium-sized farmers have between 0.5 and 2.0 ha, and large or commercial farmers have more than 2.0 ha.

4.1.2 Trade: import and export

Rwanda both produces and imports fresh vegetables and fruits.[19] The GoR pays serious attention to the exports of vegetables and fruits, as they are a source of much-needed forex. Tables 9 and 10 provide an overview of imported vegetables and fruits, and the exported vegetables and fruits, respectively.

[19] The RDB provides the names of 44 horticulture exporters (including exporters of mushrooms, spices and flowers): https://rdb.rw/export/export/products-directory/horticulture-sector/.

Table 9: Import of fruits and vegetables

Fruits & vegetables	Volumes (tonnes)					5-year average	%	Value (1 000 USD)					5-year average	%
	2015	2016	2017	2018	2019			2015	2016	2017	2018	2019		
Orange	2 453	3 038	4 048	4 892	3 040	3 494	29%	1 371	1 617	2 422	2 928	2 112	2 090	38%
Apple	974	980	973	381	580	778	6%	979	889	1 100	424	573	793	14%
Avocados	974	980	973	381	580	778	6%	979	889	1 100	424	573	793	14%
Onions, dry	1 201	2 029	2 382	2 103	1 953	1 934	16%	346	656	971	883	841	739	13%
Green beans	3 021	8 850	520	2 930	32	3 071	26%	462	1 375	112	622	4	515	9%
Watermelon	258	254	437	1 176	933	612	5%	123	122	234	655	535	334	6%
Tomato	1 245	1 208	298	825	467	809	7%	199	291	67	176	114	169	3%
Pineapple	85	239	264	473	50	222	2%	18	55	76	106	11	53	1%
Pumpkins, squash and gourds	28	86	115	161	32	84	1%	11	28	60	75	18	38	1%
Bananas	417	288	73	65	95	188	2%	45	34	12	12	16	24	0%
Chili and peppers, dry	2	3	4	5	9	5	0%	1	3	5	5	11	5	0%
Eggplant	34	55		1	1	18	0%	8	16		1	0	5	0%
Chillies and peppers, green	1	2	89	0	0	18	0%	0	3	7	0	0	2	0%
Carrots and turnips	8	3	1	2	1	3	0%	2	1	1	1	0	1	0%
Cabbages and other brassicas	6	0	2	0	1	2	0%	1	0	0	1	1	1	0%
Cauliflowers and broccoli	0	0	8	0		2	0%	1	0	1	0		0	0%
Mangoes, mangosteens, guavas						0	0%						0	0%
TOTAL						**12 016**	**100%**						**5 563**	**100%**

Table 10: Export of fruits and vegetables

Fruits & vegetables	Volumes (tonnes)					5-year average	%	Value (1 000 USD)					5-year average	%
	2015	2016	2017	2018	2019			2015	2016	2017	2018	2019		
Green beans	14 867	7 487	8 699	5 610	7 478	8 828	89%	2 457	1 387	2 378	3 405	5 183	2 962	82%
Avocados	11	2	71	175	456	143	1%	8	2	105	261	621	199	6%
Pineapple	3	3	18	24	18	13	0%	38	42	220	265	206	154	4%
Bananas	5	0	107	139	169	84	1%	2	0	91	139	153	77	2%
Chili and peppers, green	0	0	7	23	109	28	0%	0		10	36	206	50	1%
Carrots and turnips	213	43	759	165	1 114	459	5%	16	4	49	13	153	47	1%
Onions, dry	31	130	56	144	690	210	2%	9	22	8	27	131	39	1%
Chillies and peppers, dry	1		6	3	102	22	0%	1		25	13	139	36	1%
Eggplant	1	0	14	16	10	8	0%	1	0	16	24	17	12	0%
Cauliflowers and broccoli			0	7	4	2	0%			0	21	20	8	0%
Tomato	14	2	9	11	0	7	0%	11	1	7	2	0	4	0%
Cabbages and other brassicas	1	118	43	50	93	61	1%	0	6	2	2	10	4	0%
Apple	0			45		9	0%	0			17		3	0%
Mangoes, mangosteens, guavas			3			1	0%			3			1	0%
Orange	0					0	0%						0	0%
Pumpkins, squash and gourds					0	0	0%					0	0	0%
Watermelon						0	0%						0	0%
TOTAL						**9 876**	**1**						**3 597**	**100%**

Source (for both tables): Authors' compilation of data from FAO, 2020. [Cited 23 February 2020]. www.fao.org/faostat/en.

Cross-border trade

Table 11 shows that cross-border trade is largely with Democratic Republic of the Congo (DRC) and is growing, and some is with Uganda and Burundi. North and South Kivu have a combined population of 14.5 million, so a considerable market, for which Rwanda is closer than most other parts of DRC, which are moreover suffering political tensions and violence. In case of cross-border trade there can be seasonal fluctuations. Therefore, due to price differences, certain fruits and vegetables might be imported from a country in some months while exported to that same country in other months.

Table 11: Fruit and vegetable cross-border exports by destination

(In million EUR, 2014–2018)

Country	2014	2015	2016	2017	2018	Total	% of total	Average
Burundi	0.1	0.1	0.1	0.1	0.1	0.4	2.3%	0.1
DRC	1.9	2.6	1.4	3.7	4.2	13.9	90.2%	2.8
Uganda	0.1	0.2	0.1	0.4	0.3	1.1	7.4%	0.2
United Republic of Tanzania	0.0	0.0	0.0	0.0	0.0	0.0	0.1%	0.00
Total	2.1	2.9	1.6	4.1	4.6	15.4	100%	3.1
Growth rate		38%	-47%	165%	12%			42%

Source: Based on National Bank of Rwanda, from Ujeneza, 2019.

Table 12 shows which crops are leading in export. French beans and chilli do not feature in the list but are exported to DRC at a value of EUR 10 458 and EUR 46 047 respectively.

Table 12: Horticulture cross-border export by crop, with main market

(In EUR, average sales per year, 2014–2018)

SN	Product	Earnings	Target
1	Tomato	718 340	DRC
2	Sweet banana	496 960	DRC
3	Onion	445 620	DRC
4	White eggplant	267 642	DRC
5	Cabbage	179 819	DRC
6	Avocado	94 664	DRC
7	Carrot	91 613	Uganda
8	Green pea	79 309	DRC
9	Passion fruit	65 546	DRC
10	Cauliflower	62 974	DRC
11	Onion	48 951	Uganda

Source: Based on National Bank of Rwanda, from Ujeneza, 2019.

The areas in Rwanda that supply Goma and Bukavu are largely the districts close to the border. On the DRC side, wholesalers are virtually absent, although there have been cases where produce from Rwanda was imported into Goma and then flown to Kinshasa.

The Rwanda-Uganda border has been suffering from political tensions lately, with some border crossings closed and others open. Therefore, projects to support this cross-border trade and youth employment opportunities should continue to monitor the situation.

4.1.3 Consumption

Fruits and vegetables are key to a healthy diet. Although considerable improvements have been made, malnutrition is still a large challenge for Rwanda. The four pillars of food security are availability, access, utilisation and stability. Horticulture VCs contribute to the availability, access and stability pillars, either through supplying vegetables and fruits to consumers or through providing income and (youth) employment opportunities along the VC. Affordability is one of the key aspects in fruit and vegetable consumption.

Table 13 shows the consumption per person in Rwanda and some neighbouring countries. This is still far below the WHO recommended consumption of 240 g/day of vegetables and 160 g/day of fruit, although there are only very few countries worldwide that manage to realize this consumption. The recommended consumption of vegetables and fruits in Rwanda by nutrition programmes is promoted to be at least three servings of vegetables per day and at least two servings of fruits per day, a serving equalling 80 grams.

Table 13: Vegetable and fruit consumption

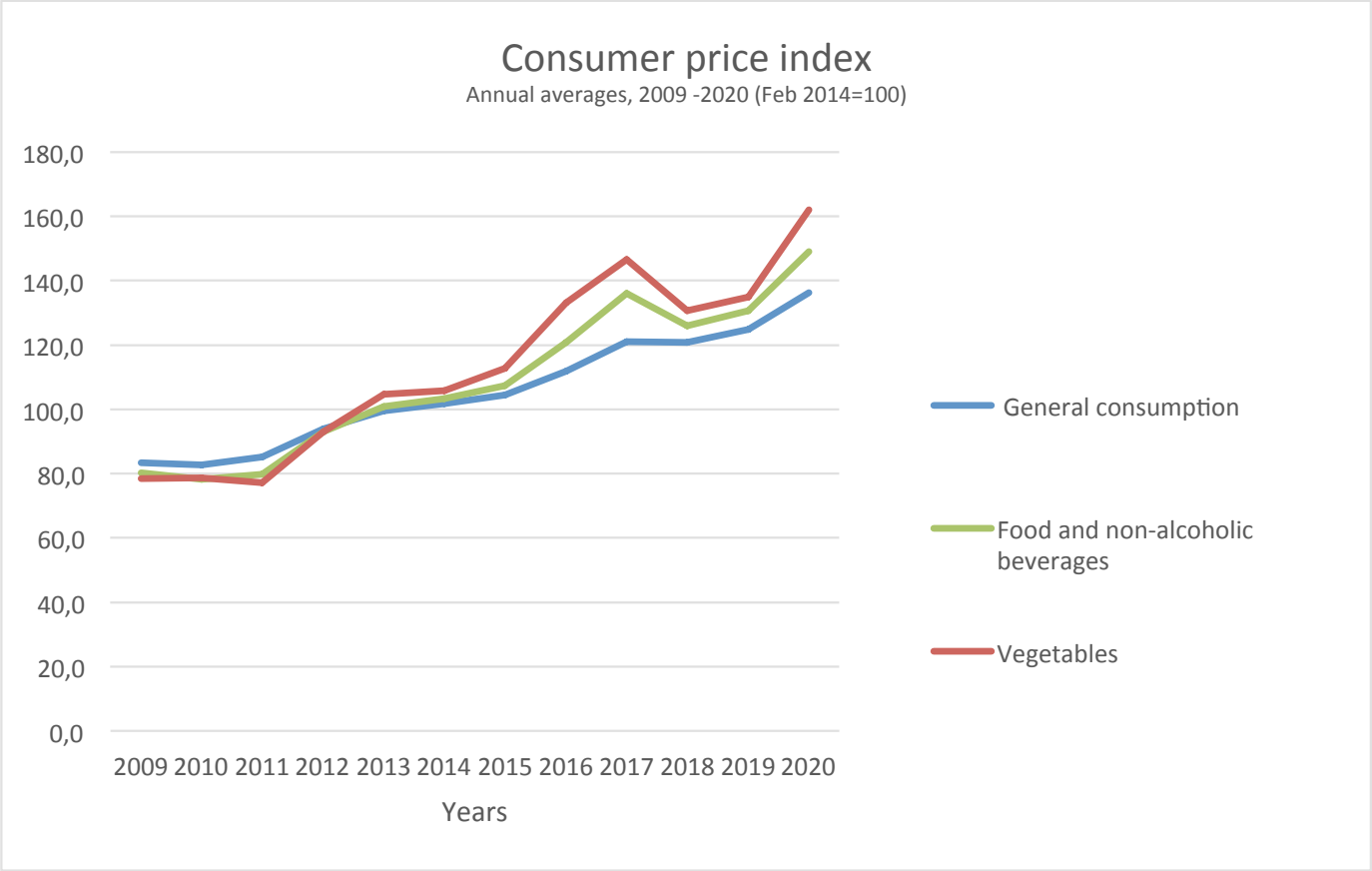
	Rwanda	United Republic of Tanzania	Uganda	DRC
Vegetable consumption (g/day)	116.7	125.0	115.7	180.8
Fruit consumption (g/day)	91.3	84.1	89.7	127.1

Source: Authors' compilation using data from Global Nutrition and Policy Consortium, Tufts Friedman School of Nutrition Science and Policy, 2019, Global dietary database [online]. Boston. [Cited 21 December 2020]. https://www.globaldietarydatabase.org/our-data/data-visualizations/dietary-data-country.

One of the challenges of increasing vegetable and fruit consumption is affordability, a factor which can be influenced by VC development. Figure 17 shows the comparison between the consumer price indexes for overall general consumption, food and non-alcoholic beverages (including vegetables), and vegetable alone. As seen, food prices have increased at a faster rate than the overall average consumer price index. Also, vegetable prices have increased at a faster rate than the overall food prices. This means that in comparison, vegetables are not becoming more affordable, which would have aided in the fight against malnutrition in Rwanda. Increasing vegetable prices means that demand is increasing faster than supply, likely due to stagnating yields and difficulty with quickly increasing areas of production.

Figure 17: Consumer price indexes

Source: Authors' own computation on the basis of data from NISR, 2020c



4.1.4 Gender

Gender

According to the World Economic Forum's Global Gender Gap Index Ranking 2020, Rwanda ranks ninth in the world for gender equality, having dropped three places from its standing in sixth place in 2019 (WEF, 2019). The index is based on the percentage of men and women who are working, economic opportunities, educational attainment, health status and political empowerment, where Rwanda showed a level of equality that can compare to the world's most advanced economies. The Rwandan horticulture sector is not an exception: female participation in the horticulture sector plays an important role, and the ratio of males to females is nearly equal, as later sections will show.

Box 4: Gender

"Yes, in terms of equality and equity these days, I can say that men and women are at the same level."

Donathien Hazitayezu, Akazi Kanoze Entrepreneurship Coordinator

Also, the Rwanda Baseline Study Report "Decent Work for Women Programme" (Ntezimana, J., 2016) found similar results:

> There were no cases of direct discrimination reported by employers and workers that we consulted. They all maintained that members of both sexes are evenly treated and that there is no discrimination done on the ground of sex or any other ground. One salient finding of this baseline study is that horticulture companies surveyed maintained that they avoid gender bias in setting payment rates.
>
> Cooperatives have clear strategies and/or an institutional mechanism to ensure that women and men have equal participation in decision-making, as they make sure women and men are equally represented on cooperative executive committees and other committees. Nevertheless, the majority of chairmanship positions are held by men, owing to the fact that women and girls prefer being secretaries and/or treasurers.

However, power differences can lead to abuse. A study on gender-based corruption concluded in 2011 by Transparency International Rwanda[20] revealed that even though Rwanda has made impressive progress both in the fight against corruption and in the promotion of gender equality, 5 percent of respondents had personally experienced gender-based corruption in the workplace, 10 percent perceived that the problem existed, and nearly 20 percent knew someone who had been a victim. The same study further underscored that the most affected sector is the private sector, as 58.3 percent of interviewees thought that gender-based corruption existed in private companies, while the public sector and especially civil society seemed to be slightly less affected (51.4 percent and 43.1 percent, respectively). The study also noted that the victims of this form of corruption were mostly women (84.5 percent), particularly those in search of jobs, while the perpetrators were mostly men (83.2 percent), especially directors and other senior staff.

J. Ntezimana (2016) concludes:

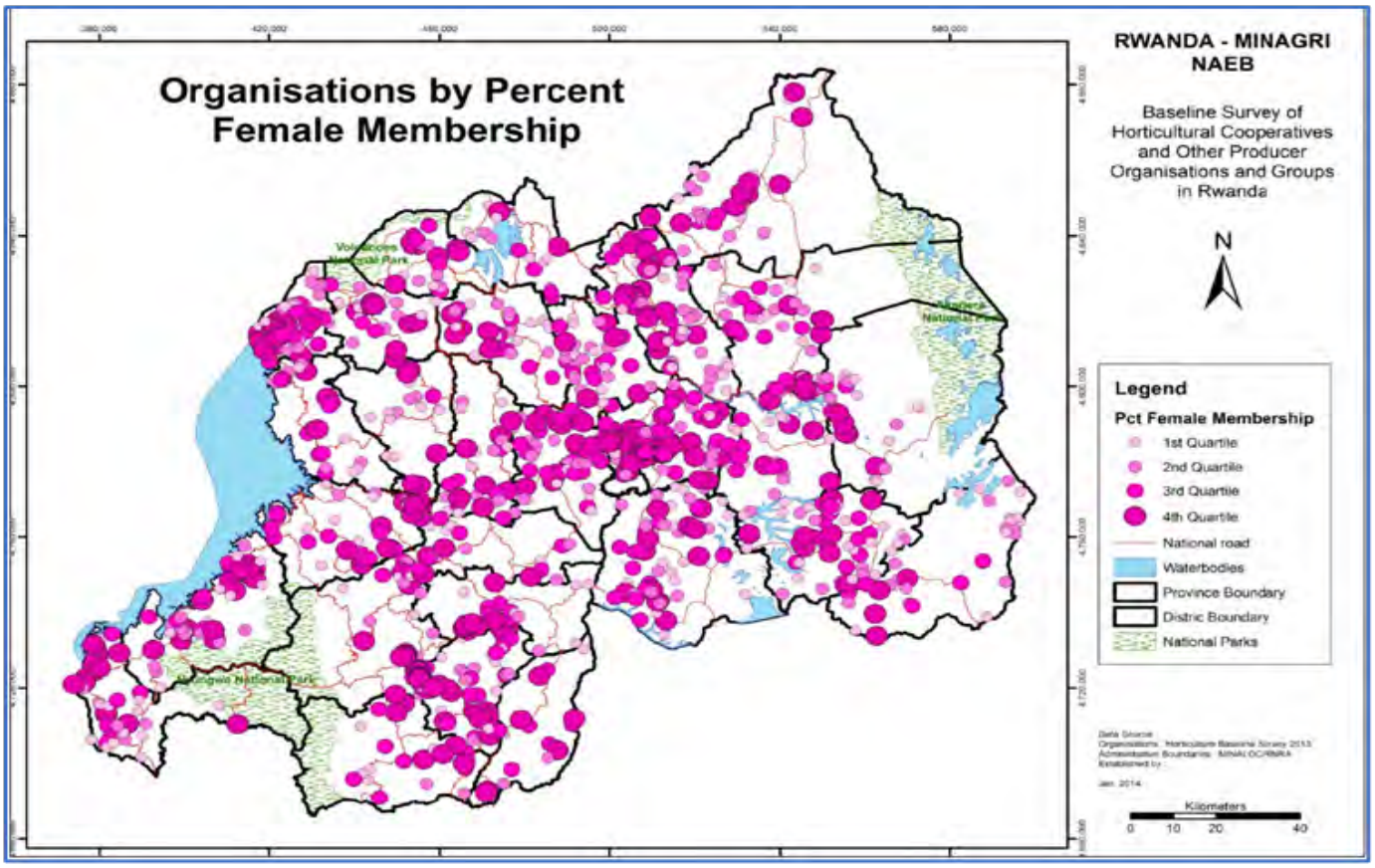
> As much as Rwanda presents a favourable environment for the promotion of decent work for women, there is need to design a project to provide ongoing gender-based trainings and support to horticulture commercial producers and exporters who are seeking to implement gender-sensitive management policy that will address the needs and concerns of female employees and contribute to the achievement of sustainability in the supply chain, certification and market access.

[20] See www.transparency.org/en/press/20110811-rwandan-workplaces.

Figure 18: Women sellers at a rural market

Figure 19 shows good female participation in horticulture cooperatives, producer organization and groups across the country, expressed in quartiles. While this shows a positive trend, the gender situation might be more complex. Earlier, the feminization of agriculture was raised as a factor of high female participation. This likely also applies to horticulture: while many men have moved to more profitable, stable or prestigious off-farm jobs, including those in urban areas, the women left behind have taken up more responsibilities in agriculture.

Figure 19: Farmer organizations in horticulture by percent female membership



Source: European Union's External Cooperation Programme for Rwanda, 2014.

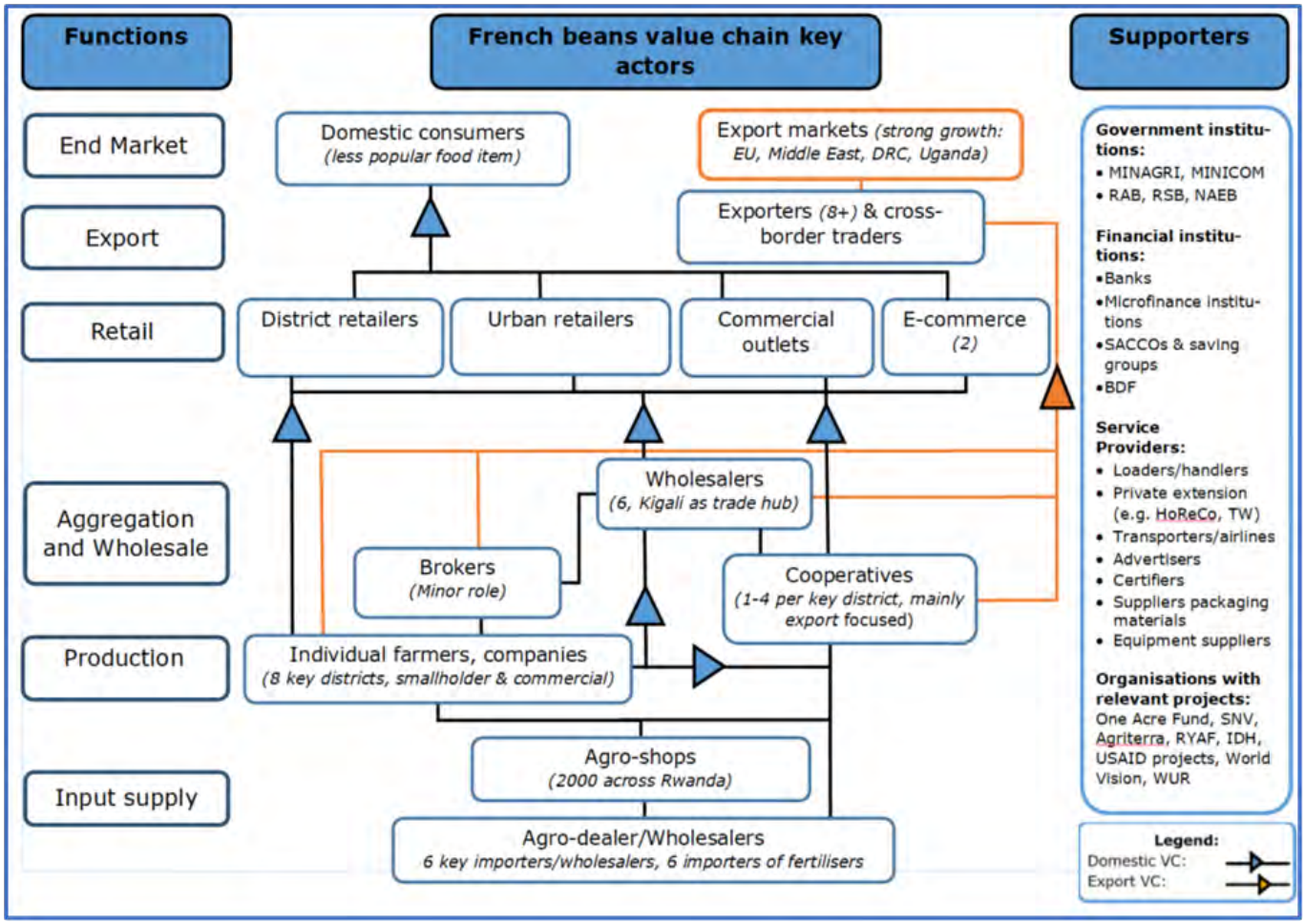
The respondents of this study stated that there is parity in the level of access to jobs, and the female respondents did not generally experience gender discrimination. The main differentiation that came from the field data was related to the types of tasks assigned to men and women. For instance, men reported to be more involved in physical activities such as lifting, loading, unloading and transporting the harvest to the market. On the other hand, women reported being more involved in weeding, and commercial farmers and exporters prefer women for harvesting, sorting and packaging due to their better and delicate handling.

4.2 Youth-centred value chain analysis of French beans

4.2.1 Value chain map

French beans are an upcoming crop in Rwanda, receiving attention especially because of both their export opportunities to Europe and Rwanda's urge to increase forex earnings. The NAEB strategy (NAEB, 2019) identifies French beans as a crop with high export potential. Nevertheless, a large amount of the produce is still consumed in Rwanda. The following VC map provides an overview of the functions, as well as the primary and support actors in the French bean VC.

Figure 20: Value chain map of French beans



Source: Authors' computation using data from field survey, 2020.

The VC map shows the flow from input suppliers to consumers. The production is characterised by a few commercial producers who often also export, and smallholders. Smallholders can supply district markets, urban markets via the Kigali-Nyabugogo wholesale market, and cross-border markets. There are also exporters who do not produce but who buy supplies for export, and those who buy from others in addition to their own production. Through various forms of retailing, the French beans ends up with the final consumers. Cooperatives often play a role in aggregation and coordination in the case of smallholder supply, especially in the case of marketing to exporters.

Various functions and characteristics are further discussed as follows, starting with the end markets to better understand the demand side, and then continuing with input supply to production to the nodes further downstream to better understand how this demand is being met.

4.2.2 End markets

Most of the production in Rwanda is still consumed domestically, but the growth of export is strong[21] (see Table 14).

Table 14: Production and export of French beans 2015–2019

Year	Total production (tonnes)	Net Export (tonnes)
2015	7 777	120
2016	7 650	317
2017	7 364	1 081
2018	7 597	3 507
2019	8 743	1 360

Source: Production data from FAO and export data from NAEB [online]. [Cited 20 February 2020]. www.fao.org/faostat/en.

In terms of export volume, regional markets are actually more important, taking more than 80 percent of the volume, with DRC taking around two-thirds and Uganda around one-third. The majority of the volume goes through formal traders and only a small portion occurs through informal trade. Nevertheless, the 20 percent that goes to the international market is of higher value than the 80 percent going to the regional markets. Key countries for international export are France, the United Kingdom (UK) and the Netherlands. Small amounts go to the Middle East.

For export to Europe, Rwanda has to compete with countries such as Kenya and Morocco, both of which have efficient, well-organized logistics and economies of scale due to large volumes. Rwanda's competitiveness is based on its ideal agro-ecological conditions and a much cheaper labour force. Because of the latter, future exports to Europe might

[21] However, different sources indicate that the production is lower than presented in Table 14 and that most is being exported. Making use of the NISR Seasonal Agricultural Surveys and adding all the districts, this would add to a production of 2 534 tonnes (2017), 3 945 tonnes (2018) and 2 720 tonnes (2019).

specialize on the more labour-intensive "fine and very fine French bean" (*haricot verts*). Having this niche market and weather that allows for year-round production, Rwanda can also export year-round with some fluctuations. In the regular French bean export, competition is fierce, and Kenya can only export in the winter months when conditions are too cold in Morocco.[22] However, low wages raise concerns of poor working conditions and do not represent a sustainable comparative advantage in the long term.

Exporters reported that around 30 percent of the French beans are rejected for export during sorting, and of this, 70 percent are sold at the Nyabugogo wholesale market in Kigali.

Table 15 shows that informal import and export plays a minimal role compared to formal export. Formal export is undertaken by registered traders and exporters. Informal export, especially to DRC, is done mainly by women who trade one bag of produce at a time across the border.

Table 15: Formal and informal trade of French beans

(Based on prices free on board [FOB])

French beans trade/export		Import			Export		
		2016/17	2017/18	2018/19	2016/17	2017/18	2018/19
Formal	Volume (tonnes)				315	1 081	3 503
	Revenue (USD)				712 718	1 769 650	3 484 253
	Price (USD/tonne)				2 263	1 637	995
	Price (RWF/kg)				2 210	1 599	972
Informal	Volume (tonnes)	0.344	7	7	2	13	11
	Revenue (USD)	133	3 226	2 436	1 661	5 321	6 189
	Price (USD/tonne)	387	461	348	831	409	563
	Price (RWF/kg)	378	450	340	811	400	550
Total	**Volume (tonnes)**	**0.344**	**7**	**7**	**317**	**1 094**	**3 514**
	Revenues (USD)	**133**	**3 226**	**2 436**	**714 379**	**1 774 971**	**3 490 443**

Source: NISR, 2019b.

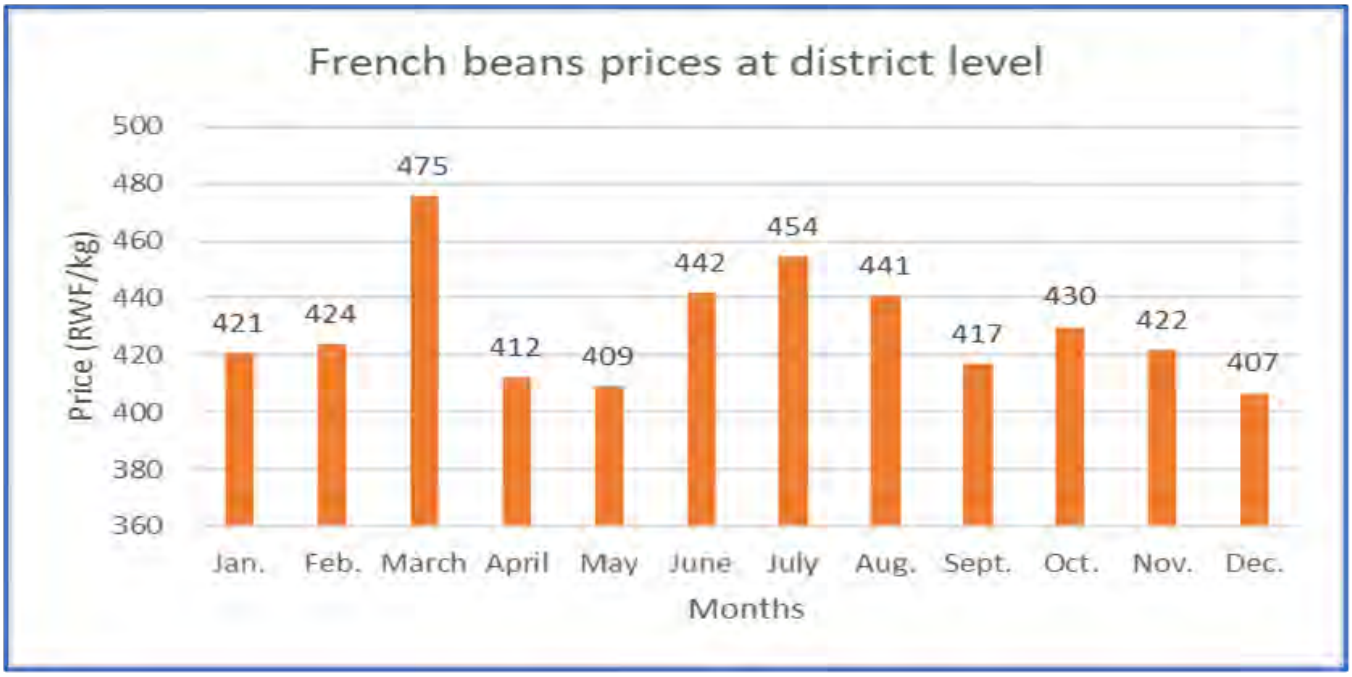
The average price of French beans reported by all farmers interviewed during the FGDs was RWF 180/kg to 360/kg for the domestic market. However, farmers producing for the international market reported prices between RWF 500/kg and 650/kg.

For the domestic market, French beans are perceived as expensive products destined mainly for middle- and upper-class people in urban areas, mainly Kigali, although small quantities are also for sale at the district markets. Additional buyers include the military and institutions such as prisons, schools, restaurants, hotels, hospitals, etc. Figure 21 provides the prices at the district level.

[22] Kenya can also produce year-round and has a canning industry, allowing for processing during the other seasons. Rwanda has no canning industry. Morocco is the main supplier for Europe in the summer months.

Figure 21: Average prices for French beans at district level

Average prices for 2017, 2018, 2019 and 2020 (excluding August, November and December 2020) from 21 districts.[23]



Source: Authors' computation from data provided by E-soko.24 [Provided in January 2020].

With this understanding of end markets, which form the demand side, the following sections describe the nodes in the supply chain for French beans, starting with input supply.

4.2.3 Input supply

As elaborated as follows, within Rwanda's agro-input sector, one can differentiate input wholesalers/agrodealers based in Kigali and the many agroshops selling a variety of inputs at the district and village levels. Several government agencies are also involved in regulating this sector. Note that input supply does not specialise in French bean production, and it targets a multitude of horticulture and non-horticulture crops. At the end of this section, the opportunities and challenges for youth employment in the input sector are also discussed.

Input wholesalers/agrodealers

Input importers-cum-wholesalers relevant for horticulture offer a variety of inputs and different brands, and they often also have some specialization. The key wholesalers include Agrotech, Holland Greentech, Balton, Kenyan Seeds, SeedCo and Sodiaco, all of which supply vegetable seed as well as agrochemicals and equipment relevant for

[23] Bugesera, Burera, Gakenke, Gatsibo, Gicumbi, Gisagara, Huye, Karongi, Muhanga, Musanze, Ngoma, Ngororero, Nyabihu, Nyagatare, Nyamasheke, Nyaruguru, Rubavu, Rulindo, Rusizi, Rutsiro, Rwamagana.

[24] E-soko is an online marketplace for agricultural commodities to link buyers and sellers (https://esoko.rw/) and also to provide market prices (http://www.esoko.gov.rw/).

horticulture.[25] They are also often representative and the sole importers for different brands. For example, Agrotech supplies PopVriend and Syngenta seeds, while Holland Greentech supplies RijkZwaan seeds. Balton supplies its own (previously Israeli) "Amiran" greenhouses and drip irrigation, while Holland Greentech supplies greenhouses from the Dutch Bosman van Zaal, and drip irrigation from Israeli Rivulus. One Acre Fund, operating under the name Tubura, is a different kind of supplier: it is a non-profit that combines training and quality inputs provided on credit. It is the sole supplier of East-West Seeds. While most wholesalers supply a variety of agroshops, there are those that have dedicated distribution systems. Agrotech, for example, has a franchise system, while Holland Greentech mainly supplies smallholders through its own district-based staff.

Most pesticides are imported from China and India, while vegetable seeds are largely sourced from Kenya, South Africa and the Netherlands. Other international vegetable seed brands available in Rwanda are Advanta, East African Seed, Kenya Highland Seed, Kenya Seed Company, Sakata Seed Co, and Victoria Seeds (Access to Seeds Index, 2020). There are no breeding or multiplication activities for vegetable seeds in Rwanda by commercial companies; quality seeds are all imported.

Box 5: Food safety concerns

Although less than surrounding countries, Rwanda is seeing an increased use of crop protection chemicals in horticulture. Rwanda does not have food safety laws regarding allowable quantities of pesticide residue on fresh crops. The government agency RICA maintains a list of allowable chemicals that can be used in Rwanda. With increased horticulture production in Rwanda, pest and disease pressure will also increase, thereby possibly also pesticide use. Access to knowledge, including for Integrated Pest Management (IPM) and safe and judicious pesticide use, will increasingly become more important. Although there is control on processed foods, the inspection of fresh fruits and vegetables and possible residues remains a grey area.

Agroshops

The wholesalers have their own shops in Kigali and/or supply to about 2 000 existing independent agroshops throughout the country.[26] Some of the larger agroshops at the district level have agents who have smaller shops at village level.

As per the research for this study, which occurred in districts with high rates of horticulture production, most profits can be made on fertilizers and pesticides. Vegetable farming is creating around 45 percent of the business of these agroshops. Women appear to play a substantial role in these shops. Several interviewees stated that women are more trustworthy and reliable than men to undertake such businesses. The shop owners mentioned that 17 percent of their customers are youth, which seems coherent with the proportion of youth who are active in farming and members of cooperatives (18 percent). Agroshops in border districts occasionally supply DRC, as is the case with the business of

[25] https://issuu.com/agribusiness/docs/agribusiness_catalogue___directory_/8 provides more names and addresses from 2014, so, slightly outdated.
[26] The list of agrodealers 2020/21 as maintained by RAB, personal communication.

fresh produce. The bordering districts in DRC perceive Rwanda to be an important supplier, often easier than far-away Kinshasa. Thirty percent of the interviewed agroshops also reporting selling in bulk to cooperatives, projects and NGOs. With an average of seven agroshops per district, competition is stiff, but the sales are also increasing as farming is becoming more input-intensive. A bachelor's degree is the standard requirement for agro-input importers, and A2[27] for agroshops. Thirty percent of the owners belonged to the youth category. (More on the youth employment opportunities can be found in the following section). There were no reports of child labour involved in the agroshops, nor of children working after school hours. Illegal, or non-registered, agroshops are few, but there could be villagers who participate on the side in unregistered business dealings with agro-inputs. There are OSH issues with dividing chemicals into smaller portions for farmers (see Section 4.6.2), as well as the health and environmental issues related to the disposal of the containers holding these chemicals.

Government agencies

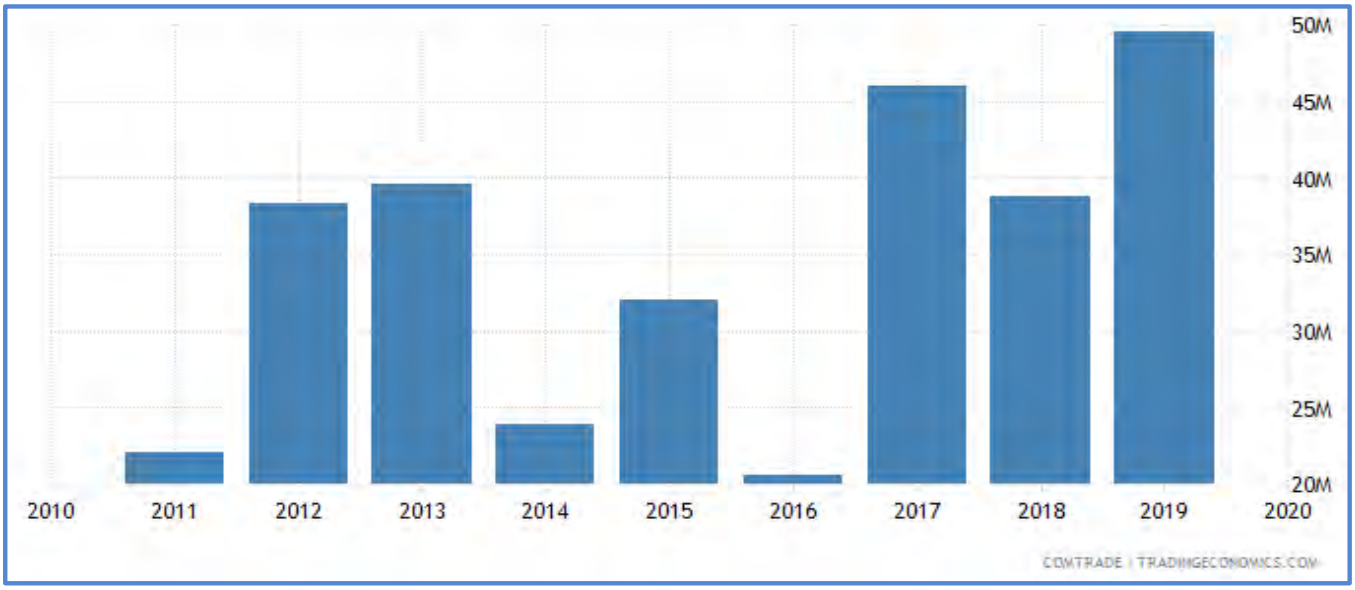
New imported seeds, pesticides and fertilizers have to be registered with RICA.[28] RICA also registers agro-input importers and agroshops, and provides phytosanitary certificates required for the export of agriculture produce. In addition, RAB performs germination tests for imported seeds before giving permission to import a consignment, and RAB conducts efficacy trials for pesticide and fertilizers before registration. The Rwanda Environmental Management Authority (REMA), the Rwanda Bureau of Standards (RBS) and the Agro-chemical Advisory Council (Wipfler *et al,* 2018) are also involved in the quality control of agrochemicals and seeds. MINAGRI leads the Agri-Inputs Sub Sector Working Group (AISSWG), a multi-stakeholder platform that promotes coordination within this subsector.

Fertilizers

Fertilizers are slightly more complex, as they are subsidised by the GoR. Increasing fertilizer usage is an integral part of the GoR's strategy to increase agricultural productivity. As a result, it has extensively committed resources to develop the fertilizer market and to support its utilisation in Rwanda. Under this scheme, the fertilizers are imported by six companies.[29] Figure 22 presents the trend of imported fertilizer for the period from 2011 to 2019.

[27] Technical Secondary Schooling (TSS), provided by Integrated Polytechnic Regional Centres (IPRCs), Vocational Training Centres (VTCs) and higher education Colleges of Technology (CoTs).
[28] This was previously known as RALIS.
[29] These six companies are API, ETG Inputs, Murenzi Supply, Mutara Enterprises, One Acre Fund (Tubura) and Yara.

Figure 22: Volume of imported fertilizer for the period 2010-2019
(In millions USD)



Source: United Nations COMTRADE database. In: Trading Economics [online]. 2021. Updated February 2020. [Cited 18 February 2020]. https://tradingeconomics.com/rwanda/imports/fertilizers.

Table 16 provides an overview of prices and government subsidies. The GoR has selected private agroshops through tenders to distribute these fertilizers. Farmers are first required to register on RAB's Smart Nkunganire System.[30]fertilizer at an agroshop. For areas greater than one hectare, there are additional procedures. Non-subsidised fertilizers can also be bought at the agroshops.

Currently all fertilizers are imported, although there are plans to start production in Rwanda in a joint venture between Morocco's OCP Group and the local firm Agro Processing Trust Corporation.[31] ENAS Pvt Ltd[32] has a fertilizer blending factory and is able to mix fertilizer nutrients on request, e.g. on the basis of soil tests, even for just one 50kg bag of fertilizer.

Table 16: Fertilizer prices and government subsidies
(In RWF/kg)

SN	Fertilizer type	Price without subsidy	Government subsidy	Farmer price
Macro fertilizers				
1	UREA	873	309	564
2	DAP	1045	412	633
3	NPK 17-17-17	930	217	713
4	KCL/MOP	780	222	558

[30] www.smartnkunganire.rw.
[31] See https://www.newtimes.co.rw/news/38-million-fertiliser-plant-be-operational-year.
[32] See http://enas.rw/services/fertilizer-blending-plant/.

Table 16: Fertilizer prices and government subsidies

Compounds/blends				
5	Urea +Sulphur (40N+5.5s)	878	296	583
6	NPK 23 -10-5 + S, Z, Mg	896	281	616
7	NPK 15-9-20 + S, B, Zn, Mg, Mn	946	284	662
8	15 N +25.6% Cao + B	824	136	688
9	NPK 5-7-5-5 + B, Zn, Cu, Mg, Fe, Mn, Mo	7500	668	6 832

Source: Ministerial instructions of 2021, MINAGRI (Original figures).

Despite the GoR's efforts to improve the use of fertilizers among farmers, the NISR seasonal agricultural survey reports indicate that the application of fertilizer by smallholder farmers is still relatively low but is rising fast, with a 24.6 percent annual increase in 2019 (NISR, 2019) and a 33.2 percent in the 2020 (NISR, 2020b). On average, the fertilizer use has increased to 46.4 kg per hectare in 2019/2020.[33]

Application of commercialised organic fertilizer was not encountered although various small commercial production units[34] do exist. Application of manure and mulching is an accepted practice for most farmers. A product with increasing popularity is CBX, a bio-stimulant of Envirom Green with soil enhancing ingredients that stimulate microbial activity and thereby improves soil quality.

While the three other crops (chilli, tomato and passion fruit) can strongly benefit from commercial (professional) nurseries, French beans do well with direct sowing.

Youth employment in the input sector

As earlier described, the data reveal that, on average, there are seven agroshops per district. The number changes dramatically in the urban areas, where there are about 1 500 agroshops in Kigali with varying sizes of business.

For this study, four input wholesalers based in the larger Kigali city area were interviewed, and 10 agroshops in five other districts were interviewed: see Table 17 for employment by these input suppliers. Interestingly, three out of the 10 agroshops were owned by (well-off) youth.

[33] From https://www.newtimes.co.rw/business/why-only-46-farmers-use-quality-agro-inputs.

[34] RAB provided the following list: (1) Biomax Technology System Limitered (Huye, Kamonyi, Kayonza, Nyanza, Nyamagabe an Rubavu districts); (2) Green Care (Huye district); (3) BIDC Group Ltd (Musanze district); (4) COPED (Gisozi, Kamonyi and Nyanza districts); (5) UR CAVEM/BUSOGO (Musanze district); and (6) Rwanda Biomass Solution (Bugesera).

Table 17: Employment with interviewed input wholesalers and agroshops

	District	Agrodealer		Total		Men		Women		Youth 16-17		Youth 18-30		Age >30	
		Brand	Owner/ Manager (age and sex)	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual
Input wholesalers	Nyarugenge	Sodiaco	Adult: 38 (M)	5	30	3	30	2				1		4	30
		Holland Greentech	Adult: 33 (M)	15	6	8	5	7	1			10	6	5	
		Balton	Adult: 42 (M)	20	10	10	10	10				10	8	10	2
		Agrotech	Adult: 36 (M)	6	20	3	20	3				2		4	20
	Total		**Adult: 4 Youth: 0**	46	66	24	65	22	1	0	0	23	14	23	52
	% of total full-time & seasonal			**41 %**	**59 %**	**21 %**	**58 %**	**20 %**	**1%**	**0 %**	**0 %**	**21 %**	**13 %**	**21 %**	**46 %**
				100%		**100%**				**100%**					
Agroshops	Rubavu	Agropha	Adult: 35 (M)	3		2		1				2		1	
		Megavet	Adult: 35 (M)	3		2		1				1		2	
		Francois Xavier Nizeyimana	Adult: 38 (F)	2		1		1						2	
	Rwamagana	Claude Hakizimana	Adult: 35 (M)	3		2		1				3			
		Fiston Habinshuti	Youth: 29 (M)	2		1		1				2			
		Denyse Niyobuhungiro	Adult: 31 (F)	1				1				1			
	Rulindo	Pierre Mbarushimana	Adult: 46 (M)	3	1	3			1			1	1	2	
	Nyanza	Oscar Nzansabimana	Adult: 38 (M)	3	1	3			1			1	1	2	
		Solange Uwase	Youth: 23 (F)		2		2						2		
	Karongi	Ange Ngaboziza	Youth: 30 (F)	2	5	2	5					2			5
	Total		**Adult: 7 Youth: 3**	**22**	**9**	**16**	**7**	**6**	**2**	**0**	**0**	**13**	**4**	**9**	**5**
	% of total full-time & seasonal			**71 %**	**29 %**	**52 %**	**23 %**	**19 %**	**6%**	**0 %**	**0 %**	**42 %**	**13 %**	**29 %**	**16 %**
				100%		**100%**				**100%**					
	Karongi	One Acre Fund (Tubura)	Youth: 28 (M)	250		75		175				50		200	

Source: Authors' computation using data from field survey, 2020.

Although the previous table is not based on representative sampling, it does provide some indications[35] that are of interest with regards to youth employment creation: the ownership of agroshops has a higher degree of youth (3 out of 10); agroshops have more

[35] The data cover four of the six to seven key input importers/wholesalers, and ten of the estimated 2 000 agroshops.

permanent staff, which presumably would be a preference for youth (71 percent versus 41 percent for input wholesalers); and agroshops also have more youth involved among permanent staff (42 percent versus 21 percent). This highlights the potential for more youth employment with agroshops, although it should be noted that employment per agroshop is only 3.1.

As earlier explained, One Acre Fund (Tubura) has a very different model. For training and input distribution throughout the country, they employ 250 full-time staff, of which 70 percent are women and 20 percent are youth aged 18–30 (see Section 3.3.2 for more on One Acre Fund).

The challenges of youth engagement in agrodealership as reported during the interviews include:

- lack of capital to invest in their own agro-input businesses;
- lack of entrepreneurship skills and specialized agrochemical knowledge;
- price fluctuations of chemicals and unstable demand; and
- high competition.

According to the respondents, the proposed solutions to address these challenges include:

- mobilizing financial institutions to develop loan products that help launch youth into this business;
- improving the curriculum and the number of vocational schools teaching agrochemical use; and
- training youth on agripreneurship.

Although the input market is growing, agrodealership itself currently does not involve much employment per district. On average, each agroshop has two full-time employees and one part-time employee. Creating 100 youth jobs would mean creating 30 new agroshops in total, one per district, where the current market already shows seven agroshops per district. These new agroshops would face some competition. Nevertheless, it was noted during field visits that the number of new agroshops is increasing, as well as the opportunities for educated youth with access to finance to start businesses. These agroshops would focus on all local VC opportunities, as the French bean VC alone would provide minimal employment opportunities.

Another opportunity is to increase the number of employees per agroshop for additional marketing activities (educating, informing, demonstrating) at village level, but also services such as spray service, pruning service and mechanization service. This could be done but would require training and investment, which is not something the agroshops would easily do. This would mean involving the importers/wholesalers, as they can invest and can train their agents, while having an interest to increase their market share, assuming the agroshops remain loyal to them. TVETs could also provide this type of training, if they are sufficiently up-to-date with horticulture knowledge, and if development partners or the GoR would contribute with initial start-up funds to train these marketing agents. Beyond employment creation, this approach would also boost horticulture development in the locality. From the perspective of the French bean VC

alone, the potential would be rather limited. Also, it is questionable how many agroshops would actually be interested to get out of their shop and look for clients, monitor staff, etc.

Some agroshops were interested in promoting through social media, and this could also involve youth with other skillsets. For employment in nurseries, it is too early to conclude whether this will work on large scale, and this would still create employment opportunities for only a few youth per district.

Box 6: Solange, agroshop owner in Nyanza

Uwase Solange, 23 years old, is an agroshop owner from Nyanza Southern Province. Following her graduation from secondary school, where she studied veterinary sciences, she dived into the agribusiness and opened a small shop in Nyanza, with the financial support of her family. Her motivation to start her business came from the needs of the local farmers to have easier access to inputs without having to commute to larger cities. Three years have since passed, and Solange says she has learned a lot about how to manage what is generally considered a man's business. In fact, among our sample, she is the only woman, but this has not presented her with any problems, and she said that all of her customers treat her with respect and accept her advice on how to apply inputs to their crops. Solange uses social media to advertise her products and to attract potential customers with special offers and casual discounts for some products. Solange is an ambitious young lady who is planning to step up in the agro-inputs import business as soon as she has saved enough capital to invest.

Source: Interview with Ms Uwase Solange by authors.

4.2.4 Production

Access to land and water

In addition to the need for access to inputs, farmers also require access to land and water. Land access is one of the crucial factors affecting horticulture production volumes. The large population, the geography of the country formed by many hills – which has given Rwanda the nickname "Land of Thousand Hills" – and the strong reliance on the Rwandan economy in the agriculture sector have caused a land availability shortage. Generally,

arable land in Rwanda is very fragmented and the plots are relatively small. This is also true for the horticulture sector, which is dominated by smallholder farmers. On average, a household cultivates a land of 60 ares (0.06 ha) (MINAGRI, 2018), often divided into three to four subplots. Table 18 shows that there are ways to access land other than through ownership. In Season C (the drier season, compared to Season A and B), land access through free lending and rent increases substantially, likely because producers are seeking plots with better access to water.

Table 18: Plots under production by land ownership and season
(In percentage)

Ownership by season in 2019	Season A (Sept.–Jan.)	Season B (Feb.–May)	Season C (June–Sept.)
Owned	75.8	76.6	49.6
Free lending	9.5	9.5	19.0
Rented (in-cash or in-kind payment)	14.7	14.0	30.4
	100	**100**	**100**

Source: NISR, 2019 (Original figures).

According to the horticulture youth farmers interviewed for the selected crops, 60 percent own the land they cultivate. The remaining 40 percent are cultivating on drained marshlands or other rehabilitated areas assigned to them by the GoR, directly or through a cooperative, usually at very minimal fees (see more as follows); or are leasing from neighbouring farmers for roughly RWF 250 000 to 350 000 per are per year. In key production areas, this rate reaches RWF 500 000 per are per year.

Another way to access land is through sharecropping, more popular in eastern and western Rwanda, a form of leasing land in which the lessee provides a share of the harvest to the landowner. Often, there is an equal division of harvest, although this depends on the specific negotiation. However, this is mostly applied to staples and is not common for vegetable production.

Access to land is a challenge for youth to enter agriculture. Most of the youth between 18 and 30 cannot afford to buy land, and even leasing land can be burdensome as it requires upfront payment. The requirement for collateral by commercial banks for loans to acquire land is a key challenge (see Box 7).
In recent years, investments and efforts from the public sector, international NGOs and local NGOs to increase the volume of arable land around the country have increased. Land restoration efforts include irrigation schemes, terracing and draining marshlands.

Box 7: Importance of horticulture production

The vice mayor in charge of economic affairs of Rulindo District indicated that horticulture production is a priority because of the district's proximity to the main market of Kigali. Also, the district has given special priority to youth associations and entrepreneurs to access the rehabilitated land.

Mr Olivier Muvadimwe from RYAF indicated that his organization is negotiating a Memorandum of Understanding (MoU) with the eight districts to avail state land to youth farmers. This would highly contribute to boosting youth engagement in agriculture, and increase production in general and employment for many rural youth.

Although the rainfall patterns in Rwanda are favourable for agriculture, irrigation will reduce rain dependency, which is especially key when intensifying vegetable production. With 1.9 percent of the arable land being irrigated,[36] this will remain a key issue for youth wishing to start vegetable production for the market.

Marshlands are prime areas for agriculture, as they are flat lands with access to water. The GoR is investing heavily into irrigation schemes. For example, HoReCo, under RAB, is implementing the OMMIS project to organize and maintain 76 irrigation schemes developed by the government, covering 10 037 ha in 18 districts.

The GoR continues to make drained marshlands in the valleys and other rehabilitated areas available to farmers; the land remains owned by the government, and cooperatives or farmers pay a minimal fee (lease) to the government. The study collected the information provided in Table 19, showing that there is considerable variation in the fees paid.

In several cases, these fees could be paid at harvest time, meaning that this approach has several advantages: fees are low; payment is done with the income from selling the harvest; and especially in marshlands, soils are good and water is available. The key people involved at the district level in decision-making on marshlands are the vice mayor in charge of economic affairs and the director of agricultural and natural resources. At the district level, there is also a multisector Youth Employment Committee, which can be key

Box 8: Funds for land access

The Business Development Fund (BDF) of the Development Bank of Rwanda (BRD, currently privatized) provides guarantees (up to 70 percent of each loan) to commercial banks, which are providing loans to SMEs, to cooperatives for various investments, and to youth to purchase land. However, when youth apply to commercial banks for a loan under the BDF scheme, they still have to provide collateral for the other 30 percent, which is difficult to do unless they are already well-off. The Nyanza office reported only two successful youth applicants in 2019. *Source: Personal information, BDF Nyanza office*

[36] Arable land: 1 139.0 ha; irrigated land: 21.4 ha. Calculated from data from NISR, 2019.

in bringing together different forms of support, for example from NGO projects, different line ministries, etc.

Table 19: Cost of leasing State-owned land per district

Cooperative	District	Cost for leasing land (RWF/ha/year)
Yahoproc	Rulindo	200 000
Urugero	Nyanza	700 000
Kaidu	Rubavu	1 500 000[37]
Jyamberemuhinzi	Nyanza	150 000
Dufatanye Umurimo	Nyanza	250 000
Cofar	Rubavu	1 250 000
Ccopareg	Rwamagana	300 000
Coop Gwiza	Rwamagana	500 000

Source: Authors' computation using data from field survey, 2020.

Figure 23: Example of low-cost irrigation

Source: Holland Greentech.

HoReCo (see Section 3.2) also sells large but portable sprinkler systems at RWF 8 million, which can irrigate one hectare in 30 minutes and be moved to the next plot. Under the OMMIS project funded by RAB, it also supports the establishment and maintenance of 76 irrigation schemes (10 037 ha) in 18 districts, many of them focused on (export-oriented) horticulture and on sloping terrain.

[37] This is very fertile volcanic land, which is why the cost is so much higher than the others.

Access to finance

Ibimina and *Umurenge* are the main sources of loans for production. *Umurenge* is the *Kinyarwanda* term for SACCOs. *Ibimina* are local credit and saving groups which operate on the basis of contributions from their members, who are mainly residents of the same village or settlement. Each group comprises about 30 members, take turns in lending money and rely on mutual trust between them. Contributions are paid each week and range between RWF 200 and RWF 500 per share. Each member pays up to four shares a week. Several commercial banks have started offering these *Ibimina* groups the possibility of opening accounts, reducing the chances of pilferage.

Some cooperatives have generated their own funds as an internal savings and credit scheme, or they act as a guarantee to their members when these borrow from SACCOs and MFIs. Cooperatives in general do not take loans and divide them among members; they create the necessary linkages between SACCOs, MFIs and their members.

Banks and the BDF were also mentioned as possibilities, but are very challenging as they reportedly require collateral, they have long procedures that cause loans to be too late to support production, and they require regular repayments to be made rather than repayments made after harvest. More on organizations and institutions providing access to finance can be found in Section 4.2.8.

Box 9: IKOFI
The Bank of Kigali launched its e-wallet in May 2019, allowing for access to credit for "un-bankable" smallholder farmers. Registered farmers have to make their agricultural payments and sales through the IKOFI mobile payments. In this way, the bank collects data on the agriculture business of the participating farmers. Using these data, the bank can decide if a farmer is trustworthy for a loan, also provided through the IKOFI e-wallet, which the farmer can only spend at agroshops registered with IKOFI.

Production

Ideally, French bean yield in Rwanda is 11 to 14 tonnes/ha (RAB, 2016), but the actual yield in 2018 was 8.4 tonnes/ha (see Table 20). The yields, a good measure for competitiveness, are increasing in Rwanda, but are still lower than those in Kenya, the biggest French bean producer and exporter in the region (see Figure 24).

Table 20: Production of French beans in Rwanda

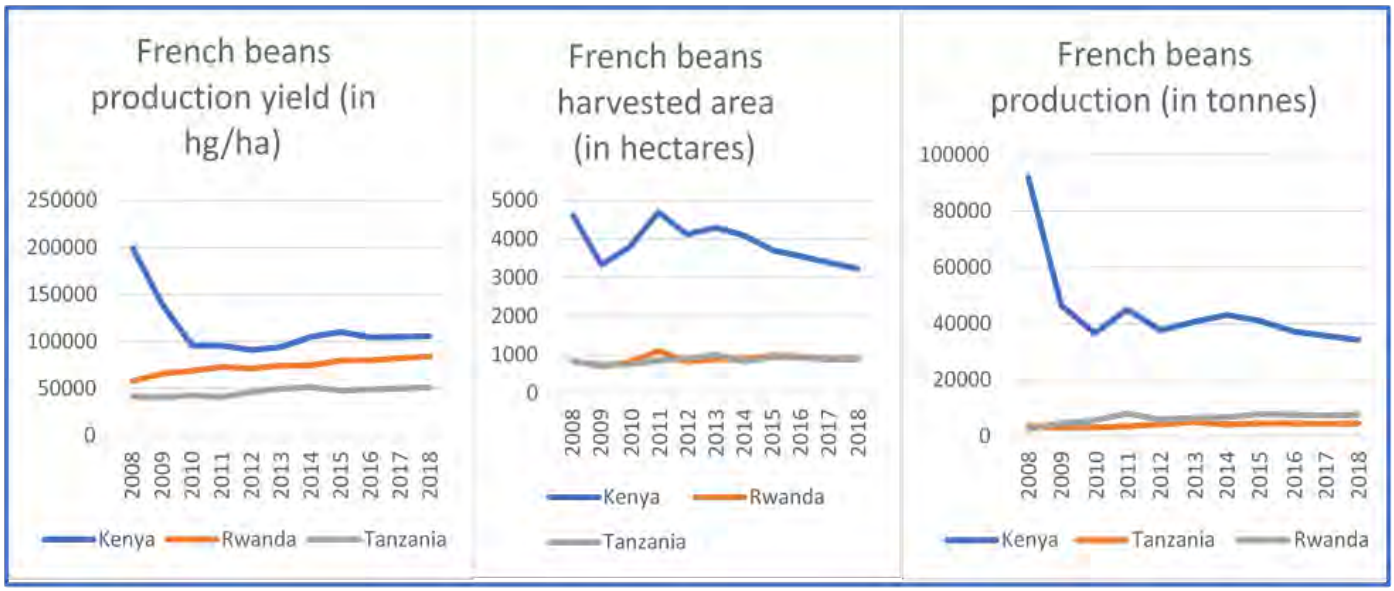
Year	Rwanda		
	Acreage (ha)	Output (tonnes)	Yield (tonnes/ha)
2009	700	4 626	6.6
2010	807	5 562	6.9
2011	1103	8 052	7.3
2012	816	5 843	7.2
2013	882	6 563	7.4

Table 20: Production of French beans in Rwanda

Year	Rwanda		
	Acreage (ha)	Output (tonnes)	Yield (tonnes/ha)
2014	889	6 665	7.5
2015	974	7 777	8.0
2016	954	7 650	8.0
2017	895	7 364	8.2
2018	901	7 597	8.4

Source: FAO, 2020, FAOSTAT [online]. Rome. [Cited 15 September 2020]. www.fao.org/faostat/en.

Figure 24: Comparison between Kenya, Rwanda and United Republic of Tanzania



Source: Authors' computation using data from FAO, 2020, FAOSTAT [online]. Rome. [Cited 15 September 2020]. www.fao.org/faostat/en.

Smallholder production of French beans is mostly on 5 to 20 ares per farmer, so on very small plots, which is not much different from that of other vegetables. Of the farmers interviewed for this report, 75 percent in the French bean VC owned the land while the rest leased government land. The five to seven regular exporters have large areas of production, producing on several hectares per season.

There are many varieties of French beans, available under various seed brands on the market. Regarding pests and diseases, the production of French beans is less risky than that of chilli or tomato. Also, the French bean is a *Leguminosae,* which contributes to soil fertility. The other advantage is that French bean harvest starts after 45 days after planting and, depending on the variety, has a complete harvest within three to four months and has earned back the investment. Short-duration crops are likely of more interest to youth who are short on cash. The 11 groups of French bean farmers, with export linkages, interviewed for this report all managed to produce three seasons per year, making the French bean crop a potentially good income-generator. Tables 21 and 22 show that French beans are mainly grown in eight key districts, and mainly in Seasons A and B.

Table 21: Production of French beans per district

(Average production from 2017, 2018, 2019)

District	Production (tonnes)	District	Production (tonnes)	District	Production (tonnes)
1. Bugesera	33	11. Kayonza	12	21. Nyamasheke	1
2. Burera	42	12. Kicukiro	144	22. Nyanza	126
3. Gakenke	87	13. Kirehe	-	23. Nyarugenge	32
4. Gasabo	281	14. Muhanga	-	24. Nyaruguru	-
5. Gatsibo	10	15. Musanze	25	25. Rubavu	-
6. Gicumbi	196	16. Ngoma	5	26. Ruhango	2
7. Gisagara	75	17. Ngororero	-	27. Rulindo	7
8. Huye	273	18. Nyabihu	-	28. Rusizi	-
9. Kamonyi	16	19. Nyagatare	315	29. Rutsiro	-
10. Karongi	-	20. Nyamagabe	122	30. Rwamagana	1 263
				Total	**3 066**

Source: NISR data compiled by N. Ujeneza for a HortInvest-commissioned report on import substitution.

Table 22: Production of French beans per season

(Average data from 2017, 2018, 2019)

Season	Production (tonnes)	%
SeasonA (Sept.–Feb.)	1 783	58%
Season B (March–June)	1 125	37%
Season C (July–Sept.)	158	5%
Total	**3 066**	**100%**

Source: Authors' computation of data from data of Seasonal Agricultural Survey (2015-2019), from NISR.

Regarding access to inputs like fertilizers, seeds, pesticides and equipment, the field data show that farmers, both male and female, have equal access to inputs from local agroshops or from importing wholesalers. However, during the FGDs, both farmers older and younger than 30 years of age pointed out problems related to the application of GAPs such as:

- lack of capital to acquire all required inputs and productivity-enhancing technologies (water pumps and other irrigation equipment);
- limited skills and knowledge on how to apply the right practices in the production cycle;
- significant post-harvest losses arising from the lack of a ready market for the produce; and
- low quality of seeds purchased from local seed multiplier cooperatives, which compromises the yield.

In order to address these challenges for youth and farmers in general, respondents from the FGDs gave the following proposals:

- Advocate for the inclusion of certified seeds in the NKUNGANIRE subsidy programme.
- Increase extension services through the provision of capacity-building and technical follow-up with specific attention to youth farmers.
- Support farmers to access agricultural inputs by providing financial services, improving infrastructure (feeder roads, selection/collection sheds, cold storage, transport facilities), etc.

Export companies that were interviewed stated that they provide technical support to cooperatives that produce for the export market. Garden Fresh and Proxifresh, both exporters of French beans, indicated that they provide various forms of support to farmers, including providing improved seed, pesticide approved by their international buyers, and technical support by agronomists.

Box 10: French bean production increases

According to the Division Manager, Emerging Value chains of NAEB, the reasons the acreage under French beans production increased include:

- The export companies such as Proxifresh and Garden Fresh have been encouraging farmers to get involved as out-growers, to take advantage of technical assistance in production, and to transport their produce to NAEB's packhouse, where it is sorted and packed and from where it is taken to the airport for shipment.
- The production cycle of French beans takes relatively fewer days than that of other vegetable crops.
- There is an increasing demand of French beans at export markets.
- Government policy exists to exclusively use marshlands for vegetable production.
- Government projects like RSSP-LWH, RCSP, and the current SAIP promote the production of French beans (micro-credits, technical support, etc.).

Cost–benefit

The farm-gate price varies from RWF 180/kg to 360/kg depending on the quality and demand, if channelled to the domestic market. Various cost–benefit analyses are presented as follows. Table 23 was prepared during the field work with the cooperative Koabiga of Gasabo District, which has export connections; its members produce for the exporter Garden Fresh, which explains the higher price.

Table 23: Cost–benefit of French beans

(Exchange rate: EUR 1 = RWF 1 029 [May 2019])

French beans					
Items	**Unit**	**Unit Cost (RWF)**	**Quantity**	**Cost (RWF/are)**	**Cost (EUR/ha)**
1. Land lease	are	1 100	1	1 100	107
2. Seed	kg	15 000	0.43	6 450	627
3. Manure	kg	28	100	2 800	272
4. Mineral fertilizer NPK	kg	560	1	560	54
5. Mineral fertilizer DAP	kg	480	2	960	93
6. Urea	kg	425	1	425	41
7. Foliar fertilizer	kg	5 000	0.08	400	39
8. Fungicides	E.g. Ridomile, Victory			2 225	216
9. Insecticides	E.g. Dudu acelamectine, Cypermethrine			610	59
10. Land preparation 1st	labour day	1 000	1.5	1 500	146
11. Land preparation 2nd	labour day	1 000	1	1 000	97
12. Sowing	labour day	1 000	0.5	500	49
13. Pump, other irrigation equipment	lump sum	4 450	1	4 450	432
14. Pump/irrigation maintenance/repairs	lump sum	1 180	1	1 180	115
15. Fuel/electricity costs irrigation	litre	1 000	3	3 000	292
16. Tools	tool	500	1	500	49
17. Other cultural operations (weeding, fertilizer application, spraying and watering)	labour day	1 000	3	3 000	292
18. Harvesting, sorting and packing	labour day	1 000	2	2 000	194
19. Transport to collection point	kg	3	100	300	29
Total cost (A)				**32 960**	**3 203**
Yield (B)				kg/are	kg/ha
				100	10 000
Unit price received (per kg) (C)				RWF/kg	EUR/kg
				550	0.53
Revenue (D=B*C)				RWF/are	EUR/ha
				55 000	5 345
Gross margin (E=D-A)				**RWF/are**	**EUR/ha**
				22 040	**2 142**
Cost of production (per kg) (F=A/B)				**RWF/kg**	**EUR/kg**
				329.6	**0.32**
Labour investment (days) (G)				days/are	days/ha
				8	800
Return on labour (per day) (H=E/G)				**RWF/day**	**EUR/day**
				2 755	**2.68**

Source: Authors' computation using data from Koabiga cooperative, 2020.

HortInvest data show that this yield is reasonable but that with the application of modern practices (e.g. GAPs, IPM, additional rounds of harvesting, etc.), it can be further increased, and that the cost of production (per kg) can also be decreased, further increasing the profitability of French beans.

Youth agripreneurship in production

Smallholders with small plots of French beans largely make use of household labour and therefore offer only few casual employment opportunities for youth. However, of more interest for youth is to start French bean farming as small-scale agripreneurs. As explained earlier, for this to happen, access to land, water, knowledge, finance and markets are key. This requires strengthening the existing cooperatives, forming new cooperatives where feasible or required, and encouraging youth to become members of such cooperatives and to benefit from them. District government offices can support with land access and with cooperative formation. Exporters can ensure market channels, and service providers of knowledge on GAPs are equally important. Such services can be facilitated by projects, exporters, out-grower schemes or existing extensions. Table 24 provides the memberships of visited cooperatives, which provides an indication of youth agripreneurship in the production of French beans.

Table 24: List of visited cooperatives and their memberships

No	Cooperative	Key crops[38]	District	Male	Female	Total	Male youth	Female youth	Total youth	Youth in leader-ship
1	Coop Gwiza	French beans, chilli, tomato	Rwamagana	421	320	741	29	7	36	No
2	Dufatanye Umurimo	French beans, tomato	Nyanza	13	17	30	6	3	9	Yes
3	Isonga Rya Bwunya	French beans, tomato	Gasabo	420	402	822	22	16	38	Yes
4	Koabiga	French beans, chilli, tomato	Gasabo	256	560	816	123	151	274	Yes
5	Kaidu	French beans, tomato, onion	Rubavu	92	106	198	40	35	75	
6	Cofar	French beans	Rubavu	57	52	109	22	28	50	Yes
7	Ccopareg	French beans	Rwamagana	22	15	37	2	4	6	Yes
8	Yahoproc	French beans, tomato	Rulindo	30	70	100	3	7	10	No
9	Abahujintego Busogwe	French beans	Nyanza	202	239	441	20	80	100	Yes
	Total			**1 513**	**1 781**	**3 294**	**267**	**331**	**598**	
	%			**46**	**54**	**100**	**8**	**10**	**18**	

Source: Authors' computation using data from field survey, 2020.

Regarding the gender aspect of cooperative membership, Table 24 reveals that 54 percent of the total cooperative members are women, highlighting the importance of female farmers in horticulture. It also reveals that 18 percent of the total is youth, which is a proportionally low rate of participation, [39] as youth have fewer opportunities to start agriculture. An overview of

[38] From the four crops of this study.

[39] Comparing the youth (ages 15–29, of which 32.5 percent are still in education or training: 67.5 percent x 3 069 554 = 2 071 948) and adult-working-age population (ages 30–64: 2 782 947), then the youth should form more than 40 percent of cooperative membership. (Data from: ILO, 2020, and NISR, 2012).

146 horticulture cooperatives[40] supported by HortInvest shows similar results: 45 percent female membership and 15 percent youth membership. The average membership in Table 24 is 366 members, substantially higher than the 142 members of the HortInvest overview, which is explained by the fact that HortInvest largely works in less developed districts. In Section 4.2.5, more will be presented about farmer cooperatives. Nevertheless, it is evident that being involved with an export chain like French beans, with modern technologies and cooperative membership, provides more esteem to youth farmers than, for example, cultivating maize for household consumption. Youth who are less educated but who have experience working on their parents' land are likely to succeed, perhaps even more often than educated youth without such experience.

Box 11: Youth and cooperatives
Farmers in Gasabo District reported that, "the youth usually are aware of the advantages of joining a cooperative, nevertheless, many are affected by lack of starting capital for investment in agriculture, making it difficult for them to join cooperatives"

Youth employment in production

Wage labour undertaken by youth at the production level can be found with commercial farms and exporters. The data in Table 25 were collected for this study and shows the opportunity for youth employment in surveyed medium-sized farms and commercial farms and exporters. Interestingly, the exporters have many casual workers, since they use more labour in sorting and packaging (including a high number of women in seasonal work) and depend on orders (consignments) from abroad.

In terms of potential, one could foresee that with some capacity-building support to youth, associated with some support to the companies, one could create three to five full-time jobs per active exporter and commercial farmer, and 10 to 15 part-time jobs with the most active exporters, with the assumption that they are seeing growth potential in their sales and are willing to invest in expansion.

Table 25: Employment in French beans production

(The first two rows refer to employment [wage labour, not membership] in cooperatives; the remaining rows refer to employment in commercial farms and export companies)

District	Cooperatives/ farms/companies	Total		Men		Women		Youth 16–17		Youth 18–30		Adults > 30	
		Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual
Rulindo	Rusanganwa Farm	40	5	12	4	28	1	20		10	5	10	
Nyanza	Niyonsaba Farm	15		10		5				5		10	
Kigali City	Proxifresh Exporter	11	80	8	32	3	48			3	24	8	56
Kigali City	Garden Fresh Exporter	20	200	16	80	4	120			6	150	14	50

[40] These cooperatives are based in the project area of HortInvest: Karongi, Muhanga, Ngororero, Nyabihu, Rubavu and Rutsiro.

Table 25: Employment in French beans production

District	Cooperatives/ farms/companies	Total		Men		Women		Youth 16–17		Youth 18–30		Adults > 30	
		Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual
Kigali City	Almond Green Farm Ltd exporter	10	30	5	7	5	23			4	1	6	29
Kicukiro	Bahage Food Ltd	22	72	4	10	18	62			20	72	2	0
Total		**118**	**387**	**55**	**133**	**63**	**254**	**20**	**0**	**48**	**252**	**50**	**135**
% of total full-time and seasonal		**23%**	**77%**	**11%**	**26%**	**12%**	**50%**	**4%**	**0%**	**10%**	**50%**	**10%**	**27%**
		100%		**100%**				**100%**					

Source: Authors' computation using data from field survey, 2020.

The table shows that employment in commercial farms and companies is 77 percent seasonal work, related to production and tasks around harvesting, sorting and packaging. Women are in demand because they are appreciated by companies for handling fragile produce with care. Although wage employment provides opportunities for youth, which are already well represented (60 percent), the main opportunity is seasonal work and as a sole livelihood this is difficult, as wages are low in Rwanda (see Section 4.6.3).

Figure 25: Smallholders visiting Sunripe Farm in Bugasera district

(Organized by SEAD-project)

Figure 26: East Gate Farm, Rwamagana district

4.2.5 Farmer cooperatives

Rwanda's PSTA4 recognizes that farmer organizations, cooperatives and associations are central to achieving sustainable and inclusive agricultural development. Also, cooperatives constitute a vehicle through which the individual members can benefit and access different services like market information, extension services, innovation and capacity development, financial services, collective marketing of produce, and joint purchase of inputs. Agricultural cooperatives can help members reduce transaction costs in input and output markets, and increase the bargaining power of small producers vis-à-vis large buyers and input suppliers. This entails youth to become members of cooperatives, groups and associations. The earlier Table 24 provides an overview of the membership of the visited cooperatives whose members produce French beans.

The FGDs and KIIs revealed the main challenges reported for youth to join cooperatives, including:

- Youth have a negative mindset about the agriculture subsector. Many youth, especially those who are educated, are not interested in farming activities. They consider the agriculture sector to be a household activity for subsistence and not for economic gain.
- Youth are constrained by lack of capital to pay the membership fees (share) required to become a cooperative member.
- Youth lack access to land. In order to become a member of a cooperative, one has to be a farmer owning or leasing land.
- Female youth do not show much interest in buying land unless they face responsibilities at a young age (such as having a child at a young age), and start looking for a living.[41] Their male counterparts typically work, save money and buy land.

The more assets and businesses a cooperative has, the higher the per-share-cost a prospective member has to pay. Table 26 shows the data collected, although not specific for French beans; often, it is not much, as horticulture cooperatives do not have a long history[42] and thereby do not

[41] This is contrary to what the table suggests: more female youth than male youth are members of cooperatives and, therefore, should have access to land. Likely, the high female youth membership is a sign of the feminization of agriculture.

[42] Cooperatives with a longer history, large assets can be found in for example in dairy, coffee and maize. Also, the average number of members is much higher in those subsectors. Horticulture became a priority subsector to the GoR relatively late, in the last 10 years.

have many assets. However, with a wage labour rate of RWF 1 000/day, it can still be an obstacle for youth to join.

Table 26: Cost of membership per cooperative

Cooperative	District	Cost of share / membership (RWF)
Isonga Rya Bwunyu	Gasabo	12 700
Koabiga	Gasabo	10 000
Yahoproc	Rulindo	20 000
Urugero	Nyanza	30 000
Kaidu	Rubavu	48 000
Jyamberemuhinzi	Nyanza	10 000
Dufatanye Umurimo	Nyanza	300 000[43]
Cofar	Rubavu	30 000
IABM	Muhunga	50 000[44]
Ccopareg	Rwamagana	10 000
Coop Gwiz	Rwamagana	12 000

Source: Authors' computation using data from field survey, 2020.

What can cooperatives mean for youth?

Box 12: A case of access to finance by a cooperative

The IABM cooperative of Muhanga District borrowed from the Bank of Kigali EUR 18 375, which will be repaid in four years. The purpose of this loan was to match a grant from the HortInvest project. Part of this loan has already been used to buy a car for transportation purposes, and the remaining amount is meant for post-harvest facilities (cold storage, washing station and dryers). IABM is currently working with two export companies, namely Garden Fresh (French beans export) and Virunga Biotech (gherkin export), as well as other domestic buyers such as hotels and supermarkets.

The team did not observe existing cooperatives providing additional support to new youth members or undertaking other efforts to increase youth membership. Two cooperatives interviewed had a surprisingly high participation of youth: Kaobiga (French beans, chilli and tomato production) from Gasabo District and Urugero (tomato production) from Nyanza District. In both cases, the district governments were key in initiating the cooperatives, giving youth a priority from the start and making marshlands available for the cooperatives. More so, Gasabo District also allowed membership fees (shares) to be paid at harvest time. It also joined hands with RYAF; RYAF sponsored an intern under its internship programme[45] to support the new cooperative in its management, thereby creating an effective mix of educated and uneducated (youth) membership. Such focused measures can be adopted in other cooperatives as well in order to increase youth participation in the French bean VC.

[43] This cooperative has a number of assets and is more established than the others.
[44] Horticulture is a second product for this cooperative, which is bigger in the seed production and processing of maize.
[45] A collaboration with Feed the Future project Hinga Weze.

Youth employment with cooperatives

While the main purpose of cooperatives is to serve its members, cooperatives can also provide employment opportunities. Cooperatives have limited staff who are involved in administrative tasks, networking, logistics around inputs and training, aggregation, etc. Youth form 18 percent of the membership of cooperatives involved in French beans, while percentage-wise, more youth are employed in cooperatives (38 percent), but less than the employment by commercial farmers and exporters (60 percent). Coop Gwiza has a large influence on the cooperative data: this cooperative leases 230 ha of land, which it cultivates with French beans and other produce, and the cooperative also performs sorting and packaging tasks, which one would normally expect the exporters to do.

Table 27: Employment by cooperatives active in French beans

District	Cooperatives/ farms/companies	Total		Men		Women		Youth 16–17		Youth 18–30		Adults > 30	
		Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual
Rulindo	Yahoproc Cooperative	6	1	5	1	1				2	1	4	
Rubavu	Cofar Cooperative		3		2		1			2			1
Rwamagana	Coop Gwiza	5	190	3	125	2	65			2	71 (42F)	3	119
Total		**11**	**194**	**8**	**128**	**3**	**66**	**0**	**0**	**6**	**72**	**7**	**120**
% of total full-time and seasonal workers		**5%**	**95%**	**4%**	**62.5 %**	**1.5 %**	**32%**	**0%**	**0%**	**3%**	**35%**	**3%**	**59 %**
		100%		**100%**				**100%**					

4.2.6 Post-harvest handling and aggregation

Small quantities of produce can be directly supplied by the farmers to the local retailers at the district and village markets. However, for supply to exporters or wholesalers, aggregation is an important function to reduce transaction costs. In the French bean VC, typical brokers at the local level are virtually absent. Either wholesalers or exporters come to the village to collect, or the cooperatives play the aggregation role and organize transport to the wholesale markets or to the export company. The lack of brokers in the French bean VC explains the case of small local market volumes, fewer actors and relatively small distances within Rwanda. Harvesting is crucial, as the quality of produce starts in the field. It is necessary to engage workers who are sensitive to the required quality in order to prevent/reduce losses and rejections. In the study team's interview, the Garden Fresh representative[46] mentioned that the company prefers to hire 100 percent female workers during harvesting because women are gentle and patient. The representative added that the company does not prefer to hire youth during harvesting because

[46] Interview with Mr Jean-Paul Kabalisa.

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they lack experience and are careless. The company allocates 75 percent of its total labour cost to harvesting activities.

The post-harvest activities as reported by farmers during the FGDs include sorting, grading, packaging, storage, transporting, distributing, and marketing. These activities must be undertaken with care to maintain the fresh quality and to assure the food safety, while also minimizing losses in the process.

The study revealed that farmers are facing substantial post-harvest losses, which was confirmed by buyers/exporters who attributed the high ratio of rejection to the poor quality. Proxifresh indicated that almost 20 percent of the total production ends up in local markets due to poor quality and not meeting the standards set by foreign buyers. At times, farmers also fall victim to unscrupulous aggregators who collect their produce and then tell them that it was all rejected, and consequently pay them less.

Opportunities for youth

As previously mentioned, French beans are delicate, especially in the case of export, and women are more in demand in the harvesting, sorting and packaging of French beans. There is less desire to hire youth, as they are perceived to be less responsible. Men are employed for other tasks. Female and male youth, for their respective tasks, could likely be supported with coaching to garner their employability.

Table 28: Suggested post-harvest losses, causes and solutions

Causes of post-harvest losses	Proposed solutions
• Poor harvesting methods and inappropriate equipment • Poor transportation • Lack of quality storage and cooling facilities • Delay in harvesting • Lack of market (subdued global demand during the COVID-19 pandemic) • Poor infrastructure (sheds, feeder roads, cold storage, transportation, decentralised packhouses) • High cost of airfreight (especially during the COVID-19 pandemic) • High cost of packaging materials	• Training on harvesting methods and export quality standards • Mobilizing financial institutions to finance farmers/cooperatives (youth) to access appropriate harvesting equipment and infrastructure • Provisioning and improving decentralised storage facilities to help keep the harvest fresh at source • Assessing supply chains where Plastic Returnable Crate systems are already functioning. Based on lessons learned, introduce field crates and crates for transportation of harvested beans.

Source: Authors' collation of inputs from KIIs and FGDs, 2020.

4.2.7 Trade

Less than 30 percent of workers involved in the trade are under 30 years old. There is no apparent gender inequality in terms of participation, with approximately equal percentages of male and female youth involved. Around 70 percent of wholesalers and retailers interviewed reported not dealing with suppliers younger than 30 due to a lack of trust. The remaining 73

30 percent who deal with young suppliers claim that they are not satisfied with their services. However, youth are usefully engaged in marketing activities, and their ICT skills are in demand. Social media platforms are increasingly being used for advertising food products, and youth are the ones managing such activities. In addition to wholesale and retail, trade also entails export.

Box 13: Youth and ICT

According to the field data collected for this report, skills in ICT are one of the main strengths that youth have in comparison to their older peers. The use of social media, smartphones and other ICT-related devices increasingly play an important role in business, and the horticulture sector is not an exception. In fact, social media and other digital platforms can be considered great tools to advertise products and to gain new customers, and youth ICT skills are valued along the VC.

"I use social media to market my products, and sometimes I conduct market analysis using social media and ICT sources (websites)." (*Christophe Nsonzeyumpa, 28, agripreneur chilli farmer*).

Moreover, the technology is lately facilitating financial inclusion across Rwanda. Leading companies in telecommunications such as MTN and Airtel are providing financial services through their mobile money account services popularly known as MoMo. With only a simple telephone it is possible to save, lend and transfer money without needing a bank account. Youth that have more familiarity with phones and digital devices are often the ones in charge of making payments using their mobile money.

Another advantage that technology is giving youth is the possibility of accessing information on new practices and trends in agriculture via the internet, and the potential to apply that knowledge in their respected area. Youth, who are more likely to be connected to the web than older colleagues with the help of video and online contents, are more often coming up with innovative ideas and are therefore more involved in decision-making in the workplace.

4.2.7.1 Wholesale

The key wholesale market in Rwanda is the Nyabugogo market in Kigali, which also has a section for retail. The wholesale market opens in the morning around 4 a.m. and closes at about 8 a.m., after which the retailing starts. From here, supplies go to other retail markets in Kigali (e.g. Kimironko, Kigali city market, Kicukiro and Kabuga), hotels, restaurants and supermarkets and to other districts as well.

At the Nyabugogo market, there are six major French bean wholesalers (four females and two males), including three youth who are all female. The French bean wholesalers have two sources for their French beans: (1) the main source is the second-grade quality that gets rejected at the NAEB packhouse after the first-grade is sorted and prepared for the export markets; and (2) the second source is the direct supply by farmers or cooperatives from the main production districts of Gasabo, Rwamagana, Bugesera, Gicumbi, etc. This shows that French beans are largely produced for the export markets and that oversupply and second-grade products are destined for the domestic market.

The main operating costs are related to the purchasing costs of vegetables from farmers, logistics and transportation costs, and tax in the case of cross-border trade (see Table 29).

Table 29: Reported investments, costs and profit margins for wholesalers

District	Crop	Investment per batch (RWF)	Costs per month (RWF)	% Veg. thrown away	% profit margin
Kigali Nyabugogo wholesale market	French beans	300 000–500 000 (for 750–1 500kg)	Rent: 10 000 License fee: 5 000 Tax: 4 000 Cleaning: 2 000	5%	30%

Source: Authors' computation using data from field survey, 2020.

Such investments are out of reach for most of the unemployed youth.

The specific challenges for youth in wholesale as reported by the interviewees are:

- lack of capital
- lack of appropriate transport facilities without cold storage
- lack of storage facilities once produce arrives in Kigali
- price fluctuation
- reduction of customers, which was amplified by market closures during the COVID-19 pandemic.

Box 14 gives examples of modern logistical and supply services in Rwanda, although the majority of French beans in the domestic market still go through the traditional channels.

Box 14: Modern suppliers

Get It, Ineza and Garden of Eden are suppliers in Kigali to hotels, restaurants and supermarket chains like Simba, Sawa City, Woodlands, Frulep, etc. They source vegetables and fruits from larger farms and wholesale markets. Get It recently installed cold storage to improve its services.

Youth opportunities in wholesale

As stated earlier, three of the six wholesalers operating in the Nyabugogo market are youth. Furthermore, wholesale requires substantial investment and therefore considerable risks. This largely prohibits youth agripreneurship in horticulture produce like French beans. Youth could take chances with small amounts of produce, for example, when prices are lower in their villages. One could gradually grow into the business and slowly increase the volume. Some youth can also learn this wholesaling on the job if relatives are already in the business. Employment in wholesale, however, can mainly be found in menial, temporary jobs like portering, (un)loading, etc. Again, the work attitude and reliability are key to finding employment here.

Figure 27: French beans wholesale and retail

[Wholesale (left) and retail (right) at the Nyabugogo market]

4.2.7.2 Retail

In the rural areas, you can find road-side retailers, mainly farmers selling their own produce. Such informal business is not allowed in the towns and cities: retailers have permits and allocated stalls. This is very different from other African countries, where large numbers of retailers can be found on the pavements of strategic locations.

Retailers tend to sell between five and ten different vegetables and fruits to consumers. The investment per crop, per batch, is not very big. Typically, with RWF 50 000 for 90 to 120 kg, retailers can start a retail business in French beans. With some loans and coaching, it should be possible for an unemployed youth to start a retail business in the horticulture sector (see more on costs involved in retailing in Section 4.3.7.2, and on involvement of youth in general as retailers at vegetable markets in Section 5.3).

Commercial outlets and e-commerce

A few supermarkets do have dedicated fruit and vegetable sections. Most consumers rely on the district markets and three big vegetable markets in Kigali. Freshness of produce, choice and price keep consumers from buying at the supermarkets.

E-commerce has similar problems. More than 10 e-commerce companies such as DMM Hehe (see Box 15) deliver many fast-moving consumer goods (food and non-food) to the consumer's doorstep. However, only a few supply fresh produce such as fruits and vegetables, meaning going beyond being an ad hoc transporter between a retail market and consumers. As such, freshness and choice remain a challenge, which is limiting the growth of this channel. Pride Farm, which is also collaborating with HortInvest project, focuses only on organic fruits and vegetables, and does home delivery. There are many motorbike drivers who will go to retail markets and buy vegetables and fruits for consumers.

Box 15: DMM HeHe

DMM HeHe, formerly Hehe Labs, was founded in 2010 by a group of Rwandan college students after graduating from an MIT incubation programme. Hehe, meaning "where" in Kinyarwanda, is an e-commerce platform with a mission to create an efficient distribution service to match demand and supply, and to connect SMEs with consumers (via home delivery). In 2017, the company joined a leading Japanese technology conglomerate.

Even though its current focus did not include horticulture supply, the growing middle class in Rwanda and DMM HeHe's plan to expand business in the regional market is leading the company to focus on the distribution of vegetables across Rwanda and use its current network of nearly 2 million consumers to connect rural farmers with potential buyers in urban areas. In 2019, the company started a partnership with HortInvest to source vegetables directly from local farmers and cooperatives across the districts of Rwanda. The measures related to the COVID-19 pandemic gave an additional boost to DMM HeHe, which maintains a youthful staff, including 25 professionals with an average age of 27, with only five a little older than 30.

Source: Interview with Mr Diego Twahirwa by authors.

Opportunities for youth in retail

Retailers consulted for this study have indicated that with around RWF 50 000 one can start a retail business. French beans are not in great demand from domestic consumers, therefore one could ideally combine it with selling other crops. RWF 50 000 is a relatively small amount of money, which many (even less educated/skilled) youth should be able to acquire from their networks. In addition, youth would need access to a market space and linkages with suppliers. Space can be an issue at vegetable retail markets, and can differ from district to district, so this needs to be assessed with the market management committee who gives permission to new retailers. This could also be a more attractive agripreneurship opportunity for (young) women.
Opportunities for youth in other retail forms (supermarkets and e-commerce) are limited because fruits and vegetables are not key sales items, and certainly not French beans alone.

4.2.7.3 Export

The GoR has a strong priority to increase international exports due to the pressure to increase forex earnings. It is important to understand the different export channels.

Types of export

As explained above on the end markets, there are three types of exporters: (1) formal exporting companies which export to Europe and the Middle East by air freight; (2) formal traders who do cross-border export; and (3) informal traders who carry bags of crops, one or two at a time, across the border.

Export companies can be differentiated into three categories as well: (1) those that only export their own produce; (2) those that have no production unit and only buy from farmers; and (3) those that own production units but also buy from farmers. In total, there are 87 active exporters, but many are irregular.[47] Rwanda's Horticulture Exports Association has about 60 members. Table 30 shows the key exporters for French beans, most of which focus on more than one crop.

Table 30: Overview of key exporters of French beans

SN	Company name	Type of products	Own produce only	Only buying (no farm)	Own produce and buying
1	Proxifresh Rwanda Ltd	French beans			X
2	Garden Fresh Ltd	French beans, broccoli, baby corn			X
3	Lotec Rwanda Ltd	French beans, peas, okra			X
4	Safi Price Ltd	French beans, green chilli		X	
5	Eden Fresh Ltd	French beans, green chilli		X	
6	Excella Produce Ltd	French beans			X
7	ABCD Great Life Ltd	French beans		X	
8	Effective M and N Ltd	French beans, chilli, avocado			X
9	Sunripe Farm	French beans, chilli, tomato, sweet pepper	X		
10	Bahage Food Ltd	French beans, chilli, passion fruit			X

Source: Authors' computation using data from field survey, 2020. Companies and products provided by NAEB.

Most of the exporters which both produce and buy provide embedded services to their smallholders. This includes advancing certain inputs like seeds, pesticides and extension services by their agronomists. This is a good advantage for smallholders, as this (to a certain extent) reduces their access to finance problems, provides them with access to knowledge, and supports establishments built on more trusted relationships and better coordination between buyers and suppliers.

Traders cross borders with large volumes in trucks and pick-ups, and pay custom taxes on both sides of the border (e.g. USD 140 is charged per truck on the DRC side, while the Rwandan side

[47] A list of the 87 exporters in 2019 can be found at: https://naeb.gov.rw/fileadmin/documents/Fresh_Produce_exporters.pdf.

charges only RWF 2 000 (USD 2.05)[48] These traders can be individual traders, large farmers or cooperatives

The study encountered two associations of cross-border traders in Rubavu who supply to Goma in DRC, and who often aggregate their produce (maize, French beans, etc.), including smaller amounts of chilli. They grow the produce themselves and/or buy from others. These are not the individual women doing the informal cross-border trade.

Table 31: Members of trade associations in Rubavu

No	Association of traders	Male	Female	Total	Male youth	Female youth	Total youth
1	Duhuzimbaraga Group	21	75	96	10	37	47
2	IAIIRU Association	22	0	22	20	0	20

Source: Authors' computation using data from field survey, 2020.

Informal traders avoid the earlier-mentioned taxes by caring one or two bags a time across the border, either on foot or by bicycle. Many of these traders are local women who buy a bag on the Rwandan side, cross the border and sell to a retailer or wholesaler on the DRC side. If the price differences are good, they can do this several times a day.

International export comes with requirements

It is important to differentiate between EU markets (certified and non-certified) and other markets, mainly Middle East and China markets. At its borders, the EU conducts stringent checks on fresh imports, whether or not they have been certified. The EU checks mainly for pesticide residues and harmful organisms in the product or packaging/crate. In the case of a rejection, the consignment is destroyed, which means a loss for the exporter. Exporters to the EU can be temporarily banned from exporting to the EU after several rejections. Also, a country can be banned from exporting a certain crop to the EU, which has happened several times, for example from Kenya and Ghana, until the government can prove that the production and handling of that specific crop has improved.

Box 16: French bean exporter Garden Fresh

While in 2018 Garden Fresh was supplying 15 to 18 tonnes per week, it now supplies up to 30 tonnes per week. Mr Jean Paul Kabalisa, the representative for Garden Fresh, said that his company has received increased demand from the international markets, which constitute an opportunity for smallholder farmers and cooperatives to secure guaranteed markets for their produce. "We either go and buy and collect directly from the farmers, or farmers themselves bring us the French beans."

Many EU supermarkets and EU importers require various certifications, the basic one being GlobalGAP for fresh produce (but not for dried products like dried chilli, for example). Other

[48] It seems like a high tax, but for a five-tonne truck this is a cost increase of RWF 28/kg.

common required certification includes Hazard Analysis and Critical Control Point (HACCP), British Retail Consortium (BRC) Certification, International Finance Corporation (IFC) for quality control, and Sedex Members Ethical Trade Audit (SMETA) certification for social sustainability such as labour conditions and decent wage (see also Section 4.4.3). These are "voluntary" certifications, meaning they are agreed upon and demanded by the industry but are not a requirement of any EU agency or national government. The open markets and so-called "ethnic markets" (shops which sell especially to groups with foreign backgrounds such as of South Asian decent) do not require certifications.

Source: New Times [online]. Kigali. [Accessed 15 December 2020]. (see footnote)

Rwanda currently has three GlobalGAP certified exporters (Garden Fresh, Sunripe and Fresh Gate Eastern Africa), while a few others are in the process of becoming certified. Certification is a costly and complicated affair, which covers many production and handling requirements, and is still considered too complicated for smallholders in Rwanda. The Rwandan exporters are currently focused on certification of their own farms and handling facilities. Whatever these exporters buy from smallholders, the supplies are destined for markets that do not require certification. Buying from smallholders for the EU is also a risk, as it can be difficult to control the smallholders' use of pesticides and could lead to rejections. In Kenya, there is a trend of reducing out-grower schemes/contract farming with smallholders for export schemes, due to the risk of rejection. To date, Rwanda has seen no rejections in the export of French beans.

Rwanda's competitiveness, compared to other exporting countries like Kenya and Ethiopia, comes from its suitable agro-ecological conditions and from its low labour costs. Farm wage labour costs roughly EUR 1 per day in Rwanda, EUR 2 in Ethiopia, and EUR 3 in Kenya. Export from Rwanda is still challenged by fewer facilities and costly airfreight compared to its competitors. Nevertheless, the GoR is keen to support exports. Since 2018, the NEAB has been providing transport subsidies to keep cargo costs to Europe low at USD 1.20/kg to 1.40/kg. However, cargo space with RwandAir remains limited, and the other slightly more expensive carrier is Ethiopian Airlines. The COVID-19 pandemic resulted in reduced budgets of NAEB and had to cancel its air freight subsidies. At the same time, due to reduced flights and reduced cargo, the airlines increased their prices to between USD 1.80/kg and 2.20/kg.[49]

[49]See www.newtimes.co.rw/news/horticulture-exporters-decry-hike-airfreight-charges.

Although the overall picture of French bean export is favourable, it is still a developing sector in Rwanda and still faces challenges; many companies are investing and growing and would be happy to break even.

Box 17: Proxifresh committed to provide intern opportunities for graduates

Proxifresh is a company specialised in import, export and distribution of fruit and vegetables from Mauritius operating in Rwanda since 2014. Currently it is one of the largest exporters of French beans in Rwanda supplying mostly to the European market, especially France and the Netherlands. However, despite the large quantities that it ships every day to Europe, their business is not as profitable as they planned. Among the main reasons for its reduced profitability, Mr. Dannisen Chellen, the general manager, mentioned the low skills levels of farmers. In order to overcome this challenge Proxifresh is currently giving training to their affiliated farmers on topics such as land preparation, spraying pesticides in alignment with the Good Agriculture Practices (GAP) international standards, and reduction of post-harvest losses. Furthermore, the company got into the conversation with MINAGRI to accept a fixed number of fresh graduates (Bachelors) for internships to gain practical experience in a sizable export horticulture company. He is still interested, but the process should not become bureaucratic.

Figure 28: Women working in NAEB's packhouse

In 2019, the NAEB upgraded its cooled packhouse in Kigali, with support from the HortInvest project, and offers its services to exporters as a shared facility, as exporters lack adequate packing facilities. The key advantage is that the packaging at the NAEB facility occurs under hygienic and cooled conditions before being flown out of the country. The idea is that leading export companies like Garden Fresh and Proxifresh will invest in their own facilities with the support of projects such as HortInvest, creating space at the NAEB's packhouse for other companies with fewer investment capacities.

Horticulture exports from Rwanda valued USD 27 million in 2018/19 and USD 28 million in 2019/20. The NEAB's pre-COVID target was an annual export revenue of USD 208 million by 2024 from horticulture but has lately been reduced to USD 130 million by 2024.[50]

Box 18: NAEB packhouse

"Ninety percent of our workers at the pack house are women."

Jean Marie Munyaneza, NAEB emerging commodities diversification manager

Youth opportunities in export

Youth agripreneurship opportunities in formal export to cross-border and international markets are minimal, since they require having considerable knowledge, networks abroad and upfront investment capital. Existing opportunities seem limited to self-employment in the informal cross-border trade, carrying one bag of French beans at a time across the border into DRC, like the many women who already do this at the main border crossings. This may not be an attractive

[50]See www.newtimes.co.rw/business/whats-way-forward-rwandas-horticulture-industry.

proposition for many youth, but it certainly is within their reach, as capital requirements are low. The opportunities for youth farmers in Rubavu to trade their produce to Goma is considerable, especially if they can join or organize themselves, as two associations are proving.

The export companies provide substantial employment, with different tasks assigned to women and men. As the export of French beans grows, both to the EU and to DRC, youth employment opportunities are also expected to increase. Although there is some reservation towards youth, who are deemed less responsible than their older peers, 60 percent of exporter employees are youth. Note that this is largely seasonal work with low wages (see Section 4.6.3 about decent wage). In addition to being employed by exporters, producing as a youth farmer for exporters is another good opportunity, especially if exporters are willing to invest in production with the provision of inputs and/or with the provision of agronomic advice from their own agronomists. If not, support organizations should consider supporting starting youth farmers. EU markets can be divided into non-certified and certified, the latter being beyond the capacity of starting youth farmers.

4.2.8 Service providers

The market of service providers is not very well developed yet in Rwanda. Supporting organizations which rely on government funding, external funds and subsidies were presented in Section 3.3. Besides the input suppliers already mentioned in Section 4.2.3, a few other service providers exist, including financial institutions (see the next paragraph), which provide services on a more commercial basis:

- Soil testing: Holland Greentech and ENAS operate handheld soil testers which provide results within a few minutes on five key soil characteristics.[51] In partnership with RAB, Morocco's OCP group, one of the leading exporters of phosphate fertilizers in the world, started the Caravan project, which applies a set of mobile equipment with modern soil testing technologies, in collaboration with the fixed laboratory at RAB. The project began a pilot phase in Nyabihu District with the aim of covering the whole country. ENAS also has a fixed soil lab.
- HoReCO (see also Section 3.2) and Holland Greentech (see also Section 4.2.3) provide private extension services, and they currently have commercial farmers as paying clients. Services provided to smallholders are still paid for by the GoR or by development projects. The farmer promoters and FFS facilitators are also perceived as "private extensions", but they also are largely paid for by the GoR or by projects. AgriWin Ltd (see also Section 3.2) is probably the only youth organization solely providing extension services on a fee-for-service basis.[52]
- The NAEB provides packhouse services and prepares consignments for air freight. Export companies are paying for these services (see Section 4.2.7.3).

[51] The handheld soil tester (from Agrocares) measures N, P, K, pH and organic matter. It is linked to a mobile phone app which, on the basis of the measurement, online data and selected crop, also provides soil advice.

[52] This report provides an interesting analysis of youth agripreneurship, agricultural extension and advisory services (https://www.digitalgreen.org/wp-content/uploads/2017/09/DLEC-Study-on-Engaging-Young-Agripreneurs_Lessons-from-Rwanda-and-Uganda.pdf). Many of the youth organizations mentioned are also mentioned in this report, although the findings in this report are that several of these youth organizations which do fee-for-service or on-commission work largely rely on funded/project implementation work.

Box 19: Crop insurance and subsidies

The NAIS, launched on 23 April 2019 by MINAGRI, is meant to mitigate risks and losses incurred by farmers due to unpredictable natural disasters, pests and diseases that affect their livestock and crops. The scheme also enables farmers to more easily access financial services and ensure flow of credit to the agriculture sector.

The VCs under the scheme are maize, rice, Irish potato, French beans, chilli, cattle, piggery and poultry in all 30 districts of Rwanda. It will eventually expand to other commodities, including other horticulture crops.

The risks covered include loss of yield due to unpreventable risks, namely drought, dry spells, floods, inundation, uncontrollable pests and diseases, landslides, natural fires and lightening, storms, hailstorms and cyclones. The scheme has already insured three hectares of French beans and 259 hectares of chilli.

French beans: The sum insured for French beans is RWF 2 018 250/ha.
Premium rate: Eight percent applied to the sum insured, meaning an insurance premium of RWF 161 460/ha, of which farmers pay 60 percent (RWF 96 876) and the other 40 percent is subsidy (RWF 64 584).

Chilli: The sum insured for chilli is RWF 2 151 860/ha.

Premium rate: Eight percent applied to the sum insured, meaning an insurance premium of RWF 172 148/ha, of which the farmers pay 60 percent (RWF 103 288) and the other 40 percent is subsidy (RWF 68 860).

There is a need to sensitize farmers, including youth, through export companies and farmer organizations to benefit from this existing facility.

- Exporters of French beans provide embedded services to their supplying smallholders and their cooperatives in the case of contractual production/supply agreements.
- The Control Union has recently established an office in Rwanda to provide GlobalGAP and other certification services.
- There are several packaging producers in Rwanda such as Rwanda Plastics, AgroPlast, EcoPlastic, V-Plus and Jabbal which provide items like plastic crates, bottles, bags and pots. However, the cost of locally produced packaging is very high; therefore, companies buy them from Kenya, except for those who need small quantities.
- The National Agriculture Insurance Scheme (NAIS) insures various horticulture crops, including French beans, against crop losses due to weather, pests, diseases, etc. (see Box 19).

Not available but relevant for the French bean VC:

- Pesticide residue testing as a service is not available in Rwanda, and samples are sent abroad, for example to Kenya.

Financial service providers

The following financial service providers were found to have specific youth-related products and activities, and are active in horticulture VCs, although are not crop-specific:

a) Umurenge SACCOs

Some 480 SACCOs are registered with the RCA, offering financial services, especially in the rural areas. The Fin Scope 2008 and 2012 surveys revealed that in 2008, 21 percent of Rwandans 18 years and older were using formal financial institutions and in 2012, the percentage had increased to 42 percent. Before 2008, among the half a million who were involved in banking in Rwanda, 97 percent were holding a bank account at the Union of Cooperative Banks UBPR (Union Banques Populaires du Rwanda, now privatised as Banque Populaire du Rwanda); within three years, *Umurenge* SACCOs multiplied by five the number of banked people, and have an impact on households that represent more than half of the total population. Currently the 80 percent of SACCO clients live in rural areas (AFR, 2016).

Box 20: Youth and digital finance

"Youth are highly interested in using digital financial services like mobile banking and mobile money."

Jean Claude Mutuyimana, president of a horticulture platform in Karongi

b) Local Competitive Fund (LCF)

The LCF is a matching grant facility that funds innovative partnerships between private sector players to enhance VC integration. NGOs and TVETs can also partner under certain conditions. Nine districts were selected to pilot the LCF: Burera, Gatsibo, Gisagara, Huye, Karongi, Kirehe, Nyamagabe, Nyamasheke and Rulindo. There must be at least two businesses (companies/cooperatives) per partnership. Targeted VCs include agro-processing in dairy, meat/fish, Irish potato, soybeans, sugar, milling products, fruit and coffee, and high-end products like essential oils, silk, stevia, macadamia nuts, banana, wheat, tea, potato and pineapple. The expected own contribution of the appliers varies between 25 and 40 percent.

The LCF was implemented by the Local Administrative Entities Development Agency (LODA) in the Ministry of Local Government of Rwanda and the respective districts funded by Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ) and the GoR.

c) Access to Finance Rwanda (AFR)

This programme, initiated in 2010, is funded by the UK Foreign Commonwealth and Development Office (FCDO), Sweden, USAID, the MasterCard Foundation and KfW, and supports the development of the financial sector in Rwanda. The AFR's intent is to remove the systemic barriers that hinder access to financial services by putting low-income people, particularly the rural poor and women, at the centre of its interventions. It supports the development and the provision of financial services, including savings, credit, insurance, payments and remittances.

d) BK Urumuri Initiative

The BK Urumuri Initiative was launched in 2017, in partnership with the Inkomoko business consulting firm, as part of the Bank of Kigali's corporate social responsibility programme. It has the purpose of empowering young and growth-oriented entrepreneurs in Rwanda to create jobs.

To date, 100 businesses have completed the programme and have received more than RWF 100 million in interest-free loans.

e) Business Development Fund (BDF)

As part of the financial infrastructure to promote SMEs, the BDF was established in 2011 as part of the Development Bank of Rwanda (BRD), with the objective of assisting SMEs to access finance, particularly those without sufficient collateral to obtain credit at reasonable rates from traditional financial institutions. The BDF helps small businesses access credit by providing:

- access to finance through SME guarantee schemes
- start-up toolkit loan facilities
- agribusiness investment facilities for university graduates
- equipped Integrated Craft Production Centres through leasing schemes.

With those services, the BDF wants to achieve the following objectives:

- Provide modern facilities for production and marketing of local products.
- Organize the facilities in a central area instead of operating in makeshift structures in residential areas.
- Generate employment opportunities for the youth and facilitate their participation in economic development.
- Enhance technology development and technical training.

As the BDF provides guarantees for 70 percent of the loans, this remains a challenge for youth (See Box 7 in Section 4.2.4).

f) Inkunga Finance Plc

This is one of the financial institutions, among several in Rwanda, which offers savings and credit services to agriculture entrepreneurs, traders, industrial businesses, young entrepreneurs and regular people who just want to save for personal projects. Inkunga Finance Plc offers various savings products and credit products to suit different projects. The company's objectives are to increase the penetration rate in the intervention zone, implement financial products that fit with the needs of their customers, and improve technology-based services.

g) Kenya Commercial Bank (KCB) Igire programme

This programme for the youth empowerment was launched in 2019, after signing a MoU between KCB Bank Rwanda and the National Youth Council. It has provided 100 new graduates with intensive six-month TVET, after which the KCB Foundation provided funds to some of the young entrepreneurs for their start-ups.

h) Development Bank of Rwanda (BRD)

This bank provides short-, medium- and long-term investment loans to projects in the priority sectors of the Rwandan economy, particularly agriculture, export, energy, housing and education. It also operates the BDF fund (see point e)).

4.2.9 Value capture along the French beans VC

French beans are sold at both export markets and local markets. At domestic markets, the gross values per actor is lower. As can be seen in Table 32, both wholesalers and retailers take a gross value share of 14 percent, whereas farmers retain almost 50 percent of the gross value.

Table 32: Value capture French beans domestic market

Price per kg	Farmer	Local aggregator	Wholesaler (Kigali)	Retailer	Consumer in Kigali	Total
Selling price/kg (RWF)	350	500	600	700	Consumes	
Gross value added (RWF)	350	150	100	100	-	Total value added RWF 700
Percentage of value capture	**50%**	**21.4%**	**14.3%**	**14.3%**	**–**	**Total 100%**

Source: Authors' compilation based on FGDs and KIIs undertaken for this study.

Export is more profitable to farmers than the domestic market, as Table 33 shows, and there is more value created in the export channel compared to domestic markets. In the export market, however, the gross value share is mostly captured at the level of international buyers and retailers. Note that exporters reject 30 percent but still sell these French beans to the domestic market. Prices for export are FOB, so the exporter's gross value share includes around USD 1.80/kg for air cargo costs.

Table 33: Value capture French beans export market

Price per kg	Farmer through cooperative	Exporter to Europe from Rwanda	Wholesaler in Europe (Kigali)	Retailer in Europe	Consumer in Europe	Total
Selling price/kg (RWF) FOB	575	1 130	3 900	5 200	Consumes in Europe	
Gross Value Added (RWF)	575	625	2 770	1 300	-	Total value added RWF 5 200
Percentage of value capture	**11%**	**12%**	**53%**	**25%**	**-**	**100%**

Source: Authors' compilation based on FGDs and KIIs undertaken for this study.

4.2.10 SWOT analysis and key opportunities

Table 34 provides the SWOT analysis for the French beans VC. The opportunities for youth employment are further elaborated in Table 35.

Table 34: SWOT analysis for French beans

STRENGTHS	OPPORTUNITIES
Production: • Quick returns: harvesting can start after 45 days and be produced three seasons per year if irrigation is available. • Less production investment compared to tomatoes, chilli and passion fruit. Less perishable than tomatoes. • Less prone to diseases compared to tomatoes and chilli. • Increasing yields. Contributes to soil fertility (*Leguminosea*). • Platforms with government support (e.g. RYAF, YEAN,	Production: • Still many exporters are not buying from smallholders who could be nudged into contract farming. • Cost of production and yields can easily be increased by (youth) smallholders by applying proven GAP practices. • Introduce crates for harvesting and marketing.

HoReCo) facilitate youth involvement (e.g. with interns in cooperatives, agronomic training, etc.). • Some export companies undertake contract farming and provide inputs and agronomic advice to their producers. • NAIS crop insurance scheme has prioritized French beans. <u>Market:</u> • Diverse end markets for French beans reduce marketing risks (domestic, although less strong; cross-border; international). • French beans can be an important contribution to healthy diets (proteins). • French beans lead in export value compared to the other three crops studied. • Rwanda has a competitive advantage in agro-ecology and in low wage labour compared to competing export countries. Rwanda is especially advantageous for *haricot verts* production (fine and very fine French beans, year-round demand, less competition). • Special opportunities for women exist, as they perform better in some activities such as harvesting, sorting and packaging. • There is a large number of women involved in informal cross-border trade. • Strong support by the NAEB exists (subsidies on air freight, packhouse, etc.) <u>Youth employment-related:</u> • Key opportunity: youth are motivated for French bean production (as smallholder producers), as proven by several cooperatives. Employment for youth with exporters in agricultural activities, harvesting, sorting, packaging, logistics. • District government offices are key in accessing land by availing (drained) marshlands, including for youth. • Cooperatives can be very supportive for youth if youth are a key focus from the start.	<u>Market:</u> • Demand is still growing for French beans in cross-border and international markets. • Because of export opportunity, there is political interest, making it easier to garner support from agencies and districts. <u>Youth employment-related:</u> • Youth employment is increasingly getting attention from government agencies and policies. • French beans have the potential to employ youth at different nodes of the VC (weeding, harvesting, sorting and transport). • Youth have a keen interest in GAP practices. • Sufficient marshlands and political interests remain to support youth in horticulture. • There is potential to employ both educated (inputs, value addition, e-marketing) and uneducated youth in farming, seasonal work and retailing. • New programmes are increasingly focusing on youth and on horticulture, e.g. World Bank, SAIP, Kilimo, IFAD, IMSAR, MasterCard Foundation, HortInvest, HingaWeze, Agriterra. • There is increasing attention on horticulture in IPRCs, ATVETs, UR-CAVM and RICA. • Financial facilities include BDF (guarantee schemes and matching grants) for educated, well-off youth.
WEAKNESSES <u>Production:</u> • Compared to other vegetables (tomatoes, cabbage, carrots), volumes of French beans and number of smallholders are relatively less. • Most extension staff/TM are not well-trained in French bean production (only recently a priority crop). <u>Market:</u> • Export is growing but is not very stable destination-wise. • Domestic demand does not seem to be growing, which brings the risk of dependency on exports and cross-border trade. <u>Youth employment-related:</u> • Access to land is a key issue for youth to start farming. • Access to finance (for inputs and land) is a limiting factor: most youth cannot provide collateral. Slow	**THREATS** <u>Production:</u> • With the growth of production, pests and diseases will increasingly impact yields. Access to knowledge for smallholders on horticulture GAP practices is not well-organized in Rwanda. <u>Market:</u> • Weak in-country infrastructure (storage, packhouses, refrigerated transport); possibly a bottleneck to further growth. • Export remains vulnerable to shocks (COVID-19, Ebola, competition, also possible impacts of future EU bans). • Limited flights, destinations and costly freight (currently USD 1.8/kg).

processes lead to untimely finance for the production season. • Youth employment mainly in seasonal work with exporters and commercial farmers. Youth are perceived as less responsible/reliable than older adults. Daily wages are low. • Once established, most cooperatives are not making special facilities/regulations to support youth.	• Difficult to meet market standards and certification with high-cost implication, disadvantaging (youth) smallholders. Youth employment-related: • Without irrigation investments for hillsides, there will be a high dependency/competition for the limited marshland.

Key employment opportunities for youth

Table 35 provides an indicative overview where additional youth employment opportunities can be found in the different nodes of the VC of French beans. Opportunities are divided in two groups: those for youth agripreneurship (self-employment, starting one's own business, including farming) and those for youth employment by others (wage employment). Opportunity is given in terms of low, medium or high, from a short-term perspective (two to four years), and from a production perspective (in areas where the respective VC is already well-established). Table 21 shows that French beans are mainly produced in seven or eight key districts, although the whole VC operates across more districts. A key factor in youth employment creation is market demand. While French bean export is growing strongly, it appears to be a less popular product on the domestic market. For this exercise, it is assumed that a commercial farmer has at least one hectare of open field production. Smallholders have a production of less than one hectare, often only 5 to 20 ares, of open field. Although the opportunities depend on many factors, including the amount and the kind of support provided to youth to gain employment, the willingness of VC actors to invest in youth employment, etc., the following has been used as an indicative guideline:

- Low: less than 50 new jobs can be created (within those key 7-8 districts combined)
- Medium: 50 to 200 new jobs
- High: more than 200 new jobs.

Table 35: Youth employment opportunities in French beans VC

SN	Node	Agripreneurship	Wage employment	Remark
1.	Input supply	Low	Medium	For educated youth in agripreneurship starting small agroshops. In employment: as agents of existing agrowholesalers and agroshops. Should focus inputs for multiple crops.
2.	Production by smallholder	High	Low	Land and market access preferably through cooperative and government support. Also, uneducated youth fit well if they can access training. Mainly export is growing, requires quality production.
3.	Production by commercial farm	Low	High	In employment: various tasks for educated/uneducated youth in the primary production and post-harvest handling activities, which are labour-intensive to meet the requirements for the export markets. Harvesting and sorting,

Table 35: Youth employment opportunities in French beans VC

SN	Node	Agripreneurship	Wage employment	Remark
				especially by women. Employment largely seasonal, daily wages are low.
4.	Aggregation and wholesale	Medium	Low	Uneducated youth in agripreneurship: with a small capital, youth can start a business. In employment: mostly occasional wage labour.
5.	Retail	Medium	Low	Uneducated youth in agripreneurship: although domestic demand of French beans is relatively low, there is potential if combined with other fruits and vegetables, as it requires small investment. In employment opportunity: low, only some occasional wage labour.
6.	Export	Low	Medium	Especially for uneducated women in harvesting and value addition in packhouses and value addition. Often seasonal. Number of exporters is limited, but several are opening their own packhouses soon. Many women are involved in the informal cross-border trade (as agripreneurs), but this is not perceived as an attractive option for youth.
7.	Service providers[53]	Low	Low	Mainly for educated youth. Private extension (e.g. HoReCo, TM), logistics, marketing, export consultants, import of packaging materials, etc. Although opportunities for youth employment are minimal, the effect of service providers on upgrading the VC could be considerable in the longer term.

Source: Authors' compilation based on FGDs and KIIs undertaken for this study.

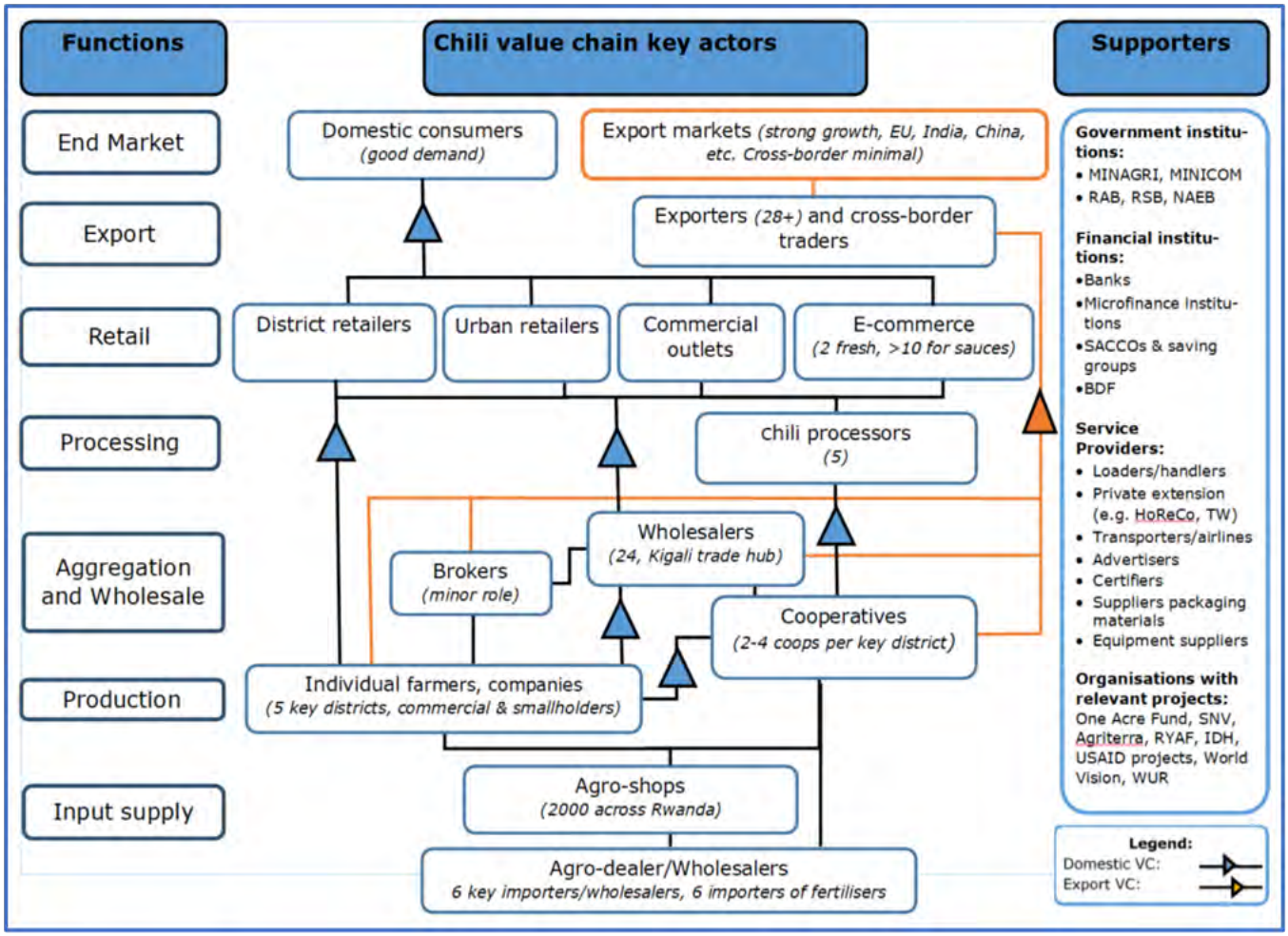
4.3 Youth-centred value chain analysis of chilli

4.3.1 Value chain map

Chilli, or hot pepper, is an upcoming crop in Rwanda, and the chilli VC is similar in many ways to that of French beans, also receiving substantial government attention due to its export opportunities and Rwanda's push to increase forex earnings. Chilli is among the crops identified in the NAEB strategy (NAEB, 2019) with a high export potential. Nevertheless, most of the produce is still consumed in Rwanda. The following VC map provides an overview of the functions and the primary and support actors in the chilli VC.

[53] Other than input suppliers, although some providers do both.

Figure 29: Value chain map of chilli



Source: Authors' computation using data from field survey. 2020.

Chilli is a less sizeable crop than that of French beans: chilli volumes are 65 percent of French bean volumes. The export volumes are around 20 percent of those of French beans, and in terms of export value, chilli is around 28 percent that of French beans. Chilli is produced by small and commercial farmers and is aggregated by wholesalers, cooperatives, exporters and sometimes brokers. International export markets absorb 24 percent of the volumes, showing strong growth until COVID-19 impacts reduced exports. Regional export or cross-border trade is not substantial. On the domestic market, chilli is sold to consumers via district markets and larger markets in Kigali. The amounts processed are small.

4.3.2 End markets

End markets include domestic consumers and international export markets.

The majority of the export of chilli goes to international markets. Smaller amounts go to Uganda, DRC and Kenya, mainly due to seasonal price differences, which also cause imports, although in substantially lower volumes (see Table 36). Of the chilli exports to international markets, more than 60 percent chilli goes to the UK, with smaller amounts going to India, Belgium, the Netherlands and France. There are about 10 countries that import very small amounts on an infrequent basis. Chilli export shows fluctuations, which coincides with the notion that many of the

Rwandan exporters are without stable, long-term customers. However, this also fits with the notion that Rwanda has only recently begun to emerge as an exporter, and stable export relationships require time and sustained performance, taking competition from other supply countries also into account.

Table 36: Chilli imports and export, formal and informal

Chilli		Import			Export		
		2016/17	2017/18	2018/19	2016/17	2017/18	2018/19
Formal	Volume (kg)	29 519	25 643	37 182	175 762	239 775	527 224
	Revenues (USD)	24 284	28 691	71 644	237 395	412 913	942 776
Informal	Volume (kg)	2 196	4 082	5 179	108 470	117 995	194 039
	Revenues (USD)	1 476	2 569	2 175	101 154	71 428	93 837
Total	**Volume kg)**	**31 715**	**29 725**	**42 361**	**284 232**	**357 770**	**721 263**
	Revenues (USD)	**25 760**	**31 260**	**73 819**	**338 549**	**484 341**	**1 036 612**

Source: NISR, 2019b.

When comparing export with production (see Table 37), it shows that domestic markets still absorb 76 percent of the volumes. Although clear data of domestic consumption during the COVID-19 pandemic does not yet exist, likely the domestic market has been less vulnerable to shocks. Additional buyers include institutions such as prisons, schools, military, restaurants/hotels, hospitals, etc.

The data do not differentiate between fresh green and fresh red (ripened) chilli, and dried red chilli. It is assumed that the data mostly apply to the fresh green chilli, as this has the biggest market share. Dried red chilli is often used for processing in sauces and other processed items.

On the domestic market, there is mainly differentiation in appearance and pungency. For export markets, the actual variety (depending on the seed company) also matters, but in general in Rwanda, one differentiates *pili pili* (or also called *teja*) which is a collection of local varieties, habanero and Scotch Bonnet (both *Capsicum chinense*) and African bird's eye pepper (*Capsicum frutescens*) (see Figure 30).

Figure 30: Types of chilli on the market

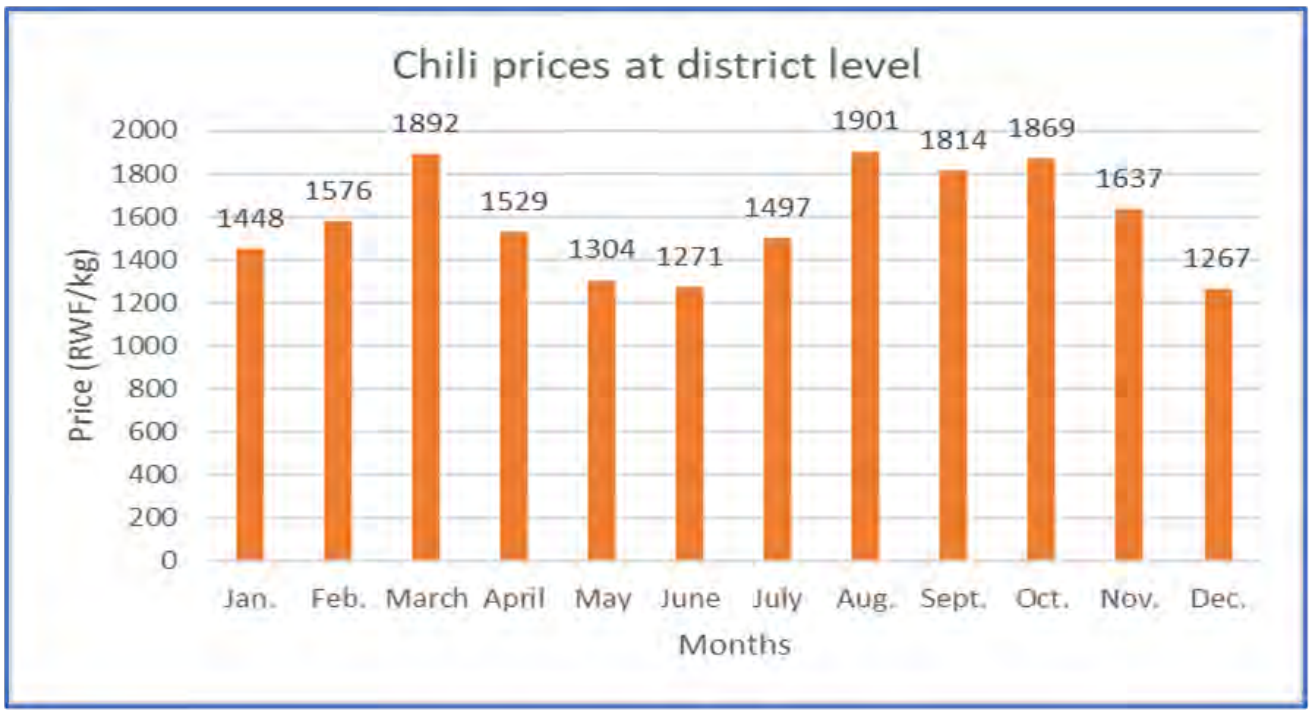
Pili pili (teja)	Habanero	African bird's eye chilli pepper
Large and small local varieties. Green, only fresh. Red (ripened) can be fresh and dried. For the domestic market and for regional export.	Very hot, oval shaped. Can come in different colours, including red, green, yellow and purple. For fresh domestic and fresh export markets.	Small and hot. Fresh and dried, for both domestic and export markets. Dried, often for processing into food additives.
		

Source: Authors' collection from field survey. 2020.

Figure 31 that there are considerable price fluctuations between the months, with higher prices during drier Season C (July–September).

Figure 31: Chilli prices at district level

Average prices for 2017, 2018, 2019 and 2020 (excluding August, November and December 2020) from 21 districts.[54]



Source: Authors' computation from data provided by E-soko (provided in January 2020).

[54] Bugesera, Burera, Gakenke, Gatsibo, Gicumbi, Gisagara, Huye, Karongi, Muhanga, Musanze, Ngoma, Ngororero, Nyabihu, Nyagatare, Nyamasheke, Nyaruguru, Rubavu, Rulindo, Rusizi, Rutsiro, Rwamagana.

With this understanding of the end markets, which form the demand side, the following sections describe the nodes in the supply chain for chilli, starting with the input supply.

4.3.3 Input supply

Within Rwanda's agri-input sector, one can differentiate input wholesalers/agrodealers based in Kigali (with around six key actors) from the many agroshops (around 2000) that sell a variety of inputs at the district and village levels. Several government agencies are also involved in regulating this sector, including RICA, RAB, REMA, the RBS, etc.

Note that the input supply does not specialise in chilli production and instead targets a multitude of horticulture and non-horticulture crops. The description in the French beans section (see Section 4.2.3) provides more details on the input supply, which also apply to this VC.

Nurseries

In more developed horticulture sectors elsewhere in Africa, like in Kenya and Ethiopia, commercial nurseries play a key role in chilli production by supplying quality seedlings to smallholders. Quality nurseries are key to getting the most out of high-quality (hybrid) seeds, as the seedling survival rate is very high, less infected by pests and diseases, and a good start to root development, compared to traditional practices by farmers in seedbeds.

The SEAD project did an assessment and concluded that smallholders will not quickly invest in seedlings. The report mentioned that the Rwanda-Israel HCoE kickstarted the production of seedlings for different vegetables, including tomatoes and onions, in 2018/19, but the business model failed due to insignificant demand from farmers who customarily produce their own seedlings (SEAD project, 2019).

This shows that to make commercial nurseries feasible, as is the case in other African countries, a lot of demonstrations will be required, comparing professionally raised seedlings with farmers' own seedlings. The case of HortInvest provides some initial evidence that nurseries for vegetable seedlings[55] are viable (although not with chilli seedlings, as chilli is not a major crop in the HortInvest project's agri-ecological zone). HortInvest currently supports two cooperatives in the districts of Rutsiro and Rubavu, starting nurseries in shade-net houses. The Rutsiro cooperative has started selling quite well at RWF 50–100 per seedling for tomatoes and cucumbers, and RWF 150 for sweet pepper seedlings, to both cooperative members and non-members. One has to place orders in advance. The cooperative has benefited from several demonstrations of cultivating vegetables with GAPs, and a growing number of farmers in the surrounding areas are ready to pay for seedlings. The Rubavu cooperative is showing delays due to internal management issues, which shows that organizational capacities are as important as many of the agricultural/technical capacities and physical facilities.

[55] Nurseries for fruit saplings are present in all districts, but in other countries this is a separate business unaffiliated with the production with vegetable seedlings.

Although not yet proven for chilli, this does provide an indication that commercial seedling production could also work for smallholders producing chilli in a semi-commercial manner.[56]

Youth employment opportunities

Although the input market is growing, dealership itself currently does not entail a lot of employment per district. As shown in Section 4.2.3, each agroshop has two full-time employees and one part-time employee on average. Creating 100 youth jobs would mean creating 30 new agroshops where the current market already shows 3–30 agroshops per district. As mentioned, it was noted during field visits that the number of new agroshops is increasing, and therefore providing opportunities for educated youth with access to finance to start businesses is also increasing. These agroshops would focus on all of the local agricultural VC opportunities, and the chilli VC alone would allow separate agroshops. There are likely also some opportunities for marketing agents and trained youth, paid by agroshops, who can promote the sales of quality products in more remote parts of the district. This kind of extension is currently often funded by projects or the GoR, and is commercially still difficult. Commercial chilli nurseries, and possible youth employment in more significant numbers, are still not likely in the short term, unless a programme would take this up with substantial promotion of the use of seedlings by smallholders and with proper training in nursery management, as the latter requires more skills than an average smallholder has.

4.3.4 Production

Access to land and water

The high population density of Rwanda and the nation's hilly geography have created a landscape that is covered with small agricultural plots. On average, a household cultivates a land of 60 ares (0.06 ha) (MINAGRI, 2018), often divided into three or four subplots on the hillsides. This shows that smallholders produce on very small areas, something which also applies for chilli. Commercial farms[57] that produce chilli are few.

Smallholders can borrow land (no payment) or lease land (pay rent). Crop sharing is scarce in Rwanda's horticulture sector. Especially in the more organized production of chilli, (e.g. for the export), smallholders often lease drained marshlands or other rehabilitated areas made cheaply available by the GoR. Marshlands are especially attractive as they are flat, fertile and have easier access to irrigation water. As explained in Section 4.2.5, cooperatives can play important roles for youth to access these fertile lands, especially if they have been given preference from the start of the cooperative formation, and when distributing the newly available land. District government offices and organizations like RYAF (see Section 3.2) also play a key role here.

Rain-fed agriculture is still the normality in Rwanda and has long been so, even for chilli production. The rains are sufficient in Season A (September–February) and Season B (March–June), although the reliability on rain is quickly declining due to climate change. Season C (July–September) is a relatively drier season, where irrigation is required for vegetable production. Now

[56] In this context, semi-commercial means that although smallholders, these farmers are able and willing to invest in quality inputs, apply modern agricultural practices and perceive agriculture (in this case horticulture) as viable, key sources of income.

[57] Commercial farms have two hectares or more of chilli production per season (MINAGRI definition of large/commercial farmers), or who have at least 1 000 m^2 of chilli production in greenhouses.

with the changing rainfall patterns, irrigation becomes more crucial for the semi-commercial production. Technologies are available and make year-round production possible, but the purchasing power of smallholders for modern irrigation is limited, and to date, access to these technologies has largely required subsidies. This has further increased the demand for the marshlands to be converted into productive lands. See more in Section 4.2.4 on access to land and water; many of the issues of French bean production also apply to chilli production.

Access to finance

Ibimina and *Umurenge* SACCOs are the most potential sources for loans for production. *Ibimina* are local credit and savings groups which operate on the basis of contributions from their members who save between RWF 200 and RWF 500 per week. Some cooperatives have generated their own funds as an internal saving and credit scheme, or act as guarantees to their members when they borrow from SACCOs and MFIs.

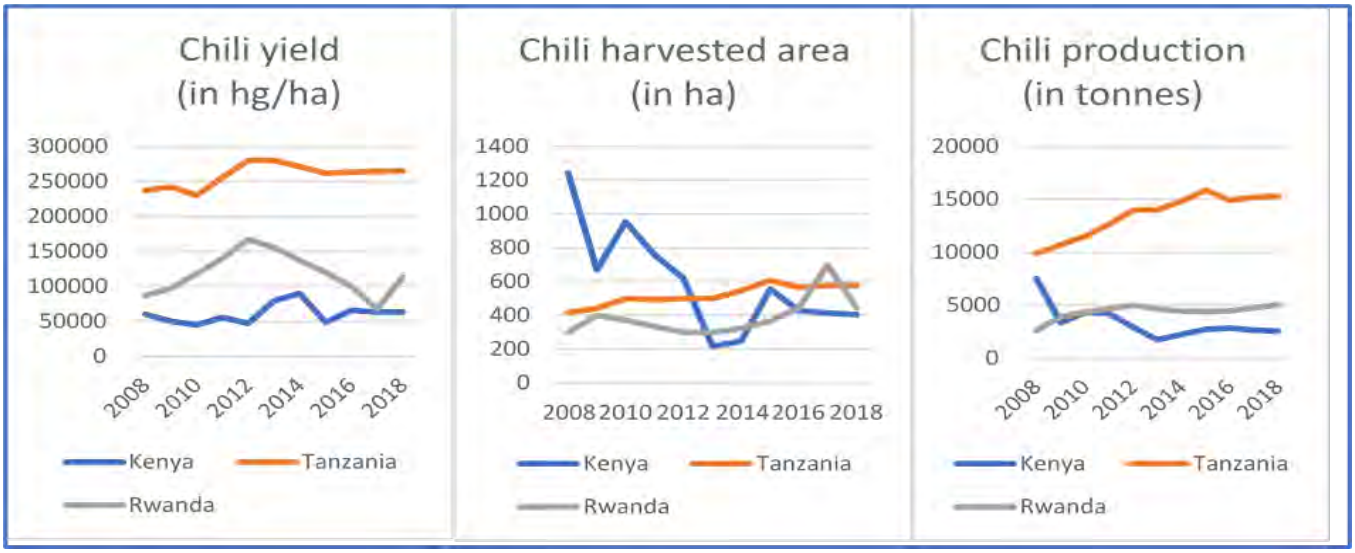
Banks and the BDF were also mentioned as possibilities, but are very challenging as reported: they require collateral; they have long procedures, causing loans to be too late to support production; and they require regular repayments rather than repayment after harvest.

More on organizations and institutions providing access to finance can be found in Section 4.3.8 on service providers.

Production

Comparison of Rwanda's yield, area and production with that of Kenya and the United Republic of Tanzania shows that the United Republic of Tanzania is a strong competitor; with higher yields, United Republic of Tanzania's cost of production is likely also lower. Figure 32 shows that Kenya has lost much of its competitiveness, although the causes are not clear.

Figure 32: Chilli production in Rwanda and neighbouring countries



Source: Authors' computation using data from FAO, 2020. FAOSTAT [online]. Rome. [Cited 15 September 2020]. www.fao.org/faostat/en.

Production in Rwanda has fluctuated over the last 10 years (see Table 37). Acreage and outputs could differ because of price fluctuations, and therefore farmers' inclination to produce and invest inputs, and yields could be impacted by weather conditions and pest and diseases incidences.

Table 37: Chilli production in Rwanda

Year	Rwanda		
	Acreage (ha)	Output (tonnes)	Yield (tonnes/ha)
2009	400	3 902	9.8
2010	372	4 392	11.8
2011	333	4 663	14.0
2012	300	5 000	16.7
2013	299	4 647	15.5
2014	323	4 439	13.7
2015	366	4 412	12.1
2016	447	4 460	10.0
2017	698	4 750	6.8
2018	442	5 009	11.3

Source: Authors' computation using data from FAO, 2020. FAOSTAT [online]. Rome. [Cited 15 September 2020]. www.fao.org/faostat/en.

Box 21: Interest in chilli
"We are in chilli production because it is a profitable business and there is the possibility to become an exporter."
A youth from the Kojyamunya Cooperative

In theory, chilli can be grown everywhere in Rwanda, although with the country's "1 000 hills" there is a high degree of different microclimates. If irrigation is available, however, then the lower altitudes and drier areas are preferred to the higher altitudes of western Rwanda, as this reduces the chances of certain pests and diseases.

Table 38 [58] provides an indication of the most important districts for chilli production. Chilli is a product with domestic demand, and is produced to some extent in nearly all districts, but the key districts are Bugesera, Gasabo, Kayonza and Rusizi.

Table 38: Production of chilli per district
(Average production from 2017, 2018, 2019)

District	Production (tonnes)	District	Production (tonnes)	District	Production (tonnes)
1. Bugesera	115	11. Kayonza	83	21. Nyamasheke	2
2. Burera	2	12. Kicukiro	22	22. Nyanza	21
3. Gakenke	12	13. Kirehe	3	23. Nyarugenge	2
4. Gasabo	44	14. Muhanga	1	24. Nyaruguru	–

[58] The data here suggest a ten times smaller production than the FAOSTAT data presented in Table 37, although FAOSTAT also makes use of data provided by Rwandan agencies.

Table 38: Production of chilli per district

District	Production (tonnes)	District	Production (tonnes)	District	Production (tonnes)
5. Gatsibo	17	15. Musanze	23	25. Rubavu	–
6. Gicumbi	15	16. Ngoma	1	26. Ruhango	11
7. Gisagara	1	17. Ngororero	–	27. Rulindo	14
8. Huye	2	18. Nyabihu	-	28. Rusizi	84
9. Kamonyi	20	19. Nyagatare	8	29. Rutsiro	3
10. Karongi	9	20. Nyamagabe	–	30. Rwamagana	20
				Total	**535**

Source: NISR data compiled by Ujeneza for a HortInvest commissioned report on import substitution.

Table 39: Production of chilli per season

(Average data from 2017, 2018, 2019)

Season	Production (tonnes)	%
Season A (Sept–Feb.)	345	64%
Season B (March–June)	188	35%
Season C (July–Sept.)	2	0%
Total	**535**	**100%**

Source: NISR data compiled by Ujeneza for a HortInvest commissioned report on import substitution.

Compared to the other three selected crops for this study, chilli is the most sensitive; its yields are very responsive to improved practices and are more prone to pests and diseases, thereby it is a knowledge-intensive crop. On average, chilli requires a higher investment in pesticides than the other the selected crops. In terms of production, chilli can be harvested in several rounds: between the fourth and sixth month, after transplanting with traditional cultivation practices; and the double of those rounds between the third and eighth month after transplanting, in the case of modern cultivation practices. Especially due to improved fertilization, chilli can flower earlier than with the traditional way of fertilization, and more rounds of flowering and harvesting can be stimulated. Good return on investments would be key for motivating youth farmers; on this matter chilli is similar to tomato, as both require more duration than French beans but give faster returns than the three-year production cycle of passion fruit.

Increased pungency (a strong, sharp taste) allows for considerably higher prices on the domestic market, which can be realized by using specific (hybrid) varieties. These factors have a big impact on the cost–benefit.

Some hybrid varieties require trellising.[59] With the correct agricultural practices, this leads to higher yields and profits, but the higher up-front investments (seed price, trellising and required labour for trellising) make this less attractive for smallholders. In Rwanda, this is only applied in some greenhouses of commercial farmers.

[59]A trellis is a frame that supports climbing plants.

Cost–benefit

Table 40 presents the average cost–benefit figures of fresh Habanero and bird's eye chilli for export, based on data provided by Koabiga and Jyamberemuhinzi cooperatives. The cost of production is calculated per are, as this is how farmers think about their production: smallholders produce between 5 and 20 ares of chilli for the market. These two cooperatives have export linkages, but if produced for the domestic market, farm gate prices are similar, between RWF 400/kg and RWF 900/kg. There is also considerable demand for dried chilli, with farm gate prices between RWF 1 200/kg and RWF 2 000/kg.

Also, this cost–benefit includes costs which farmers usually do not perceive, e.g. use of own household labour, own land, etc. Taking the four crops of this study into consideration, chilli and tomato require relatively more investment, which is difficult for a starting youth, but should also be more profitable. It is not only the quality of agri-input, but also the knowledge regarding when and how to apply those inputs, and how to get the most out of quality inputs. Earlier in this section, different technologies have been discussed and how they can affect the cost-benefit.

Table 40: Cost–benefit of chilli

[Exchange rate EUR 1 = RWF 1 029 (May 2020)]

Chilli					
Items	**Unit**	**Unit cost**	**No Units**	**Cost (RWF/are)**	**Cost (EUR/ha)**
1. Land lease	are	1 100	1	1 100	107
2. Seed	package	3 500	2	7 000	680
3. Manure	kg	40	140	5 600	544
4. Mineral fertilizer (NPK)	Kg	560	1	560	54
5. Mineral fertilizer (DAP)	Kg	480	2	960	93
6. Mineral fertilizer (Urea)	kg	435	1.5	653	63
7. Lime	kg	30	2	60	6
8. Foliar fertilizer (Polyfeed standards)	kg	5 000	1	5 000	486
9. Fungicides (Copper Hydroxyde Ridomile)	kg	8 000	1	8 000	777
10. Insecticides (Cypermethrin)	litre	4 000	1	4 000	389
11. Land preparation (first)	labour day	1 000	1	1 000	97
12. Land preparation (second)	labour day	1 000	1	1 000	97
13. Transplanting	labour day	1 000	1	1 000	97
14. Mulching material	labour day	1 000	4	4 000	389
15. Pump, other irrigation equipment	lump sum	4 450	1	4 450	432
16. Pump/irrigation maintenance/repairs	lump sum	1 180	1	1 180	115
17. Fuel/electricity costs irrigation	litre	1 000	2	2 000	194
18. Tools	lump sum	500	1	500	49
19. Other cultural operations	labour day	1 000	2	2 000	194
20. Harvesting, sorting and packing	labour day	1 000	1	1 000	97
21. Transportation to collection point	kg	**3**	**218**	**654**	**64**
Total expense				**51 717**	**5 026**
Yield (B)				kg/are	kg/ha

Table 40: Cost–benefit of chilli

Chilli					
Items	**Unit**	**Unit cost**	**No Units**	**Cost (RWF/are)**	**Cost (EUR/ha)**
				218	21 800
Unit price received (per kg) (C)				RWF/kg	EUR/kg
				450	0.44
Revenue (D = B × C)				RWF/are	EUR/ha
				98 100	9 534
Gross margin (E = D - A)				RWF/are	EUR/ha
				46 384	**4 508**
Cost of production (per kg) (F = A/B)				RWF/kg	EUR/kg
				237	**0.23**
Labour investment (days) (G)				days/are	days/ha
				6	600
Return on labour (per day) (H = E/G)				RWF/day	EUR/day
				7 731	**7.51**

Source: Authors' computation using data from field survey, 2020. (Average of Koabiga cooperative, Gasabo district and Jyamberemuhinzi cooperative, Nyanza district).

Youth agripreneurship in production

For youth to participate in production as agripreneurs, which means to start farming as a business, the membership of cooperatives involved in chilli must be considered. Table 41 shows a very similar picture as that of French beans: 20 percent youth involvement, and 12 percent female youth (more than male youth) in chilli production, compared to 18 percent and 10 percent for French beans, respectively. This high female participation can be explained as female economic empowerment but also possibly as the feminization of agriculture, with men taking better-paying off-farm jobs. The youth participation is less than expected based on their ratio in the overall population, but the absolute numbers are substantial and therefore relevant if one wants to create larger numbers of employment through farming.

Table 41: Membership of cooperatives involved in chilli

No	Cooperative	Key crops [60]	District	Male	Female	Total	Male youth	Female youth	Total youth	Youth in leader-ship
1	Jyambere Muhinzi	Chilli	Nyanza	22	26	48	7	3	10	No
2	Coop Gwiza	Chilli, tomato, French beans	Rwamagana	421	320	741	29	7	36	No

[60] Of the four crops under this study.

Table 41: Membership of cooperatives involved in chilli

No	Cooperative	Key crops [60]	District	Male	Female	Total	Male youth	Female youth	Total youth	Youth in leader-ship
3	Association Abahizi	Chilli, tomato, onion	Rwamagana	10	10	20	5	5	10	Yes
4	Koabiga	Chilli, tomato, French beans	Gasabo	256	560	816	123	151	264	Yes
5	Kotipui	Chilli	Rubavu	28	8	36			0	No
6	Coabimuru	Chilli	Karongi	199	161	360	8	2	10	Yes
7	Dufatanye Nyanza	Chilli	Nyanza	11	26	37	2	2	4	No
8	Koraukire Muyanza cooperative	Chilli	Rulindo	1 827	1 000	2 827	239	400	639	
	Total			**2 774**	**2 111**	**4 885**	**413**	**570**	**973**	
	%			**57%**	**43%**	**100 %**	**8%**	**12%**	**20%**	

Source: Authors' computation using data from field survey.

Youth employment (wage labour) in production

Table 42 shows the youth participation in wage labour in commercial farms and exporters. Note that commercial farms and private companies focus on various products, which differ per year and per season, but it still provides an indication of youth involvement. Youth wage labour with these commercial entities is 21 percent, and adults older than 30 participate substantially more (80 percent). Like in French bean production, women are well-represented.

Table 42: Employment (wage labour) in chilli production

District	Coop, farm, company	Total		Men		Women		Youth 16-17		Youth 18-30		Adults > 30	
		Full-time	Seasonal / casual	Full-time	Seasonal / casual	Full-time	Seasonal / casual	Full-time	Seasonal / casual	Full-time	Seasonal / casual	Full-time	Seasonal / casual
Rwamagana	ZIBERA Modeste commercial farmer	34		24		10				21		13	
Gasabo	Gashora Farm	30	2 000	18	500	12	1 500			20	300	10	1 700
Kicukiro	Bahage Food Ltd	22	72	4	10	18	62			20	72	2	0
Total	2 158	86	2 072	46	510	40	1 562	0	0	61	372	25	1 700

Table 42: Employment (wage labour) in chilli production

District	Coop, farm, company	Total		Men		Women		Youth 16-17		Youth 18-30		Adults > 30	
		Full-time	Seasonal / casual	Full-time	Seasonal / casual	Full-time	Seasonal / casual	Full-time	Seasonal / casual	Full-time	Seasonal / casual	Full-time	Seasonal / casual
% of total full-time & seasonal		4 %	96 %	2 %	24 %	2 %	72 %	0 %	0 %	3 %	17 %	1 %	79 %
		100 %		100 %				100 %					

Source: Authors' computation using data from FGDs and KIIs, 2020.

Note the large employment in the seasonal work (96 percent) is related to cultivation, harvesting, sorting, packaging and logistics. Daily wages between RWF 1 000 and RWF 2 000 make it difficult to earn a decent living (see Section 4.6.3). Nevertheless, the employment numbers are substantial and can therefore not be ignored by efforts to create youth employment. Exporters prefer female employment (72 percent), especially for harvesting, sorting and packaging, as these tasks require sensitive treatment of the produce.

Gashora Farm catches the attention in the Table 42: this commercial farm and exporter has a supply contract with China of dried chilli (see also Box 20), and that their large number of staff undertakes not only production but also post-harvest handling and sorting.

Youth opportunities

Table 41 shows that 20 percent of cooperative members are youth, which suggests that chilli production is certainly of interest to youth, if they acquire resources and support (land, water, extension) and access to markets. Approaches to support youth in joining chilli production are similar to the ones proposed for French beans (see Section 4.2.4). The opportunities for off-season production are great with chilli, if the water and production knowledge can be organized; prices on the retail market swing between RWF 300/kg and RWF 2 000/kg. Table 42 shows that youth can find employment in commercial farms, although adults older than 30 have better opportunities due to their skills and their reliability as employees.

4.3.5 Farmer cooperatives

Farmer cooperatives are strongly promoted in Rwanda, and all interviewed chilli producers were also members of cooperatives. Cooperatives provide opportunities to improve access to services (extension, finance, support from government or projects), markets (aggregation, bargaining), market information, and inputs. Table 43 shows that male employment is high in general, and that youth employment is in line with what can be expected population-wise. However, with only two cooperatives, we cannot take this as a general indication.

The team did not come across established cooperatives that provided additional support to new youth members, or that supported other efforts to increase youth membership. It therefore seems that if one quickly wants to organize a large number of youth, one would need to consider

establishing new cooperatives with higher numbers of youth membership. This comes with certain risks, of course, and requires forms of capacity building support.

Table 43: Employment by cooperatives involved in chilli

District	Coop, farm, company	Total		Men		Women		Youth 16-17		Youth 18-30		Adults > 30	
		Full-time	Seasonal / casual	Full-time	Seasonal / casual	Full-time	Seasonal / casual	Full-time	Seasonal / casual	Full-time	Seasonal / casual	Full-time	Seasonal / casual
Rwamagana	Coop Gwiza	5	190	3	125	2	65			2	71	3	119
Rulindo	Yahoproc Cooperative	5	1	4	1	1					1	5	
Total	201	10	191	7	126	3	65	0	0	2	72	8	119
% of total full-time & seasonal		**5 %**	**95 %**	**4 %**	**63 %**	**1 %**	**32 %**	**0 %**	**0 %**	**1 %**	**36 %**	**4 %**	**59 %**
		100 %		**100 %**				**100 %**					

Coop Gwiza is an exception: it produces on 230 ha of leased land and has its own sorting and packing facilities, from which it supplies to exporters. Coop Gwiza is an interesting case, as the cooperative has managed to gain control over the value addition and apparently has gained that trust from the exporters.

Table 26 in Section 4.2.5 shows that prospective members need to buy shares usually around RWF 10 000 to RWF 30 000, although when assets of a cooperative increase, so does the value of the shares. For youth, this is another challenge, in addition to the challenges of becoming a farmer in the first place, especially with regards to access to land.

Opportunities for youth

Although farmer cooperatives provide seasonal employment, it is seasonal and low-paid, and at the most, an additional source of income. Cooperatives can provide other substantial benefits (as mentioned), which are essential for youth to become viable farmers. Cooperatives usually do not give youth preferential treatment, but there are examples where district governments push for substantial youth membership at the start of cooperative formation, and when this happens in combination with making marshlands or rehabilitated lands available to the members, youth stand good chances to establish themselves as farmers. Districts can even delay payment of land lease until after the harvest.

4.3.6 Post-harvest handling and processing

For small quantities, farmers can supply to the retailers at the district or village markets. But for supply to exporters or wholesalers, aggregation and post-harvest handling is an important function of reducing transaction costs.

Sorting takes place at the cooperative, wholesaler and exporter level, usually by size and colour. Brokers are fewer in the cases of organized farmers, but they play a more significant role with unorganized farmers (see more on trade in the next section). For the fresh market, maintaining freshness is key, although in the case of chilli, even if it wrinkles a little bit it will not rot quickly, unlike other fresh vegetables. Still, chilli is very fragile and needs to be handled with care. During their visit to the Kigali market, the study team found some quite damaged chilli. Most of the damage occurs due to poor transport.

Figure 33: Chilli-based products

For chilli exporters, maintaining freshness and a good outer appearance is a big challenge. This involves a complex process of managing harvests from the farm, aggregation from smallholders, sorting and packaging (usually at the NAEB's pack house), and getting the volumes ready for export by plane in time (see Section 4.3.7.3 on exporters).

For dried chilli, one largely relies on drying in the sun, in open air, on large plastic sheets. For the domestic market, farmers are usually the driers; for export, the exporters themselves will dry in order to control quality and hygiene.

Processing

There are several producers of chilli oil and chilli sauces, including Didi's Chilli Oil, Akabanga Chilli Oil, Primo Hot Chilli Sauce, etc. (see Box 22). In addition, many food processors will use chilli powder as an ingredient in very small quantities. For Akabanga Chilli Oil, by far the biggest brand of chilli oil, the required amount of chilli per year is an estimated 50 tonnes, and it exports 30 tonnes of chilli oil. This shows that the amounts of processing are an estimated 2 to 3 percent of the total that is produced (using data from Table 37).

The company Ese Urwibutso produces a variety of products besides chilli oil, and mostly employs youth and women for its processing. Table 44 shows Ese Urwibutso's personnel composition for its various product lines and processing units.

Table 44: Ese Urwibutso staff

Employees	Total	Men	Women	Youth 16–17	Youth 18–30	Adults >30
Full-time	40	15	25	0	30	10
Seasonal/casual (per year)	80	10	70	0	50	30

Source: Authors' computation using data from field survey, 2020.

As shown, more than 66 percent of Ese Urwibutso's workers, full-time and casual, are younger than 30, and the majority are women. The youth-intensive activities are factory groundwork, sales and marketing, where youth can exploit their skills gained through secondary and university courses. The Ese Urwibutso manager said that the youth who work in the factory are very motivated and that their machinery knowledge and ICT skills are greater than that of their older peers. This is why the company has a large percentage of youth workers.

However, in the processing unit, which produces both Akabanga chilli oil and tomato ketchup, employment is minimal, as Table 45 shows.

Table 45: Employment in Ese Urwibutso's chilli oil ketchup processing unit

District	Total		Men		Women		Youth 16–17		Youth 18–30		Adults >30	
	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual
Rulindo	8		2		6		0	0	6 (4 f)		2	0

Source: Authors' computation using data from KIIs, 2020.

Box 22: Akabanga chilli oil

Akabanga, which means "little secret" in Kinyarwanda, is a Rwandan chilli oil made from Scotch Bonnet and Habanero peppers (80 percent), blended with vegetable oil (20 percent). Despite its name, Akabanga is far from being a secret. In fact, it has a cult following in Rwanda, and in the last decade, it has rapidly gained recognition in the international market. With special mentions from mass media outlets like CNN and many chilli specialized magazines, the Rwandan chilli oil is exported all over the world, and buyers can order it on Amazon or via other worldwide e-commerce.

The product originated in 1983 in Nyirangarama, a village in Rulindo District, when Mr Sina Gerard began Akabanga production a few years after he started selling dough balls roadside. Now, after nearly four decades, Akabanga is big business. In 2019, due to the large demand from the U.S., Akabanga USA LLC was initiated, and 20 percent of its net profits are donated to the Aegis Trust to support peace education in Rwanda.

Opportunities for youth

In the aggregation and post-harvest handling of chilli, only a few additional (new) youth jobs can be expected, unless the volumes greatly increase, for example if the supply of dried chilli to China (see Section 4.3.7.3 on export) actually materializes. Post-harvest handling by smallholder farmers is done by the family members. Cooperatives are directly in contact with wholesalers, exporters and processors, and already have access to fixed seasonal workers for menial tasks such as unloading, sorting, packaging and loading. Female youth in particular have an opportunity to find jobs with the processors, and in the packhouses of exporters.

Youth can find additional work on the few commercial farms and with exporters, where seasonal or permanent workers are required for post-harvest activities. Youth are disadvantaged, as they are perceived as being “less reliable”. While agripreneurship in processing is not technically complicated, it is still challenging, as it requires start-up capital for processing equipment, and marketing to compete with other brands. One way to increase youth employment in the sector could be by supporting the existing processors to increase their markets and volumes, with the agreement to employ more youth and to buy chilli especially from youth farmers.

4.3.7 Trade

As stated earlier, the key wholesale market in Rwanda is the Nyabugogo market in Kigali. The wholesale market opens in the morning around 4 a.m. and closes at about 8 a.m., after which the retailing starts. From here, supplies go to other retail markets in Kigali (Kimironko, Kigali city market, Kicukiro and Kabuga), hotels, restaurants, supermarkets and to some other districts.

Larger traders usually specialise in a few crops (as in the case of wholesalers), and in a larger number of crops (as in the case of retailers). Smaller traders can limit themselves to just one crop, although they are often seasonal traders (brokers). The number of youth (employers and employees) involved in trade is somewhere between 20 and 40 percent, but there is no gender inequality, with even percentages of male and female youth. Moreover, 70 percent of wholesalers and retailers interviewed do not prefer to deal with suppliers younger than 30 due to a lack of trust, and the remaining 30 percent who deal with young suppliers claim they are not satisfied with the services provided by the youth. However, youth are usefully engaged in marketing activities, and their ICT skills are increasingly in demand.

4.3.7.1 Wholesale

The total number of wholesalers at the Nyabugogo market is 24, including two males and 22 females, 10 of whom are youth. The reason for female dominance among chilli wholesalers, according to the respondents, is due to the nature of the activity, which requires considerable patience and sustained efforts to sell, and the profits are quite small. Females are much better at this kind of work, as reported by wholesalers. Prices fluctuate widely: from RWF 300/kg at peak supply to RWF 2 000/kg in the off season. The costs of undertaken wholesale for the domestic market are similar to those of wholesale of French beans (see Table 29 in Section 4.2.7.1).

Losses for wholesalers are about 10 percent per 50 kg bag due to poor post-harvest handling and poor transportation means, coupled with the lack of proper (packing) equipment used during

transportation. Systems of Returnable Plastic Crates should be developed to reduce such losses, although existing systems and the conditions for successful functioning should be carefully assessed.

Figure 34: Chilli wholesale and losses

Wholesaler stands

Losses

Losses from poor transportation

Losses

Pictures from ©SNV

Modern suppliers like Get It, Ineza, etc. (see Box 14) also play a role in supplying hotels, restaurants and supermarket chains. These buyers often buy directly at the wholesale markets, while some have supply lines with a few commercial farmers, for example those with greenhouses.

Youth opportunities in wholesale

Although 35 percent of the wholesalers are youth, earlier information show that wholesale requires substantial investment (at least RWF 300 000) and therefore considerable risks. This largely prohibits youth agripreneurship at this node of the chilli VC. Youth could take chances with small amounts of produce, for example when they find very low prices in their villages. One could grow into the business and slowly increase one's volumes. Some youth can probably learn on the job if extended family members are already in the business. Employment in wholesale, however,

can mainly be found in menial, temporary jobs like portering, un/loading, etc. Again, the work attitude and reliability are key to finding employment here.

4.3.7.2 Retail

Retail largely happens at the district markets and at the four large markets in Kigali. There are few specialized vegetable and fruit shops, and some of the supermarket chains sell small amounts to expats and sporadic national consumers who are in a hurry.

Retailers at the district and Kigali markets typically sell 5 to 10 different vegetables and fruits to consumers. The investment per batch of a specific crop like chilli is around RWF 10 000 for around 10-15 kg, as consumers buy only a few fresh chillis a time.

In the rural areas, there exist roadside retailers, often female farmers trying to sell their own produce. Such informal business is not allowed in the towns and cities; retailers have permits and allocated stalls. This is very different from other African countries where large numbers of retailers can be found roadside in strategic locations in towns and cities.

E-commerce (home delivery) has boomed during the COVID-19 pandemic, but the supply of fresh vegetables is complicated, and customers complain about freshness and the higher prices compared to the physical markets. An e-commerce company introducing fresh vegetable supply is DMM HeHe (see Box 14), whereby it wants to buy from cooperatives and not from the wholesale markets.

Youth opportunities in retail

RWF 10 000 for starting a retail business in chilli is a relatively small amount, which many youth should be able to arrange within their networks, but they would also need to sell other crops as well. Moreover, youth would need access to both market space and supply. It was also noticed that this is a more attractive agripreneurship option for female youth. There is very little wage labour employment, only some occasional portering and transportation.

Opportunities for youth in other retail forms (e.g. supermarkets and e-commerce) are limited, as fruits and vegetables are not key sales item.

4.3.7.3 Export

The GoR has a strong priority to increase international exports, due to the pressure to increase forex earnings. It is important to understand the different export channels.

Types of export

As explained earlier on the end markets, there are four types of exporters: (1) exporting companies which export fresh chilli to Europe and the Middle East by air freight; (2) exporters who sell dried chilli by container transport; (3) formal traders who do cross-border export; and (4) informal traders who carry bags of crops, one at a time, across the border. For chilli export,

regional markets and cross-border trade is less significant: EUR 46 047 to DRC on average for the period 2014–2018.

Exporting companies can be differentiated into three groups: (1) those that only export their own produce; (2) those that have no production unit and only buy from farmers; and (3) those that do their own production and also buy from farmers. Table 46 provides an overview of the status of the most important exporters at the time of this study. Rwanda's Horticulture Exports Association has about 60 members; however, only few are regular exporters of chilli.

Table 46: Overview of key exporters of chilli

SN	Company Name	Type of products	Own produce only	Only buying (no farm)	Own produce + buying
1	Safi Price Ltd	Green chilli, French beans		X	
2	Eden Fresh Ltd	Green chilli, French beans		X	
3	Effective M and N Ltd	Chilli, French beans, avocado			X
4	Nature Fresh Foods	Chilli		X	
5	Crinnod Ltd	Chilli			X
6	Super Fresh Ltd	Chilli		X	
7	Bahage Food Ltd	Chilli, French beans, passion fruit			X
8	Sunripe Farm	Chilli, French beans, tomatoes, sweet pepper	X		

Source: Authors' computation using data from field survey, 2020.
Companies and products provided by the NAEB.

International export comes with requirements

It is important to differentiate between EU markets (certified and non-certified) and other markets, mainly Middle East and China markets. At its borders, the EU conducts stringent checks on fresh imports, whether or not they have been certified. The EU checks mainly for pesticide residues and harmful organisms in the product or packaging/crate. In the case of a rejection, the consignment is destroyed, which means a significant loss for the exporter. Exporters can be temporarily banned from exporting to the EU after several rejections. Also, many EU supermarkets and EU importers require various certifications for fresh chilli, the basic one being GlobalGAP. Dried horticulture products might also require certification in the near future.[61] The situation is similar to that of French beans (see Section 4.2.7.3). Also, the support provided by the NAEB for French beans applies for chilli export, including packhouse services and, for a period, subsidies on airfreight.

[61] In Kenya, some exporters of dried mango are already applying certification in anticipation of this new development (Personal communication from SNV HortIMPACT project).

To date, Rwanda has experienced zero rejections by the EU agency Rapid Alert System for Food and Feed (RASFF), but the EU agency European Union Notification System for Plant Health Interceptions (EUROPHYT) did intercept chilli from Rwanda in 2019.[62]

Box 23: Chilli exports disrupted by COVID-19 pandemic

Located in Rwamagana District, Gwiza cooperative is a cooperative that grows chilli for export and was visited for this study. The cooperative is now requesting support from the GoR to find a market for their chilli production.

The cooperative has always been highly motivated, and used to grow chilli targeting different export markets at relatively good prices. In this regard, the cooperative has been increasing the investment and the land size under chilli production, from 12 ha to 50 ha.

However, due to the COVID-19 pandemic, the expected buyers are unable to absorb the total quantity produced by the cooperative; some buyers stopped buying, while others bought only small quantities. The cooperative has been producing around 6 to 10 tonnes per week, but buyers are able to only buy two tonnes per week. Furthermore, before COVID-19, farmers sold their production for RWF 550/kg, but due to a lack of market, the price is now RWF 300/kg.

These losses are putting the cooperative in critical condition. Mr Hazizi Celestin, a member of the Gwiza cooperative, indicated that he invested RWF 2 million but was able to get only RWF 1 million in return. In fact, a large quantity of production was lost from the field, as indicated by one farmer: "Today, part the production is being lost without harvesting, while another part is harvested but actually already overmature."

The exporter who normally buys from the cooperative, the SOUK company, attested that they were affected by COVID-19, so farmers should be grateful to at least sell small quantities.

District officials of Rwamagana District are advising the cooperative to target local markets as well in order to sell their produce.

Source: Igihe Journal, 10 December 2020.

[62] See RASFF's portal (https://webgate.ec.EURpa.eu/rasff-window/portal/?event=searchForm&cleanSearch=1#) In terms of exporting to the EU, one can find that there were two EU boarder rejections in 2008 related to aflatoxins in peanut, sorghum and soybean meal from Rwanda. It also reports on export from the EU to Rwanda, and one can see that a much larger number of contaminated food items were exported from the EU to Rwanda before the contamination was detected. In the case of harmful organisms, EUROPHYT is the organization intercepting imports to Europe (https://ec.Europa.eu/food/plant/plant_health_biosecurity/EURphyt/interceptions_en). The 2019 summary of reported interceptions mentions 24 interceptions of fruits and vegetables from Rwanda: harmful organisms were found on bell peppers, chilli, passion fruit and so-called Ethiopian eggplant. The Summary Report 2019 (https://ec.Europa.eu/food/sites/food/files/plant/docs/sc_plant-health_20200219_sum.pdf) states that the commission will contact Rwandan authorities with regard to false codling moth, and will request detailed information on the actions taken and on the risk mitigation measures already in place. In addition, Rwanda would be offered assistance in the form of Sustained Training Mission.

Youth opportunities in export

Agripreneurship opportunities for export to international markets are minimal, as they require having considerable knowledge, networks abroad and upfront investment capital. Self-employment could be found in the informal cross-border trade, but the demand and volumes are very minimal.

In terms of employment with export companies, most of the work is in harvesting and post-harvest handling and packaging, which was presented in Section 4.3.4. Although the export of chilli is growing, the volumes are still small, and the number of formal companies involved are still relatively limited. Export to China might provide a significant boost to the sector and to youth employment (see Box 23). However, export is more sensitive to external shocks, one of them being the COVID-19 pandemic (see Box 24).

Box 24: Gashora Farm could change the chilli sector

The GoR, through the NAEB, is encouraging the production of chilli, particularly of Bird's eye (*capsicum frutescens)*. Demand for this variety of chilli is high in the export market, particularly from China; in 2019, the young Rwandan agripreneur Gashora Farm secured a five-year contract worth USD 500 million. Thanks to this deal, chilli export from Rwanda could increase 400 times and become the top export crop, surpassing the traditional exports tea and coffee. Gashora Farm began with about 6 ha of land but today has close to 40 ha. It will also source chilli from about 1 000 smallholder farmers. This could become significant for chilli production in Rwanda, although it requires increased performance in all areas of production, drying and logistics.

Source*:* www.agrilinks.org/post/chili-processor-becomes-rwandas-top-exporter-lessons-facilitating-long-term-sme-growth. Source

4.3.8 Service providers

The market of service providers is not yet well-developed. Supporting organizations which rely on external funds and subsidies were presented in Section 3.3. Besides the input suppliers already mentioned in Section 4.3.3, a few other service providers exist, including financial institutions which are similar to that of French beans (see Section 4.2.8).

Additionally, the processors require specific services such as packaging and processing equipment. Packaging materials are mostly imported, though there are a few local companies that produce various types of packaging (see Section 4.2.8). Processing equipment can be made locally on order, while more advanced processing equipment is imported from countries like China and India.

4.3.9 Value capture along the chilli value chain

On average, farmers sell green chilli at RWF 300/kg to local aggregators. The aggregators in turn sell the green chilli at RWF 800/kg, and the retailers sell to the end consumers at an average price of RWF 1 200/kg. As Table 47 shows, farmers retain 25 percent of the total gross value (this calculation does not include their production costs), whereas retailers capture the highest gross output of 33.3 percent. Note that chilli is susceptible to substantial seasonal prices swings.

Table 47: Value capture along the chilli value chain

Price per kg	Farmer	Local aggregator	Wholesaler (Kigali)	Retailer	Consumer in Kigali	Total
Selling price/kg, RWF	300	500	800	1 200	consumes	
Gross value added (RWF)	300	200	300	400	–	Total value added RWF 1 200
Percentage of value capture	**25 %**	**16.7 %**	**25 %**	**33.3 %**	–	**Total 100 %**

Source: Authors' compilation based on FGDs and KIIs undertaken for this study.

Table 48: SWOT analysis for chilli

STRENGTHS	OPPORTUNITIES
Production: • Can be produced in drier (lower) areas. If irrigation is available, with the right knowledge chilli can be produced year-round (seasons A, B and C). • Crop insurance scheme (NAIS) is available for chilli farmers. Market: • Good domestic demand for fresh and dried chilli. • Reasonable demand by national processing industry. • Rwanda has a competitive advantage in low-wage labour compared to competing export countries. • Strong support by the NAEB (subsidy or air freight, packhouse, etc.). • Some export companies undertake contract farming, provide inputs and provide agronomic advice. • Special opportunities for women, as they perform better in some activities, e.g. 90 percent of workers at export packhouses are women. Youth employment-related: • Youth motivated for chilli production, as proven by some cooperatives. • Districts are key in accessing land by availing (drained) marshlands. • Cooperatives can be very supportive for youth, if youth are a key focus right from the start. • Youth are given a big role in some activities such as handling and transport. • Youth organizations, with government support, facilitate youth involvement, extension services, capacity building (e.g. RYAF, YEAN, HoReCo).	Production: • Sufficient marshlands and political interest to support youth with access to land. • High potential to employ both educated (harvesting, post-harvest handling, value addition) and uneducated youth in farming and in retailing. • Cost of production and yields can easily be increased by (youth) smallholders by applying proven GAPs. • Introduce use of crates to reduce losses (for harvesting and marketing). Market: • Demand is still growing for chilli in domestic market, cross-border trade and international export. • Dried chilli does not require certification for export to the EU. • Contract with China for dried Bird's Eye Chilli could transform this market, with increasing prices. • Still many exporters, who are not yet buying from smallholders, opportunities for contract farming. • Because of export potential, this crop is of political interest, making it easier to garner support from agencies and districts. Youth employment-related: • Youth employment is increasingly getting attention from government agencies and policies. • GAPs can make horticulture attractive for youth. • New programmes with focus on youth and horticulture, e.g. World Bank, SAIP, Kilimo, IFAD, DMZ, IMSAR, HortInvest, HingaWeze and Agriterra. • Increasing attention for horticulture in IPRCs (ATVETs) and UR-CAVM, RICA. • Financial facilities exist, including the BDF (guarantee schemes, matching grants), for educated, well-off youth.

Table 48: SWOT analysis for chilli

WEAKNESSES	THREATS
Production: • Chilli prone to (soil-borne) diseases. Yields decreasing. • Compared to other vegetables (tomatoes, cabbage, carrots and French beans), volumes of chilli and number of relevant smallholders are relatively less. • Most extension staff/TM are not well-trained in horticulture (only recently has this become a priority crop). Market: • Required volumes for processing is not significant, in terms of total demand. • Export value is around 1/3 of French beans. International export destinations, while not very stable, are growing. • Cross-border trade insignificant. • Several EUROPHYT interceptions, under EU border scrutiny. Youth employment-related: • Access to land is a key issue for youth to start farming. • Access to finance (for inputs, for land) is a limiting factor; most youth can't provide collateral for bank loans. Slow processes lead to untimely finance for the production season. • Youth prefer white-collar jobs to those in agriculture. • Less skilled, less know-how, therefore youth in fewer well paid positions/mainly in casual work in companies/VCs. Youth are perceived as less responsible/reliable than adults. • Once established, most cooperatives do not make additional efforts to support youth to enter chilli farming. • Employment is largely seasonal, and wages are low.	Production: • Yields can further decrease if farmers do not get better access to cultivation knowledge (GAPs). • With the growth of the horticulture sector, pests and diseases will increasingly impact yields. Access to knowledge for smallholders on horticulture GAP and IPM practices is not sufficiently organized. Market: • Export remains vulnerable to shocks (COVID-19, competition, possible future EU bans). • Limited flights, destinations and costly freight (currently USD 1.80/kg to Europe). • Weak domestic infrastructure (packhouses, storage, refrigerated transport); possibly a bottleneck to further growth. Youth employment-related: • Without irrigation investments, hillsides will not be of interest and will increase competition for marshlands. • Difficult to meet European fresh market standards and certifications, with high-cost implications, disadvantaging (youth) smallholders.

Key employment opportunities for youth

Table 49 provides an indicative overview of where youth employment opportunities – additional ones – can be found in the different nodes of the VC of chilli. Opportunities are divided in two groups: those for youth agripreneurship (self-employment, starting one's own business, including farming) and those for youth employment by others (wage employment). Opportunity is given in terms of low, medium or high, from a short-term perspective (two to four years), and from a production perspective (only in areas where the respective VC is considerably well-established). As Table 38 shows, chilli is mainly produced in four key districts, although the whole VC operates across more districts. A key factor in youth employment creation is market demand; chilli export is growing strongly, while domestic demand is also high. Processing has limited opportunities. For this exercise, it is assumed that a commercial farmer has at least one hectare of open field production, or at least 10 ares of greenhouse.

Smallholders have an open field production area of less than one hectare, often only 5 to 20 ares. Although the opportunities depend on many factors, including the amount and kind of support provided to youth to gain employment, the willingness of other VC actors to invest in youth employment, whether Chinese demand for dried chilli will fully materialise, etc., the following has been used as a guideline:

- Low: fewer than 50 new jobs can be created (assuming the production within those four key districts combined)
- Medium: 50–200 new jobs
- High: more than 200 new jobs.

Table 49: Youth employment opportunities in the chilli value chain

SN	Node	Agripreneurship	Wage Employment	Remark
1.	Input supply	Low	Medium	For educated youth in agripreneurship: starting small agroshops; in employment: as agents of existing agro-wholesalers and agroshops. Should focus inputs for multiple crops.
2.	Production by smallholder	High	Low	Land and market access preferably through cooperative and government support. Uneducated youth fit well, if they can access training. Export to China possibly a game changer.
3.	Production by commercial farm	Low	High	In employment: various tasks educated/uneducated youth in the primary production and post-harvest handling activities, which are labour-intensive, to meet the requirements for the export markets. Export is a growth market, but the number of commercial farms is still limited. Harvesting, sorting and packaging, especially by women. Export to China possibly a game changer. Work is mainly seasonal and daily wages are low.
4.	Aggregation and wholesale	Medium	Low	Uneducated youth in agripreneurship: with a small capital, youth can start a business; in employment: mostly occasional wage labour.
5.	Processing	Low	Low	Limited growth of processing expected. Employment very minimal in processing.
6.	Retail domestic market	High	Low	Volumes on domestic market are reasonable. Uneducated youth in agripreneurship: potential if combined with other fruits and vegetables, as it requires small investment (assess market space); in employment:

Table 49: Youth employment opportunities in the chilli value chain

SN	Node	Agripreneurship	Wage Employment	Remark
				opportunity is low, only some occasional wage labour.
7.	Export	Low	High	In agripreneurship: already many women involved in cross-border trade, in border districts only. Especially for uneducated women in harvesting and value addition in packhouses. Number of exporters is currently limited, but the export is growing. Export to China possibly a game changer. Work is mainly seasonal and daily wages are low.
8.	Service providers	Low	Low	Especially for educated youth. Private extension (e.g. HoReCo, TM), logistics (transporters, loaders), marketing, export consultants, import of packaging materials, ingredients and equipment for processing, etc. Although opportunities for youth employment are minimal, effect of service providers on upgrading the VC could be considerable.

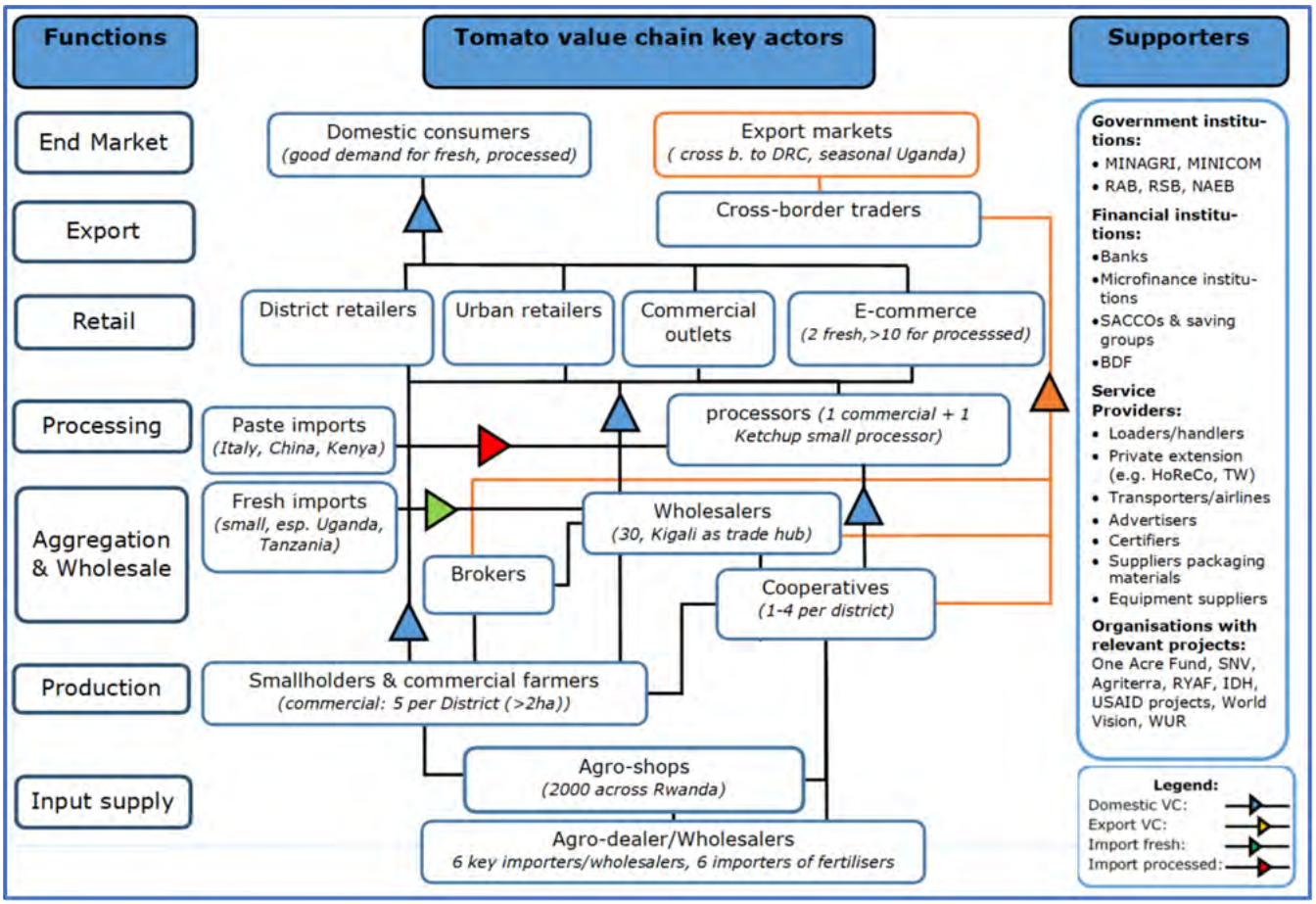
Source: Authors' compilation based on FGDs and KIIs undertaken for this study.

4.4 Youth-centred value chain analysis of tomato

4.4.1 Value chain map

Figure 35 provides an overview of the functions, actors and providers of support services in the tomato VC. Production is done largely by smallholders, although there are also a few commercial farms which produce in greenhouses. Through various forms of aggregation, tomato reaches the wholesale and retail markets. Small volumes are processed or exported (see the orange arrows in the following map). Imports (fresh and paste) are larger than exports. Fresh tomato imports are sold to wholesalers (green arrow), and tomato paste imports (red arrow) are supplied to the ketchup, sauces and food industry.

Figure 35: Value chain map of tomato



Source: Authors' computation using data from field survey 2020.

4.4.2 End markets

The fresh tomato has two end markets: domestic and export (DRC and Uganda). Processed products like ketchup and sauces are consumed domestically and regionally. Table 50 provides data for imports and exports of fresh and paste. When only looking at fresh tomatoes, the FAOSTAT data suggest that tomato imports are greater than tomato exports (809 tonnes and 7 tonnes, respectively; see Section 4.1.2). While fresh tomatoes are mainly exported to DRC, the imports mainly come from Uganda (around 60 percent), and smaller amounts from United Republic of Tanzania, Burundi and Kenya. At the borders, however, the trade pattern is seasonal: some seasons the prices are more attractive in Rwanda; other seasons the prices are more attractive in a neighbouring country. Compared to the national production of roughly 100 000 tonnes, the import (excluding paste) or export is merely 2 percent. Paste mainly comes from Italy and China, and is used by some of the processors.

Table 50: Tomato import and export, formal and informal

(Based on prices FOB)

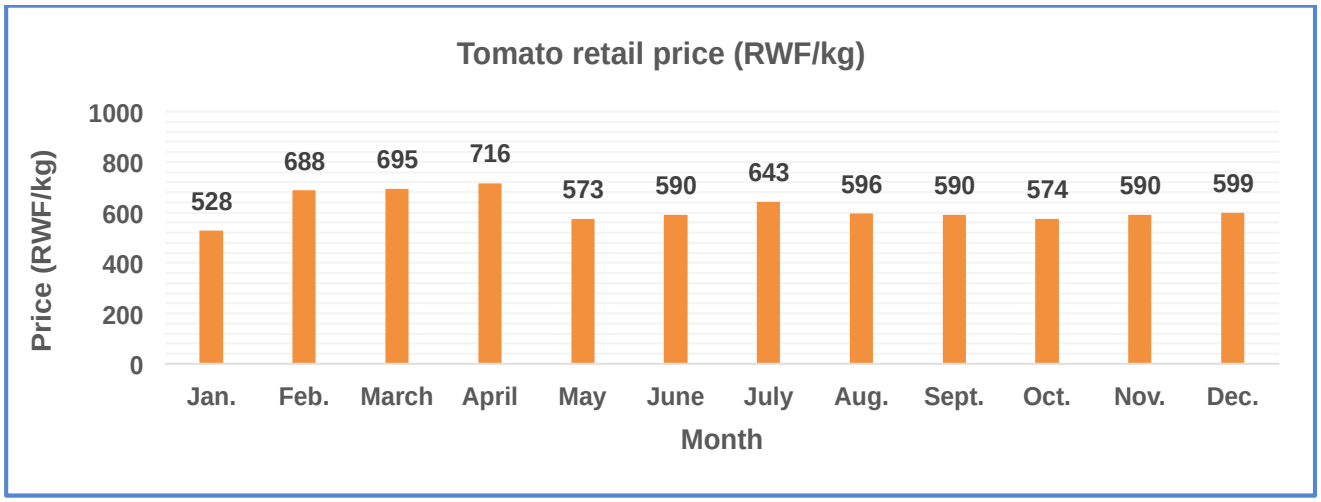
Tomatoes fresh and paste		Import			Export		
		2016/17	2017/18	2018/19	2016/17	2017/18	2018/19
Formal	Volume (tonnes)	2 759	5 214	6 200	901	1 823	2 097
	Revenues (USD)	2 429 461	5 624 765	7 004 406	1 676 719	2 850 196	3 377 813
Informal	Volume (tonnes)	211	239	181	1 504	2 498	2 473
	Revenues (USD)	60 097	70 909	45 806	1 006 381	1 487 976	1 354 190
Total	**Volume (tonnes)**	**2 970**	**5 453**	**6 381**	**2 406**	**4 321**	**4 570**
	Revenues (USD)	**2 489 559**	**5 695 673**	**7 050 212**	**2 683 100**	**4 338 172**	**4 732 003**

Source: NISR, 2019b.

Figure 36 provides the tomato retail price. One would expect higher prices in Season C (July–September), as this is the dry season with less production (see Section 4.4.4), but this does not come forward from the figure.

Figure 36: Retail price of tomato

(Based on average of January 2015 to July 2020)



Source: Ujeneza, 2020.

With this understanding of end markets, which form the demand side, the following sections describe the nodes in the supply chain for tomato, starting with input supply.

4.4.3 Input supply

Within Rwanda's agri-input sector, one can differentiate input wholesalers/agrodealers based in Kigali (with around six key actors) and the many agroshops (around 2 000) that sell a variety of inputs at the district and village levels. Several government agencies are also involved in regulating this sector, including RICA, RAB, REMA, the RBS, etc.

Note that input suppliers do not specialize in tomato only, and they target a multitude of horticulture and non-horticulture crops. The description in the French beans section (see Section 4.2.3) provides more information on the input supply, which also applies to this VC.

The types of inputs applied during the different stages of the cultivation of tomatoes have a strong impact on the harvest. In reference to field data, farmers use fertilizers such as NPK 17-17-17, Urea, D.I. Grow Foliar Fertilizer and organic fertilizers, as well as pesticides such as Dudu, Supermethrin, Mancozeb, Ridomil, Dithane, Roket and Thiodan to boost tomato production. Farmers worry about pest and disease infestations and rely heavily on pesticides. Moreover, equipment such as irrigation pumps, water cans and sprayers are also often used in tomato production. The majority of respondents reported to source their inputs from local retailers. Some farmers source their inputs from One Acre Fund (see Section 3.3.2). Cooperatives and commercial farmers will source inputs straight from the wholesalers in Kigali. Several interviewed farmers said that a "lack of information on the appropriate inputs to buy, high prices and scarce varieties of products available at the local agrodealer are the main constraints related to input supply".

The section on the chilli VC explains the challenges and opportunities of commercial vegetable nurseries (see Section 4.3.3). These also apply to tomato production. The purchase of tomato seedlings by semi-commercial smallholders is already an established profitable practice in places like Kenya and Ethiopia, where commercial seedling producers are instigated by demand from numerous commercial farmers.

HortInvest supports two cooperatives in the districts Rutsiro and Rubavo, starting with nurseries in shade-net houses. The Rutsiro cooperative has been selling quite well at RWF 50 to 100 per seedling for tomato and cucumber seedlings, and RWF 150 for sweet pepper seedlings, both to cooperative members and non-members who must place orders in advance. The cooperative has benefited from several demonstrations of cultivating vegetables with GAPs, and a growing number of farmers in the surrounding area are ready to pay for seedlings. The Rubavo coop is facing delays due to internal management issues, as has been stated earlier in the chapter on chilli.

Youth employment opportunities

Although the input market is growing, agrodealership itself currently does not entail a lot of employment per district. Nevertheless, it was noted during field visits that the number of new agroshops is increasing, providing opportunities for educated youth with access to finance to start such businesses. The opportunities are the same as from the input supply of the French bean VC (see Section 4.2.3).

4.4.4 Production

Access to land and water

Access to land is a critical issue in Rwanda, as plots are already very small. The GoR is rehabilitating and draining marshlands to make available for farmers. The analysis presented for French beans (see Section 4.2.4) also applies for tomato production. Marshlands and irrigation schemes in particular, as they ensure access to water, are key for farmers to increase their investments in tomato production and also for youth to take up farming.

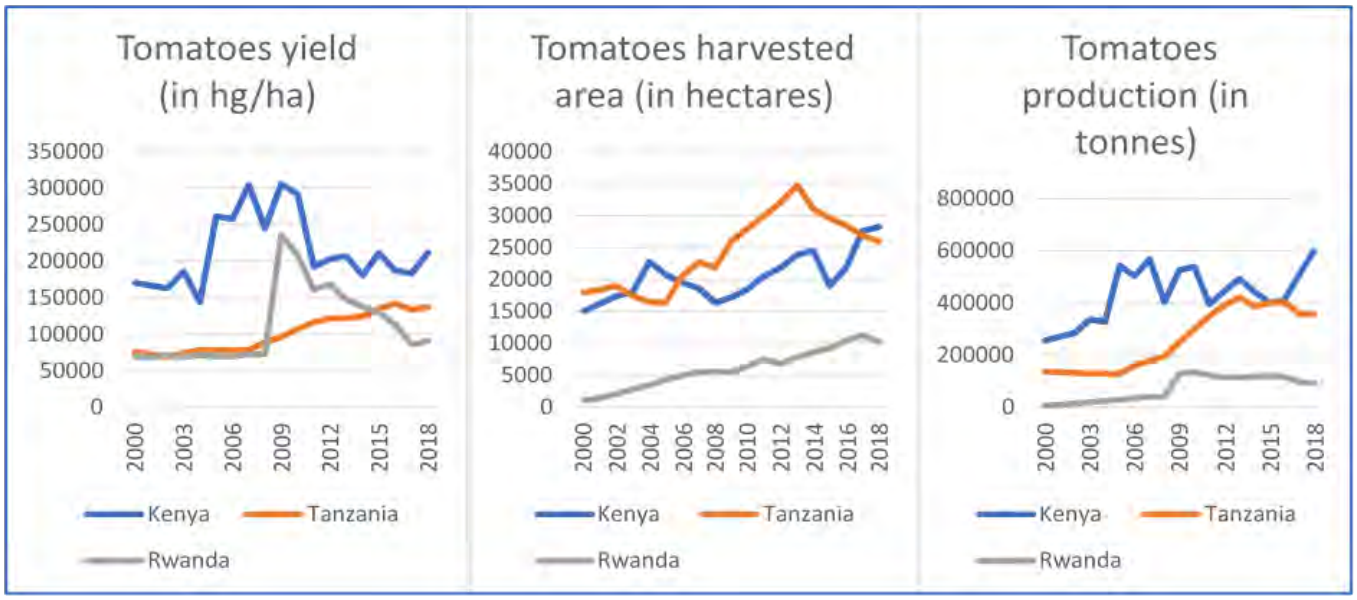
Access to finance

Ibimina and *Umurenge* SACCOs are the most potential sources for loans for production. See Section 4.2.4 for more about them.

Production

As earlier explained, Rwanda is a tomato net-importing country, mainly importing from Uganda, but these volumes are minimal and mainly based on seasonal advantages. This coincides with a declining production in Rwanda, while the United Republic of Tanzania has improved its competitiveness (see Figure 37). Table 51 further shows for Rwanda that even with an increasing area of production, the total production is declining due to decreasing yields. This means that for Rwanda farmers, tomato production is still perceived as profitable, otherwise they would not increase the area of production, but that due to certain factors yields decreased, likely due to a combination of increased pests and diseases, decreased soil fertility, etc. These developments are also seen elsewhere in Africa. This trend can only be altered through the combination of the use of quality inputs and the right cultivation knowledge such as the application of GAPs.

Figure 37: Tomato production in Rwanda and neighbouring countries



Source: Authors' computation using data from FAO, 2020. FAOSTAT [online]. Rome. [Cited 15 September 2020]. www.fao.org/faostat/en

Table 51: Tomato production in Rwanda

Year	Rwanda		
	Area under production (ha)	Production (tonnes)	Yield (tonnes/ha)
2009	5 500	129 751	23.6
2010	6 500	135 000	20.8
2011	7 568	122 167	16.1
2012	6 800	115 000	16.9
2013	7 861	116 083	14.8
2014	8 617	118 573	13.8
2015	9 255	120 207	13.0
2016	10 439	118 774	11.4
2017	11 329	97 426	8.6
2018	10 212	93 062	9.1

Source: Authors' computation using data from FAO, 2020. FAOSTAT [online]. Rome. [Cited 15 September 2020]. www.fao.org/faostat/en

As the actual number of producers of any crop is not available, one needs to rely on estimations. Of the three crops, tomato has by far the largest total acreage: roughly 100 000 ha compared to that of French beans (roughly 900 ha) and to that of chilli (roughly 400 ha). The large number of smallholders in Rwanda suggests that tomato production involves many more smallholders than do French bean production and chilli production. Anecdotal evidence also suggests that tomato production involves many smallholder farmers. Farmers expanding the area of tomato production presents an interesting fact for the promotion of youth agripreneurship in tomato production: chances that a considerable number of youth, say 5 000, will find a market among hundreds of thousands of other farmers are greater than those youth finding markets among only 10 000 other farmers, all other things being (proportionally) equal.[63]

Among the total sample, 50 percent of the respondents have their own land, while 50 percent cultivate on marshland assigned to them by the GoR or that they lease for roughly RWF 300 000 per are, per year. Furthermore, according to the respondents, a large amount of Rwandan territory is not viable for tomato production due to a lack of water for irrigation on the slopes, meaning that tomatoes can only be grown when irrigation is available, especially in Season C. This aligns with the data from NISR (see Table 52), which show that production in Season C is substantially lower.

Table 52: Tomato production per season

Tomato production per season	Average production (2017–2019) (tonnes)	%
Season A (Sept.–Feb.)	48 529	47%
Season B (March–June)	40 786	40%
Season C (July–Sept.)	13 321	13%
Total	**102 636**	**100%**

Source: NISR data compiled by Ujeneza for a HortInvest commissioned report on import substitution.

As with other vegetables, tomato was traditionally rain-fed, especially in Season A and Season B, and cultivated on the slopes. The drier Season C was more challenging. Now farmers prefer to produce with irrigation, at least those who have access to marshlands or are part of irrigation schemes. Nevertheless, the majority of smallholders who produce tomatoes still produce without irrigation and in full soil.

Holland Greentech estimates that between 100 and 150 greenhouses exist in Rwanda, most only around 240 m^2. There are 20 to 30 commercial farmers who have better functioning greenhouses above 1 000 m^2, mostly in the soil, and several

Box 25: Innovations in tomato production

This greenhouse from Eza Neza farm, close to Kigali, uses volcanic rock as growing media (substrate).

[63] The tomato VC differs considerably from the French bean and chilli VCs: the latter two receive substantial support, as they have good export opportunities. Nevertheless, the advantage of the tomato VC is its large numbers, important for employment creation. An example in different VCs shows this more clearly: if one wants to create 100 youth jobs in existing auto garages, one would have more chances of succeeding in a situation with 1 000 existing garages than in a situation of 20 existing garages of similar size and profitability.

also who use different substrates. There is an emerging discourse in Rwanda that all tomatoes (and many other vegetables) should be grown in greenhouses. Kenya, with its many abandoned greenhouses, is probably a good warning. As farmers wanted to earn back their investments as quickly as possible, and tomato was the most profitable crop, they produced tomatoes without rotation until, after a few seasons, the soils were diseased. Designs were faulty as with no ventilation and low roofs, the greenhouses became too hot. It is certainly possible for smallholders to produce in greenhouses, but if a smallholder does not have the knowledge to apply GAPs in full-soil cultivation, then the investment and the production in greenhouses is likely not going to be profitable.

Table 53 indicates seven districts that lead tomato production in Rwanda, with a combined total of 59 000 tonnes per year, representing 57 percent of the domestic tomato production, are: Rwamagana (12 800 tonnes/year), Nyagatare (11 100 tonnes/year), Nyanza (9 200 tonnes/year), Gisagara (7 700 tonnes/year), Kamonyi (7 000 tonnes/year), Gatsibo (6 000 tonnes/year) and Musanze (5 000 tonnes/year). At the same time, there are smallholder farmers producing small amounts of tomatoes all over the country. Figure 38 further shows the sales of tomatoes by organized producers (cooperatives, groups).

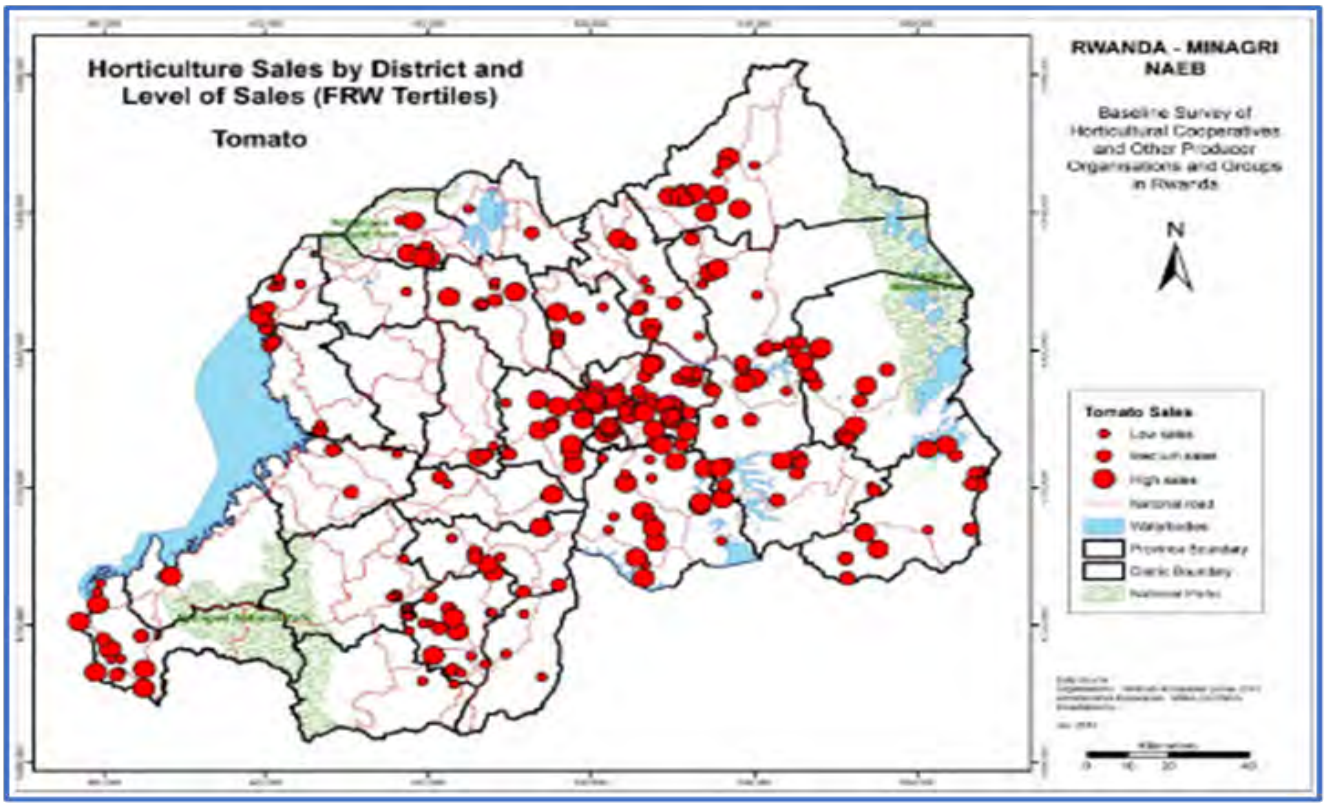
Table 53: Tomato production by district

(Average of 2017, 2018, 2019)

District	Production (tonnes)	District	Production (tonnes)	District	Production (tonnes)
1. Bugesera	2 946	11. Kayonza	4 103	21. Nyamasheke	2 603
2. Burera	949	12. Kicukiro	1 106	22. Nyanza	9 171
3. Gakenke	1 005	13. Kirehe	735	23. Nyarugenge	2 756
4. Gasabo	3 329	14. Muhanga	1 862	24. Nyaruguru	-
5. Gatsibo	5 960	15. Musanze	4 958	25. Rubavu	-
6. Gicumbi	660	16. Ngoma	1 930	26. Ruhango	3 753
7. Gisagara	7 705	17. Ngororero	3 724	27. Rulindo	2 561
8. Huye	3 016	18. Nyabihu	1 379	28. Rusizi	2 636
9. Kamonyi	7 002	19. Nyagatare	11 096	29. Rutsiro	1 012
10. Karongi	1 817	20. Nyamagabe	104	30. Rwamagana	12 756
				Total	**102 636**

Source: NISR data compiled by Ujeneza for a HortInvest commissioned report on import substitution.

Figure 38: Map of sales of tomatoes by organized farmers



Source: European Union's External Cooperation Programme for Rwanda, 2014.

Figure 39: Traditional way of tomato production without

Cost–benefit

Analysis of the cost-benefit is important for farmers to decide whether to invest more in producing tomatoes, increasing acreage and/or purchasing more quality inputs. Table 54 shows the cost–benefit of tomato production, as provided by the HortInvest project, for full-soil production.

Table 54: Cost-benefit of tomato

[Exchange rate EUR 1 = RWF 1 029 (May 2020)]

Tomatoes					
Items	**Unit**	**Unit Cost (RWF)**	**Quantity**	**Cost (RWF/are)**	**Cost (EUR/ha)**
1. Seed	kg	1 000	2.0	2 000	194
2. Own nursery (inputs like shade table, mulch, etc.)	lumpsum	3 500	1.0	3 500	340
3. Own nursery (labour)	labour day	1 000	4.0	4 000	389
4. Opportunity cost land (price of rent)	are	1 100	1.0	1 100	107
5. Ploughing	labour day	1 000	3.0	3 000	292
6. Levelling/discing	labour day	1 000	1.0	1 000	97
7. Manure	kg	40	250.0	10 000	972
8. Bed preparation	labour day	1 000	6.0	6 000	583
9. Transplanting	labour day	1 000	2.0	2 000	194
10. Irrigation labour	labour day	1 000	2.0	2 000	194
11. Pump, other irrigation equipment	lumpsum	4 450	1.0	4 450	432
12. Pump/irrigation maintenance/repairs	lumpsum	1 180	1.0	1 180	115
13. Fuel/electricity costs irrigation	litre	1 000	3.0	3 000	292
14. Tools	lumpsum	500	1.0	500	49
15. Cultivation (weeding)	labour day	1 000	1.0	1 000	97
16. Guarding	labour day	1 000	0.5	500	49
17. Staking material (sticks and rope)	labour day	1 000	1.5	1 500	146
18. Tying up (labour)	labour day	1 000	0.5	500	49
19. Fertilizer	kg	700	1.0	700	68
20. Scouting	labour day	1 000	1.6	1 600	155
21. Chemicals (pesticides)	litre	3 000	1.0	3 000	292
22. Spraying labour	labour day	1 000	1.2	1 200	117
23. Harvesting labour	labour day	1 000	0.8	800	78
24. Transportation to collection point	kg	3	298	894	87
Total expense (RWF)				**55 424**	**5 386**

Yield (B)	**kg/are**	**kg/ha**
	298	**29 800**
Unit price received (per kg) (C)	**RWF/kg**	**EUR/kg**
	350	**0.34**
Revenue (D = B × C)	**RWF/are**	**EUR/ha**
	104 300	**10 136**
Gross margin (E = D - A)	**RWF/are**	**EUR/ha**
	48 876	**4 750**
Cost of production (per kg) (F = A/B)	**RWF/kg**	**EUR/kg**
	186	**0.18**
Labour investment (days) (G)	**days/are**	**days/ha**
	25.1	**2 510**
Return on labour (per day) (H = E/G)	**RWF/day**	**EUR/day**
	1 947	**1.89**

Source: Authors' computation using data from the HortInvest project, 2020.

HortInvest data show that that yield is reasonable but that with the application of modern practices (GAP, IPM, additional rounds of harvesting, etc.), it can be further increased, and that the cost of production (per kilogram) can also be decreased, further increasing the profitability of tomato. This aligns with the notion from countries like Kenya and Ethiopia: if you can apply GAP properly, tomato is your money maker. This can be achieved by smallholders in full-soil cultivation and, as several commercial farmers have started doing, in greenhouses, and by producing for the local market, which is another sign of good local demand and high prices.

Youth agripreneurship in production

Youth membership in cooperatives that are involved in tomato production provides an indication of youth involved in tomato production. As seen in Table 55, there is a 15 percent youth involvement rate in tomato production, which is slightly lower than that of French beans (18 percent) and that of chilli (20 percent). Again, there are also more female youth involved than male youth. This shows that even though tomato production might not have the attraction of being part of an export VC, with substantial external support and political and media attention, it is still considered a viable option.

Table 55: Membership of cooperatives involved in tomato production

No	Cooperative	Key crops[64]	District	Male	Female	Total	Male youth	Female youth	Total youth	Youth in leader-ship
1	Coop Gwiza	Tomato, chilli, French beans	Rwamagana	421	320	741	29	7	36	No
2	Dufatanye Umurimo	Tomato, French beans	Nyanza	13	17	30	6	3	9	Yes
3	Association Abahizi	Tomato, onion, chilli	Rwamagana	10	10	20	5	5	10	Yes
4	Isonga Rya Bwunya	Tomato, French beans	Gasabo	420	402	822	22	16	38	Yes
5	Koabiga	Tomato, chilli, French beans	Gasabo	256	560	816	123	151	274	Yes
6	Kaidu	Tomato, onion, French beans	Rubavu	92	106	198	40	35	75	

[64]From the four crops included in this study.

Table 55: Membership of cooperatives involved in tomato production

No	Cooperative	Key crops[64]	District	Male	Female	Total	Male youth	Female youth	Total youth	Youth in leader-ship
7	Koabibika	Tomato, passion fruit	Karongi	640	372	1012	14	16	30	No
8	Yahoproc	Tomato, French beans	Rulindo	30	70	100	3	7	10	No
9	Urugero	Tomato	Nyanza	104	108	212	32	97	129	No
	Total			**1 986**	**1 965**	**3 951**	**274**	**337**	**611**	
	%			**50%**	**50%**	**100%**	**7%**	**9%**	**15%**	

Source: Authors' computation using data from the surveys, 2020.

Youth employment in production

At the production level, wage labour opportunities can be found with smallholders and with medium and large commercial farmers. Smallholders largely rely on household labour. Table 56 shows the data collected during the field work for this study for medium and large commercial farmers. Youth employment is higher, and female involvement is significantly higher than for adults above 30 and men respectively. The majority of the employment is seasonal, and daily labour wages are low in Rwanda, certainly not allowing for decent wages (see Section 4.6.3).

District	Coop, farm, company	Total		Men		Women		Youth 16-17		Youth 18-30		Adults > 30	
		Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual
Rulindo	GAKWERERE Jean commercial farmer	0	20	0	6	0	14	0	0	0	10	0	10
Karongi	NIYOMPANO Vedaste medium farmer	1	3	1	0	0	3	0	0	0	3	1	0
Total	**24**	**1**	**23**	**1**	**6**	**0**	**17**	**0**	**0**	**0**	**13**	**1**	**10**
% of total full-time and seasonal		**4%**	**96%**	**4%**	**25%**	**0%**	**71%**	**0%**	**0%**	**0%**	**54%**	**4%**	**42%**
		100%		**100%**				**100%**					

Source: Authors' computation using data from the surveys, 2020.

Opportunities for youth

Out of the four VCs in this study, tomato is by far the biggest operation in nearly every district in Rwanda. The demand is good, especially on the domestic market, so youth can become smallholder producers, as many youth members of cooperatives have already proven. Of course, they need other profitable crops as well, to reduce risks and ensure an effective rotation scheme. Case 1 in Appendix 6 describes how a family helped a daughter get established as a farmer. If the family does not avail land and initial investment, additional support will need to be organized. Section 4.2.4 on the production of French beans provides insight how organizations are supporting youth to take up farming. For example, district governments are key in preparing and availing government land, preferably with irrigation. These kinds of support are also feasible to support youth to start tomato production.

4.4.5 Farmer cooperatives

Farmer cooperatives are strongly promoted in Rwanda, and all of the tomato producers interviewed were also members of cooperatives. Cooperatives provide opportunities to improve access to services (extension, finance, support from government or projects), to improve access to markets (aggregation, bargaining) and market information, and to improve access to inputs (collective purchase, possibly of quality inputs available in Kigali). Table 26 in Section 4.2.5 shows that prospective members need to buy shares, usually around RWF 10 000 to RWF 30 000. When assets of a cooperative increase, so does the value of the shares. For youth, this is another challenge, in addition to the challenges of becoming a farmer in the first place.

Youth employment in cooperatives

Cooperatives also provide some wage labour opportunities, largely seasonal. Women are more involved (65 percent) than men, and youth find opportunities as well (41 percent).

Table 57: Youth employment in cooperatives in tomato value chains

District	Cooperative	Total		Men		Women		Youth 16–17		Youth 18–30		Adults >30	
		Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual
Gasabo	Isonga Rya Bwunyu cooperative	23		11		12		0	0	6		17	
Rubavu	Kaidu cooperative	2	17	2	10	0	7	0	0	2	7	0	10
Karongi	Koabibika cooperative	4	80	4	10	0	70	0	0	1	20	3	60
Rwamagana	Association Abahizi	8	45	6	20	2	25	0	0	7	30	1	15
Total	**179**	37	142	23	40	14	102	0	0	16	57	21	85
% of total full-time and seasonal		**21 %**	**79 %**	**13 %**	**22 %**	**8 %**	**57 %**	**0 %**	**0 %**	**9 %**	**32 %**	**12 %**	**47 %**
		100 %		**100 %**				**100 %**					

Source: Authors' computation using data from the surveys, 2020.

The cooperatives and the one association have a considerable number of employees, and these staff are involved more in organizational issues, organizing input supply and aggregation, etc., rather than production, as production of tomatoes is undertaken by the members on an individual basis. Youth have some educational advantages for certain required tasks in cooperatives.

Box 26: Post-harvest losses

Improved post-harvest handling has a strong role to play in improving saleable volumes by increasing both the quantity and the quality of tomatoes. Field work estimates, by applying the Commodity Systems Assessment methodology, show that farmers are losing on average 21 percent of their crop during harvest. At the collection point, another 11.5 percent of tomatoes are lost. At the wholesale level, 10 percent of tomatoes are culled, and at the retail level, 13.6 percent of tomatoes are discarded. Improving post-harvest handling and storage practices will reward each actor along the VC by increasing the quantity and quality of tomatoes. Post-harvest losses from tomatoes do not only lead to the loss of saleable and consumable volumes, they also translate to the use of land, water, fertilizers, chemicals and other inputs. Per tonne of tomato produced, 21 kg of fertilizers are lost due to post-harvest losses. Tomato losses also account for 86 cubic metres of water per tonne of tomatoes (USAID, 2018). It would be interesting to assess where systems of returnable plastic crates are functioning well in Rwanda and which conditions are required to make upscaling possible.

4.4.6 Post-harvest handling and processing

The post-harvest handling of tomatoes includes activities such as sorting, cleaning, packing and transporting that have a strong influence on the quality of the tomatoes that reach the market. Sorting happens based on size, and by taking out damaged tomatoes.

This happens at different nodes in the VC, although farmers will try to sell everything, which leaves the sorting to actors further down the VC.
Transport happens in large plastic bags, large woven baskets or plastic crates. The plastic bags and woven baskets can hold 50 to 80 kg of tomatoes.

Incorrect handling can lead to a considerable loss of the harvest. In Rwanda, between 40 and 60 percent of tomato production is lost before retail sales (see Box 26). The reasons for this worrisome quantity of post-harvest loss are multiple, including:

- Farmers usually pick tomatoes only when they are ripe, reducing their already short shelf-life.
- There is a lack of appropriate cold rooms and storage facilities.
- The post-harvest handling has not yet received the attention of the GoR or NGO support.
- Only rudimentary sorting occurs at the farm level.
- Packing and transportation costs are still very high due to the underdevelopment of the industry.

The tomato VC does not include international markets and related external shocks, although the cross-border export to DRC occasionally gets disrupted (e.g. border closures due to Ebola in 2019 and the COVID-19 pandemic in March–June 2020).

Figure 40: Transport of tomatoes in bags and baskets

Pictures from ©SNV

Figure 41: Damaged tomatoes

Processing

Tomatoes have a large range of potential processed products such as sauces, ketchups, pastes and sun-dried tomatoes.

Unfortunately, in Rwanda the tomato processing industry is not yet well-developed. Most of the produced tomatoes are sold and consumed fresh with only a few processing companies. At the same time, Rwanda's import of processed tomato products is increasing, with a much higher value than the small export of processed tomato products (see Table 58).

Table 58: Export and import of tomato products

Tomato products exported & imported	2015	2016	2017	2018	2019	Average	% of total processed vegetable
Export volume (tonnes)	1 420	685	1 468	1 889	2 313	1 555	83%
Export value (Million EUR)	2.3	1.1	2.2	2.5	3.1	2.3	78%
Import volume (tonnes)	5 774	4 977	6 036	7 628	7 996	6 482	80%
Import value (Million EUR)	8.7	6.8	7.3	9.2	10.2	8.4	70%

Source: Based on NISRA data in Ujeneza, 2020.

Figure 42: Various tomato-based products

©SNV

The most significant tomato processing plant in the country's history has been Sorwatom tomato paste company, with a capacity to process 60 tonnes of tomatoes per day. Between 2006 and 2011, the company produced a considerable number of processed products but nearly went bankrupt due to a lack of sufficient fresh tomato supply. It was then taken over by the Mauritius Dillux SA, after which the company based its processing on tomato paste imported from Italy for its two tomato-based products (see the two products on the left in Figure 42).

At the moment, the largest tomato processor in Rwanda that uses fresh tomatoes, with just one product (see the Akacu Hot Ketchup in Figure 42), is Sina Gerard/Ese Urwibutso based in Rulindo. However, due to its limited production (15 tonnes per year), it is considered to be an SME that supplies the domestic market. For its many other products, the company employs a considerable number of youth (see Section 4.3.6). However, the tomato and chilli processing are only a minor activity for this company and the employment is minimal (see Table 59).

Table 59: Employment in Ese Urwibutso tomato and chilli processing unit

District	Company	Total		Men		Women		Youth 16–17		Youth 18–30		Adults >30	
		Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual
Rulindo	Ese Urwibutso[65]	8	0	2	0	6	0	0	0	6 (4f)	0	2	0
		100%		100%				100%					

Source: Authors' computation using data from the surveys, 2020.

Due to the high demand for fresh tomatoes and a relatively low supply, the market prices are high. Farm gate prices can range from RFW 100/kg to RWF 400/kg, and at the wholesale level a basket of tomatoes goes for RWF 10 000 to 80 000 (USAID, 2018). The main drawbacks of the processing industry are related to the price fluctuation of the materials and the scarcity of commodities in the low season, leading to a sharp increase in the market prices of the local production. Farmers will not sell to processors if they can get better prices on the fresh market. Processing requires low-cost raw material to be able to compete with the cheap imported tomato paste. Therefore, Sorwatom was forced to switch to imported tomato paste. The feasibility of local, cheap tomato supply for processors can only happen under two conditions: (1) supply must increase faster than demand, leading to lower market prices; and (2) production must be low-cost by applying GAP practices so that tomatoes remain a profitable crop for farmers. If the latter does not happen, farmers will reduce production with the low market prices, which will then increase again. Without these conditions, large processing will not be possible in Rwanda, except for some niche markets, for example, consumers who support Rwandan products. Increasing import taxes on fresh or on paste, as some might suggest to boost domestic VCs, will not lead to lower market prices for fresh tomatoes. Farmers will keep selling to the fresh market, and therefore, this will not benefit the processing industry. Ese Urwibutso still manages to obtain small amounts for its processing (see Box 27).

[65]These are the employment numbers of unit processing for both tomato and chilli.

Box 27: Ese Urwibutso supply chain governance

Despite its limited production volume of only 15 tonnes per year, Ese Urwibutso has impressive management that addresses the issue of unreliable supplies with its governance structure. The type of governance applied by the ketchup processor can be defined as captive because in these networks small suppliers are transactionally dependent on large buyer(s). Suppliers face relevant switching costs and are therefore "captive". This type of governance is characterized by a high degree of monitoring and control by the lead firm (Gereffi *et al.,* 2006).

In fact, the processor sources 100 percent of its raw materials from a restricted number of contracted local individual farmers, from whom they buy on average 1.5 tonnes of tomatoes per month. In order to ensure the agreed quantity and quality, and to optimize the suppliers' production capacity, Ese Urwibutso provides recommendations to contracted farmers for appropriate inputs to apply during production; they monitor tomato production from the planting to the harvesting; and they train farmers and workers in effective transportation of the harvest from the farm gate to the processing plant, paying extra attention to the packing stage.

Ese Urwibutso's governance system seems to be effective, as the company claims to be fully satisfied with the quality and quantity supplied by its contracted farmers.

Source: Alexis Nkundayezu, CEO, Ese Urwibutso

Opportunities for youth

In the aggregation and post-harvest handling, few additional youth jobs can be expected, unless the volumes were to greatly increase. Post-harvest handling on smallholder farms is done by the family members themselves. In the case of membership of cooperatives, the latter are directly in contact with wholesalers, exporters and processors, and already have access to their fixed temporary workers to do menial tasks like loading and unloading. As tomato production is mainly for the domestic market, youth can find additional work on the few commercial farms, where seasonal or permanent workers are required for post-harvest activities. Youth are disadvantaged, as they are perceived as being "less responsible". The processing sector is so small that additional jobs can hardly be expected.

4.4.7 Trade

The key wholesale market in Rwanda is the Nyabugogo market in Kigali. The wholesale market opens in the morning around 04:00 hours and closes at about 8.00 hours, after which the retailing starts. From here, supplies go to other retail markets of Kigali (Kimironko, Kigali city market, Kicukiro and Kabuga), hotels, restaurants, supermarkets and to some district markets in the case of local shortages.

4.4.7.1 Wholesale

The wholesale in the tomato VC is quite different from that in French beans and chilli. The tomato wholesale includes: (1) big traders who own transport means or who hire trucks (Dinner or FUSO

long chassis) to facilitate the collection and trading of tomatoes in the Nyabugogo markets, or (2) wholesalers who also have large scale/commercial farmers who collect their own production and that of other farmers, to supply to the Nyabugogo markets. The total number of wholesalers varies with the harvesting time but can reach up to 30 people per day.

Table 60 indicates the costs incurred by wholesalers in tomato.

Table 60: Reported investments, costs and profit margins for wholesalers

District	Crop	Investment per batch (RWF)	% veg. thrown away	Fees/costs per month (RWF)	% profit margin
Nyarugenge (Kigali Nyabugogo wholesale and retail market)	Tomato	100 000 – 300 000	35%–40%	Rent: 10 000 License: 5 000 Tax: 4 000 Cleaning: 2 000	30–35%

Source: Authors' computation using data from field survey 2020.

Wholesalers in the tomato VC reported that they are experiencing huge losses (up to 30 to 40 percent) due to poor means of transportation and a lack of quality equipment. Tomatoes often come in bags of 50 kg. The price varies, in this case depending on the quantity and quality (appearance). For example, a basket of 35 kg is RWF 5 000 (around RWF 150/kg).

Modern suppliers like Get It, Ineza, etc. (see Box 14) also play a role in supplying hotels, restaurants and supermarket chains, but many of these buyers also buy directly at the wholesale markets.

Youth opportunities in wholesale

As tomato production is larger for the domestic market, youth can initiate a business, starting as brokers from their own villages, with small volumes and the minimal required capital. In this manner, youth could work up to becoming bigger traders in time. However, there is limited scope under this node of the value chain to generate significant job numbers.

4.4.7.2 Retail

Retail largely happens at the district markets and at the four large markets in Kigali. There are few specialized vegetable and fruit shops, and some of the supermarket chains sell small amounts to expats and sporadic national consumers who are in a hurry.

Retailers at the district and Kigali markets typically sell 5 to 10 different vegetables and fruits to consumers. The investment per batch of one specific crop is RWF 15 000 to 50 000. A starting retailer starts with low amounts.

E-commerce (home delivery) has boomed during the COVID-19 pandemic, but supply of fresh vegetables is complicated, and customers complain about freshness and high prices compared to the physical markets. DMM HeHe (see Box 14) is an example of an e-commerce home delivery company that is trying to buy vegetables and fruits from farmers rather than from the wholesale market.

Table 61: Reported costs and profit margins for retailers of tomato

District	Investment per batch of specific crop	% veg. thrown away	Monthly fees/costs (RWF)	% profit margin
Huye	50 000	33%	Rent: 15 000–25 000	30%
Rubavu	55 000	35%	Rent: 5 000 License:7 800	30%
Ntunga	15 000– 40 000	25%	Rent: 5 000 License: 7 000/year	28%
Nyarugenge (Kigali Nyabugogo wholesale & retail market)	30 000– 50 000	20–25%	Rent: 10 000	20%

Source: Authors' computation using data from field survey. 2020.

The price paid by individual customers ranges from RWF 300/kg to RWF 500/kg.

Youth opportunities in retail of tomato are the same as for the aforementioned VCs.

4.4.7.3 Export

Export exists through regional, cross-border trade, mainly to DRC and on a seasonal basis to Uganda. Tomato export to DRC represents 82 percent of Rwanda's total tomato exports. Of the total tomato exports, 64 percent went to Goma (3 028 tonnes; annual average 2016–2018), while 36 percent went to south Kivu (1 710 tonnes; annual average 2016-2018). Tomato export to Goma peaks in October (133 tonnes), and to Bukavu it peaks in September (89 tonnes). The lowest export to Goma is in July (70 tonnes), and to Bukavu, it is in February (17 tonnes) (Ujeneza, 2019).

Box 28: Tomato cross-border trade with Democratic Republic of Congo

Ninety percent of tomatoes that are wholesaled each morning in the Mbugangari marketplace (Rubavu's cross-border market) come from Rwanda's Eastern Province (Bugesera, Gatsibo, Nyagatare and Rwamagana). A dozen tomato traders go across the country with tomatoes, using five-tonne Daihatsu trucks (see photo). The daily price depends on the supply/offer balance. Four to eight vehicles (20 to 40 tonnes) arrive each day at the Mbugangari marketplace.

In addition to tomatoes supplied by the Eastern Province, a small portion of tomatoes (about one tonne per day) are provided on Gisenyi and Goma markets by Rubavu farmers, primarily located in the Nyamyumba sector. The cross-border traders do not appreciate the tomatoes contained in 15 to 20 kg basins, as the tomatoes do not give a consistent sauce. Everyone prefers tomatoes grown in the Eastern Province, which are more exposed to sunlight.

Rwanda has captured about 90 percent of the tomato market in North and South Kivu, and competes with tomato supplies from South Kivu (Minova). Like Rubavu's tomatoes, Minova's tomatoes are less appreciated by the mass market in Goma. Traders sell them to high-income consumers that consider them to be organic, at about a 10 percent higher price. Minova's tomatoes are delivered to Goma two times a week via small boats across Lake Kivu.

Source: Ujeneza, 2019.

Five-tonne trucks at Rubavu cross-border marketplace

There are formal traders, who are licensed and who drive loaded trucks or pick-ups across the border, and there are informal traders, mainly women, who carry across the border one bag of tomatoes at a time. For the latter, tomato farmers and/or cooperatives can bring their loads to the border district Rubavu, for example, and sell them per bag to these informal traders, or to in-between brokers. If the prices are good on the other side of the border, then these informal traders will do a second or even third sale. In Goma, informal traders largely sell directly to retailers, although there are also some vegetable wholesalers who forward produce by air to their buyers in Kinshasa.

Opportunities for youth in export

In tomato export, there are few opportunities for youth employment. Becoming a formal trader requires substantial working capital and considerable risk, and youth are hardly inspired to even become informal traders. Nevertheless, some youth living in border towns might take the opportunity to become informal traders, as the upfront capital is minimal. For youth farmers, it can be interesting to join one of the few associations or cooperatives which produce and do cross-border trade.

4.4.8 Service providers

The market of service providers is not well-developed, and many of the services towards smallholders are subsidised. Supporting organizations which rely on external funds and subsidies were presented in Section 3.3. Cooperatives are often key in attracting their members to these subsidised services. In addition to the input suppliers already mentioned in Section 4.4.3, there are a few other service providers, including financial service providers, which are similar to those in the French bean VC presented in Section 4.2.8.

Additionally, the processors require specific services like packaging and processing equipment. Packaging materials are mostly imported, and there are a few local companies producing various types of packaging (see Section 4.2.8). Processing equipment can be made locally on order, while more advanced processing equipment is imported from countries like China and India.

4.4.9 Value capture along the tomato value chain

Table 62 provides the value creation of gross margin for the fresh tomatoes sold in the Kigali market. A farmer obtains the highest gross output of 44 percent, whereas the local aggregator, wholesaler and retailer capture 12.5 percent, 18. 7 percent and 25 percent of the gross output, respectively.

Table 62: Value capture along the tomato value chain

Price per KG	Farmer	Local aggregator	Wholesaler (Kigali)	Retailer	Consumer in Kigali	Total
Selling price/kg (RWF)	350	450	600	800	Consumer in Kigali	
Gross value added (RWF)	350	100	150	200		Total value added RWF 800
Percentage of value capture	**43.8%**	**12.5%**	**18.7%**	**25%**		**Total 100%**

Source: Authors' compilation based on FGDs and KIIs undertaken for this study.

4.4.10 SWOT analysis and key opportunities

Table 63 provides the SWOT analysis for the tomato VC.

Table 63: SWOT analysis for tomato

STRENGTHS Production: • Compared to the other three selected vegetables, tomatoes involve the largest volumes and number of smallholders by far. Also, there is a considerable number of medium-sized farmers. • Can be produced in nearly all areas of Rwanda. If irrigation is available, and with the right knowledge, vegetables can be produced year-round (seasons A, B and C). • Production in greenhouses by a growing number of commercial (large) farms, which provide employment and new technologies. Market: • Good domestic demand: Rwandan farmers are increasing acreage. • Large cross-border trade to DRC. Large number of women involved in informal cross-border trade. Youth employment-related: • Youth motivated for tomato production, as proven by some cooperatives. • Districts are key in access to land by availing (drained) marshlands. • Cooperatives can be very supportive for youth, if youth are a key focus from the start. • Youth are given a big role in activities such as harvesting, sorting and transport.	**OPPORTUNITIES** Production: • With the right GAPs, yield and income increases for smallholders can be enormous. • Tomato shows potential for protected cultivation (greenhouse/net house) for well-off, educated farmers, and can provide youth employment. • Affordable quality tomato seeds at markets. • Tomato will hopefully be included in the NAIS crop insurance scheme, supporting farmers to manage agriculture risks. • Commercial nurseries will help farmers get a head-start in production with quality seedlings. • Introduce crates to reduce losses (for harvesting and marketing). Market: • Demand is still growing for tomato on the domestic market and in cross-border trade. Youth employment-related: • Still sufficient marshlands available, political interests to support youth, including land access. • High potential to employ both educated youth (cultivating, harvesting, post-harvest handling) and uneducated youth (farming and retailing). • New programmes are increasingly focusing on youth and on horticulture, e.g. World Bank, SAIP, Kilimo, IFAD, DMZ, IMSAR, HortInvest, HingaWeze, Agriterra. • Increasing attention for horticulture in IPRCs (ATVETs) and UR-CAVM, RICA. • Financial facilities including BDF (guarantee schemes, matching grants) for educated, well-off youth.
WEAKNESSES Production: • Prone to pests and diseases. Yields decreasing. • Most extension staff/TM not well-trained in horticulture (only recently a priority crop). • Due to no international export, there is less “political backing” from the central government for the tomato VC. Market: • Very high post-harvest losses due to poor on-farm practices and handling, poor post-harvest facilities and poor logistics (transport). • Due to high market prices and low volumes,	**THREATS** Production: • With the growth of tomato production, pest and disease risks are rising, thus adversely impacting yields. • Access to knowledge for smallholders on horticulture GAPs is not efficiently organized. • Weak domestic infrastructure (storage, packhouses, refrigerated transport); possibly a bottleneck to further growth. Market: • Cross-border trade remains vulnerable to

Table 63: SWOT analysis for tomato

processing remains limited and less competitive. Youth employment-related: • Access to land is a key issue for youth to start farming. • Access to finance (for inputs and land) is a limiting factor; most youth cannot provide collateral. Slow processes lead to untimely finance for the production season. • Youth prefer white-collar jobs to those in agriculture. • No export to international markets, therefore no employment by export companies. • Once established, most cooperatives are not making special facilities/regulations to support youth. • Employment is largely seasonal, and wage labour rates are low for unskilled labour.	shocks (COVID-19, Ebola, security issues). Youth employment-related: • Without irrigation investments, there will be competition for the limited marshlands.

Key employment opportunities for youth

Table 64 provides an indicative overview where youth employment opportunities – additional ones – can be found in the different nodes of the tomato VC. Opportunities are divided in two groups: those for youth agripreneurship (self-employment, starting one's own business, including farming) and those for youth employment by others (wage employment). Opportunity is given in terms of low, medium or high, from a short-term perspective (two to four years), and from a production perspective (only in areas where the respective VC is considerably well-established). As Table 53 shows, tomato is produced in nearly all districts, so the supply channels to markets are widespread. High demand provides for good employment opportunities. It is assumed that a commercial farmer has at least one hectare of open field production, or at least 10 ares of greenhouse. Smallholders have an open field production area of less than one hectare, often only 5 to 20 ares. Although the opportunities depend on many factors, including the amount and kind of support provided to youth to gain employment, the willingness of other VC actors to invest in youth employment, etc., the following has been used as a guideline:

- Low: fewer than 50 new jobs can be created (assuming the production within most districts, all districts combined)
- Medium: 50 to 200 new jobs
- High: more than 200 new jobs.

Table 64: Youth employment opportunities in the tomato value chain

SN	Node	Agripreneurship	Wage Employment	Remark
1.	Input supply	Medium	High	For educated youth in agripreneurship: starting small agroshops; in employment: as agents of existing agro-wholesalers and agroshops. Both are attractive for youth, but should focus on input supply for multiple crops.
2.	Production by smallholder	High	High	For agripreneurship: land and market access, preferably through cooperative and government support. Also, potential for uneducated youth if they can access training. For employment: seasonal wage labour on the many smallholder farms, few medium-sized farms and few

Table 64: Youth employment opportunities in the tomato value chain

				commercial greenhouses. No employment in international export, as no international export.
3.	Production by commercial farm	Low	Medium	Various tasks educated/uneducated youth. Number of commercial farms limited.
4.	Aggregation and wholesale	Medium	Medium	Large volumes produced in many districts. Uneducated youth in agripreneurship: with a small capital, youth can start a business; in employment: mostly occasional wage labour, but this is less attractive to youth.
5.	Processing	Low	Low	Little growth potential due to high market price of fresh tomato, combined with relatively low volumes. Potential development of few small-scale processing units.
6.	Retail	High	Medium	Large volumes on domestic market. Uneducated youth in agripreneurship: potential if combined with other fruits and vegetables, as it requires small investment; in employment: opportunity is minimal, only some occasional wage labour.
7.	Export	Medium	Low	In agripreneurship: many women are involved. At cross-border markets (three to four border crossings with lively business, only to DRC and Uganda).
8.	Service providers	Medium	Medium	Especially for educated youth. Private extension (e.g. HoReCo, TM), logistics (transporters, loaders), marketing, export consultants, import of packaging materials, ingredients and equipment for processing, etc. Market of service providers is identified as medium compared to low in the other three VCs, as many more smallholders are involved in tomato production. In addition to direct opportunities for youth employment, effect of service providers on upgrading the VC could be considerable.

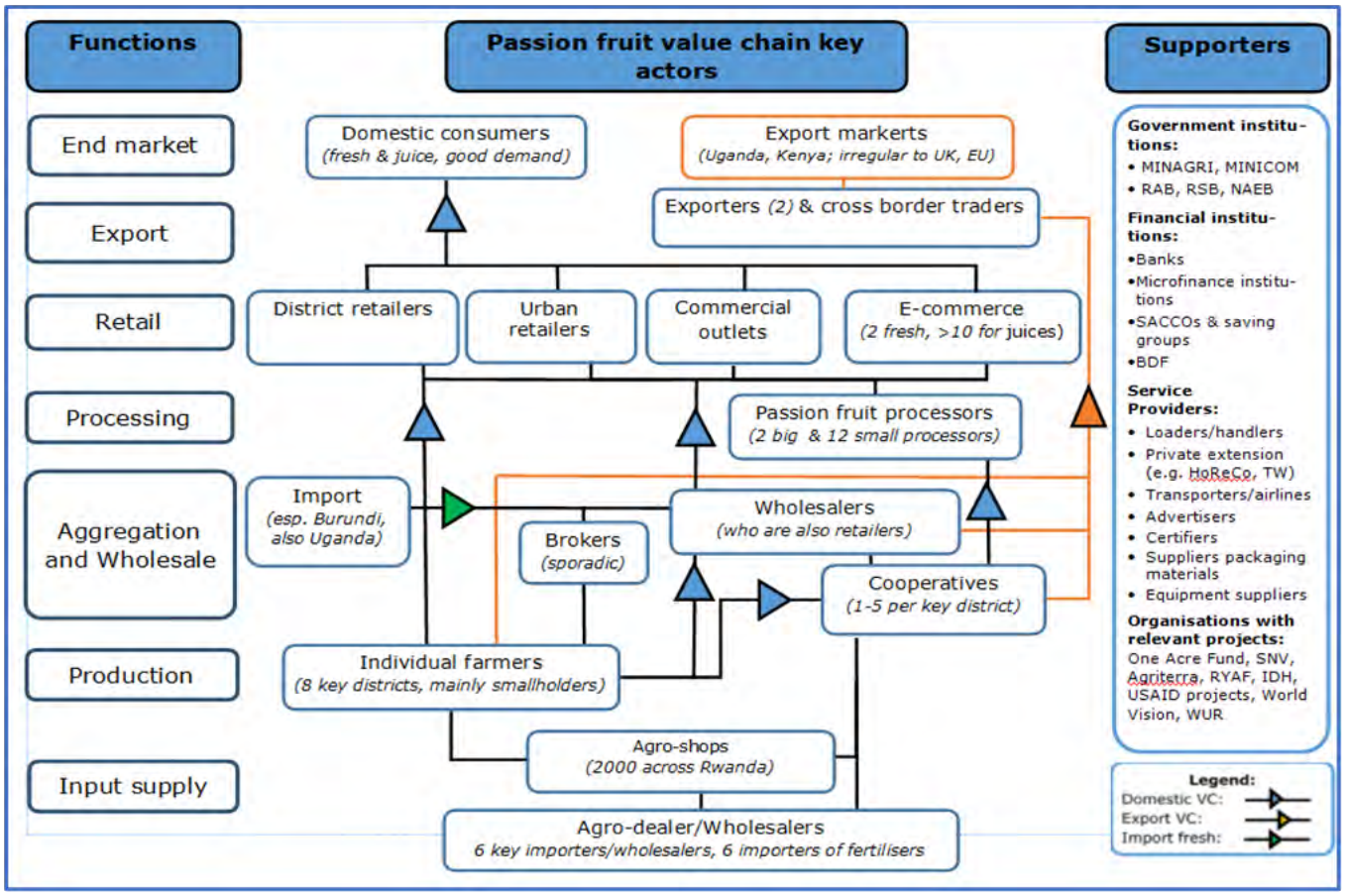
Source: Authors' compilation based on FGDs and KIIs undertaken for this study, 2020.

4.5 Youth-centred value chain analysis of passion fruit

4.5.1 Value chain map

The following map provides an overview of the functions, key actors and supporting organizations in the passion fruit VC. Smallholders are involved in production, and through various forms of aggregations, including by cooperatives and wholesalers, the fresh product reaches the retailers and consumers. There is also some import and export occurring into and from Rwanda. Passion fruit is one of the NAEB's prioritized horticulture export commodities, the others being French beans, snow peas, chillies and cut flowers. There are a number of small processors who produce concentrates and ready-to-drink juices. Various support organizations and projects are also involved in this VC, including RAB, the HortInvest project and more.

Figure 43: Passion fruit value chain map



Source: Authors' presentation using information from field survey, 2020.

The passion fruit is a popular fruit in Rwanda, with most of the production happening in the northern and western provinces, destinated for the domestic consumption as well as for the export market. In Rwanda, two types of passion fruits are primarily produced, with clearly differing appearances. The bright yellow variety, which is also known as the golden passion fruit, can grow to the size of a grapefruit and has smooth, glossy, light and hairy skin. The dark purple variety is smaller than a lemon, is less acidic than the golden passion fruit and has a richer aroma and flavour.[66]

4.5.2 End markets

Even though a lot of attention has been given to the export of passion fruit, it is largely grown for the domestic market; passion fruit juice is especially popular with the middle and upper classes and at the restaurants.

Rwanda's passion fruit production has substantially increased in the last years, moving from a net importer in 2016/17 to a net exporter in 2018/19, because of the rising interest for the crop in the European and Middle East markets but also because of the increased cross-border trade.[67] According to the Horticultural Exporters Association of Rwanda (HEAR), the United Kingdom,

[66] See https://naeb.gov.rw/index.php?id=108.
[67] Table 12 in Section 4.1.2 on cross-border trade mentions an EUR 65 546 annual export of passion fruit to DRC (2014–2018 average).

Belgium, the Netherlands and Dubai are the top destinations for the export of Rwanda's passion fruit. Quantities are still limited, however, and the export sector is not yet well-developed. Another important factor that comes from the data in the Table 65[68] is the growing informal exports to neighbouring countries, which accounts for around half of the formal export value. Ninety percent of the imports come from Burundi, the other supplier being Uganda (Ujeneza, 2020), while informal exports mainly go to DRC and smaller amounts go to Kenya and Uganda.

Table 65: Passion fruit import and export

(Based on prices FOB)

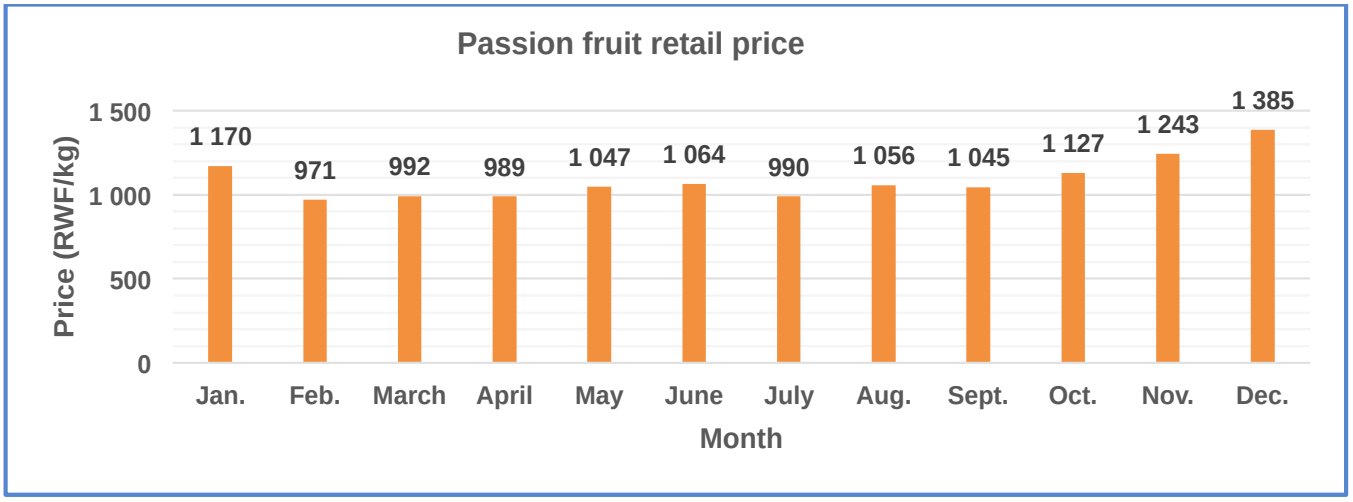
Passion Fruit		Import			Export		
		2016/17	2017/18	2018/19	2016/17	2017/18	2018/19
Formal	Volume (tonnes)	404	286	5	20	142	229
	Revenues (USD)	129 992	94 826	1 615	125 762	250 695	199 242
Informal	Volume (tonnes)	117	108	87	67	109	185
	Revenue (USD)	75 890	73 072	54 604	47 457	67 709	96 546
Total	**Volume (tonnes)**	**521**	**395**	**92**	**88**	**251**	**415**
	Revenue (USD)	**205 882**	**167 898**	**56 219**	**173 220**	**318 404**	**295 788**

Source: NISR, 2019b.

Retail prices of fresh passion fruit vary from RWF 990 in July to a high of RWF 1 385 in December (see Figure 44 for the monthly price trend).

Figure 44: Retail price of passion fruit

(Based on the average from January 2015 to July 2020)



Source: Based on NISR data in Ujeneza, 2020.

4.5.3 Input supply

Within Rwanda's agri-input sector, one can differentiate input wholesalers/agrodealers based in Kigali (with around six key actors), and the many agroshops (around 2 000) that sell a variety of inputs at the district and village levels. Several government agencies are also involved in

regulating this sector, including RICA, RAB, REMA, the RBS, etc. Many smallholders use their own saved seeds, while RAB also provides seeds, which it has under its own production.

Note that the input supply does not specialize in passion fruit production, and instead targets a multitude of horticulture and non-horticulture crops. The description in the French beans section (see Section 4.2.3) provides more information on the input supply, which also applies to this VC. A key difference is that passion fruit production requires a trellis system which should survive at least three years, as that is the lifespan of passion fruit, after which it gets uprooted.[69] Materials required for the trellis system such as poles and wire can be bought locally at many of the hardware shops. For smallholders, poles are often taken from their own tree stands or bought from neighbours.

The inputs used in the production of passion fruit include organic fertilizers (animal wastes), chemical fertilizers (DAP, Urea, NPK), pesticides (Supermethrine, Dethane, Dudu, Omagis,) and various equipment such as pruning shears, watering cans and sprayers. Of the respondents, 50 percent declared not to face any challenges with input supply, and 50 percent would like to have more information on the wide range of inputs offered by their suppliers. Smallholders mainly use their own collected seeds and manage their own nurseries.

The FAO project “Support to passion fruit value chain in Rwanda" is developing nurseries in the three target districts (Gakenke, Rutsiro and Rwamagana) on 60 hectares, producing 60 000 disease-free passion fruit seedlings.[70] Coupled with the introduction of new varieties, this could boost passion fruit production. Most farmers still raise their own seedlings, some from their own saved seeds or seeds from RAB. Hybrid varieties are not yet in use in Rwanda. A few fruit tree nurseries are now also selling passion fruit seedlings.

Youth employment opportunities

Although the input market is growing, agrodealership itself does not entail a lot of employment per district. As shown in Section 4.2.3, each agroshop has two full-time employees and one part-time employee on average. Creating 100 youth jobs would mean creating 30 new agroshops where the current market already shows 3 to 30 agroshops per district. It was noted during field visits that the number of new agroshops and the number of opportunities for educated youth with access to finance to start businesses are on the rise. These agroshops would focus on all the local VCs, and the passion fruit VC alone would only create sufficient demand, especially because it is produced in only a few key districts (see the next section). There are likely some opportunities as marketing agents, where trained youth could promote the sales of quality inputs for existing importers and agroshops. This kind of extension is often funded by projects or the GoR,[71] and is commercially still difficult. Fruit nurseries are taking up the production of passion fruit seedlings, and sales can also be the basis for a few youth jobs.

[69] Longer lifespan is possible, but the production quickly declines.
[70] Source: www.fao.org/rwanda/news/detail-events/en/c/1103017/.
[71] For example, the TM extension system or organizations like HoReCo (see Chapter 3).

4.5.4 Production

Access to land and water

In Rwanda, the high population density and the geography formed by many hills has created a landscape covered by small plots. On average, a household cultivates a land of 60 ares (0.06 ha) (MINAGRI, 2018), often divided into three or four subplots on the hillsides. This shows that smallholders produce on very small areas, including for passion fruit. Commercial farms[72] that produce passion fruit are few.

Another study (Bashangwa Mpozi *et al.,* 2020) based on a random sampling of 60 households in two districts found that inheritance was observed to be the main mode of land acquisition for passion fruit (55 percent), followed land purchase (41 percent) and lease (4 percent). Passion fruit production occurred on 0.23 ha on average, and 72 percent in combination with other crops. Sixty-four percent of the households interviewed reduced production of other crops (97 percent of these were food crops) in favour of passion fruit production. This shows that farmers see good opportunities with passion fruit production.

Although passion fruit production often still depends on rainfall, irrigation makes (semi-) commercial and year-round production more viable. However, investment power of smallholders is limited and to date, access to these technologies largely requires subsidies. Farmers currently produce passion fruit on hillsides, whether irrigation is possible or not, and reserve marshlands for other crops.

Access to finance

Ibimina and *Umurenge* SACCOs are the most potential sources for loans for production. Banks and the BDF were also mentioned as possibilities but are very challenging as reported: they require collateral; they have long procedures, causing loans to be too late to support production; and they require regular repayments rather than repayment after harvest. More information on organizations and institutions that provide access to finance can be found in Section 4.2.8.
As mentioned earlier, passion fruit has a three-year production cycle, and as the cost–benefit will show, the first year hardly provides any gross margin. Loan schemes will require longer duration, and repayment would need to start later, compared to short duration crops. This shows that passion fruit would need to be part of a farming system in which other crops provided sufficient income, especially during the first year of passion fruit production. Alternatively, it would need to be combined with off-farm work.

Production

Passion fruit largely started to be grown in Rwanda as a commercial crop after 1994.[73] The GoR is committed to promoting passion fruit farming to increase the export of the crop.

[72] MINAGRI uses the following definition: smallholders have less than 0.5 ha, medium-sized farmers have 0.5 to2.0ha, and large or commercial farmers have more than 2 ha.
[73] Source: http://www.fao.org/rwanda/news/detail-events/en/c/1103017/.

Passion fruit accounts for roughly 0.2 to 0.3 percent of the total value of sales of all of the horticulture crops.[74] The annual production increased to more than 7 000 tonnes in 2018 and 2019, and was dominated by the purple variety (see Table 66). With export volumes being less than 415 tonnes, this shows that passion fruit is largely grown for the domestic market. Eight districts produce 97 percent of the annual domestic production: Nyamagabe (131 tonnes), Karongi (199 tonnes), Rutsiro and Ngororero (269 tonnes each), Gicumbi (411 tonnes), Burera (665 tonnes), Rwamagana (1 400 tonnes) and Rusizi (2 170 tonnes): see Table 67. The latter two are key producing districts. Passion fruit covers less area than tomato but substantially more than French beans and chilli.

Table 66: Passion fruit production in Rwanda

Year	Production (tonnes)	Area (Ha)
2017	1 821	1419
2018	7 316	1 274
2019	7 894	2 102

Source: Authors' computation of NISR data, Seasonal Agricultural Survey 2015–2019

Table 67: Passion fruit production by district

(Average of 2017, 2018, 2019)

District	Production (tonne)	District	Production (tonne)	District	Production (tonne)
1. Bugesera	0	11. Kayonza	40	21. Nyamasheke	–
2. Burera	665	12. Kicukiro	10	22. Nyanza	0
3. Gakenke	29	13. Kirehe	–	23. Nyarugenge	–
4. Gasabo	–	14. Muhanga	–	24. Nyaruguru	2
5. Gatsibo	–	15. Musanze	1	25. Rubavu	–
6. Gicumbi	411	16. Ngoma	–	26. Ruhango	27
7. Gisagara	0	17. Ngororero	269	27. Rulindo	22
8. Huye	–	18. Nyabihu	4	28. Rusizi	2 170
9. Kamonyi	–	19. Nyagatare	33	29. Rutsiro	269
10. Karongi	199	20. Nyamagabe	131	30. Rwamagana	1 397
				Total	**5 677**

Source: Authors' computation of NISR data, Seasonal Agricultural Survey 2015–2019.

[74] Based on the following data: 7 316 tonnes of production (Table 7, 2018); RWF 400/kg farm-gate price (Figure 44); USD 1.2 billion horticulture production (Table 7, 2018). This compares to 4 percent for tomato.

Box 29: Advantages of passion fruit production

"We chose to work in passion fruit production because it is the family business; we get the know-how from our parents. Passion fruit production is particularly good because we can get harvest all year round and have a reliable source of income every month."
Youth producing passion fruit in cooperative Co.F.F.K. Ejoheza

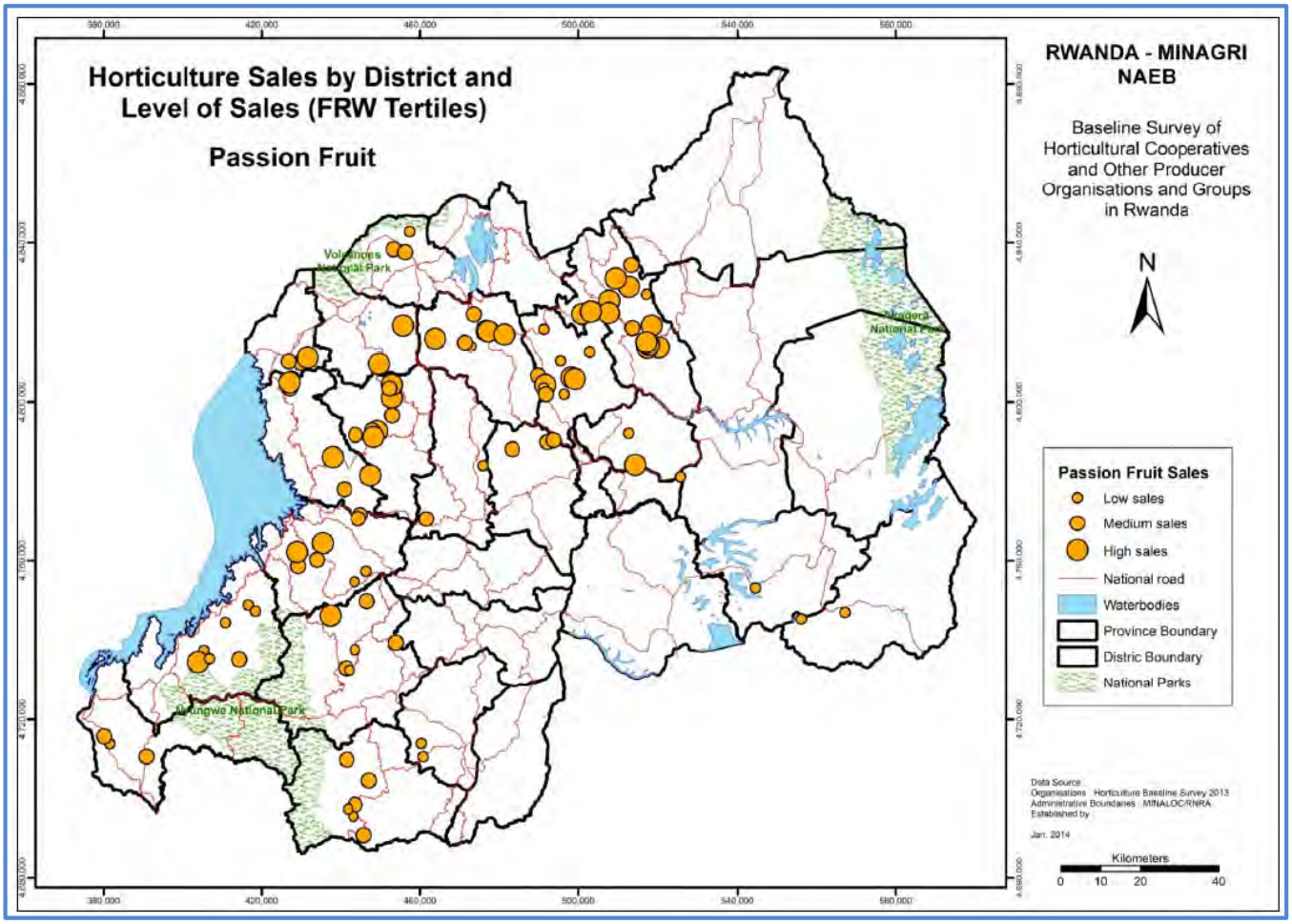
"I chose to work in horticulture because of quick economic returns and the growing domestic and export market."
Eulade Nzayinambaho, 30, passion fruit farmer

The passion fruit production sector is dominated by smallholder farmers or farmers' cooperatives, with only 3.2 percent of the national production produced by larger farmers.[75] Of the respondents, 57 percent own the land that they cultivate. The others rent or lease land. Production starts after six to nine months, and with irrigation, there is continued production. After three years the production declines, and more commercial-oriented farmers will replant. This means that for a starting youth farmer, passion fruit is more challenging than the other three crops of this study, as the first year the investments, especially for a trellis system, are higher than the revenues.

Diseases like Passion Fruit Woodiness Disease (PWD) started manifesting in Rwanda in 2002. The infected fruits are misshapen, and the pericarp becomes hard and thick. PWD is usually brought onto the farm by infected seedlings. In 2017, some of the hard-hit districts, such as Rwamagana, Rutsiro and Gakenke, lost up to one-third of their harvests. At the district level, PWD and other diseases reduced passion fruit production from 18 tonnes a week to 12 tonnes a week in the last months of 2017, totalling a loss of more than USD 8 500.[76]

[75] Baseline Report on the Rwanda Horticulture Organizations Survey, Final Report, European Union's External Cooperation Programme for Rwanda, March 2014.
[76] Source: www.fao.org/rwanda/news/detail-events/en/c/1103017/.

Figure 45: Map of sales by organized farmers



Source: European Union's External Cooperation Programme for Rwanda, 2014

Cost–benefit

Table 68 provides the cost–benefit of passion fruit in RWF per are, as smallholder farmers think in are (100 m^2) and not in hectares. The far-right column is in EUR per hectare. The table clearly shows that passion fruit is a three-year crop. More importantly, in the first year, there is hardly any gross margin (income or profit) due to the large initial investment and the lower yield. Farmers can apply staggered planting to avoid this income gap. The cost of a cooperative share is included, as this is often an additional financial burden for youth, but essential to have that market linkage with possible exporters and related higher prices. In other words, this crop is more challenging for starting youth, though once established the net incomes are attractive. Passion fruit is less prone to pests, diseases and perishability as compared to tomato. The farm-gate price in the following cost–benefit chart is high, due to the export connections and the organization of smallholders into a cooperative. Unorganized farmers with backyard passion fruit will receive less.

Table 68: Cost–benefit of passion fruit

[Exchange rate EUR 1 = RWF 1 029 (May 2020)]

Passion fruit										
Items	**Unit**	**Unit price**	**Quantity**			**Costs (RWF/are)**				**Cost 3 years (EUR/ha)**
			Year 1	**Year 2**	**Year 3**	**Year 1**	**Year 2**	**Year 3**	**Total 3 years**	
1. Land rent/opportunity costs	are	5 000	1	1	1	5 000	5 000	5 000	15 000	1 458
2. Land layout	labour day	1 000	1			1 000	0	0	1 000	97
3. Land preparation (1st and 2nd ploughing)	labour day	1 000	2			2 000	0	0	2 000	194
4. Trellis system (hardware)	kg	1 500	1.5			2 250			2 250	219
5. Pit digging for 50 poles	labour day	1 000	1.3			1 300			1 300	126
6. Passion fruit seedlings	pc	100	24			2 400			2 400	233
7. Organic manure	kg	40	60	30	30	2 400	1 200	1 200	4 800	466
8. Planting activities (pit refilling, adding organic manure, planting)	labour day	1 000	2.4			2 400			2 400	233
9. Irrigation system (pump and pipes)[77]	lump sum	13 650	1			13 650			13 650	1 327
10. Mineral fertilizer	kg	700	1	1	1	700	700	700	2 100	204
11. Macro mix (Foliar fertilizer)	litre	20 000	0.025	0.025	0.025	500	500	500	1 500	146
12. Chemicals: Copper Hydroxide, Cypermethrin	litre	12 000	1	1	1	12 000	12 000	12 000	36 000	3 499
13. Permanent part-time labour force	month	2 000	12	12	12	24 000	24 000	24 000	72 000	6 997
14. Tools	lump sum	900	1			5 000			5 000	486
15. Crates for carrying the produce[78]	pc	9 000	2			18 000			18 000	437
16. Fuel and engine oil	per month	180	12	12	12	2 160	2 160	2 160	6 480	630
17. Transportation costs to collection point	kg	2	160	192	240	320	384	480	1 184	115
Total expense						**95 080**	**45 944**	**46 040**	**187 064**	**16 867**
Yield (in kg) (B)						kg/are	kg/are	kg/are	kg/are	kg/ha
						160	192	240	592	59 200
Unit price received (per kg) (C)						RWF/kg	RWF/kg	RWF/kg	RWF/kg	EUR/kg
						600	600	600	600	0.58
Revenue (D=B*C)						RWF/are	RWF/are	RWF/are	RWF/are	EUR/ha
						96 000	115 200	144 000	355 200	34 519
Gross margin (E=D-A)						**RWF/are**	**RWF/are**	**RWF/are**	**RWF/are**	**EUR/ha**
						920	**69 256**	**97 960**	**168 136**	**17 652**
Cost of production (per kg) (F=A/B)									**RWF/kg**	**EUR/kg**
									316	**0.28**
Labour investment (days) (G)									days/are	days/ha
									42.7	4 70
Return on labour (per day) (H=E/G)									**RWF/day**	**EUR/day**
									3 938	**4.13**

Source: Authors' computation using data from Co.F.F.K. Ejoheza of Rwamagana District.

[77] Assumption: A) New pump at RWF 550 000, lasting five years, used for 2 ha. Passion fruit cost for three years: RWF 165 000. B) 200 m of pipes (lasting three years), with furrow irrigation at RWF 6 000/m. C) Total: RWF 1 365 000/ha or RWF 13 650/are.

[78] Two crates for 1 are, 50 crates for 1 ha (efficiency gains).

Note that the yield here is higher than suggested in Table 66 (about 3.5 tonnes/ha or 350 kg/are). Table 66 presents the average throughout Rwanda, while the cost–benefit in Table 68 is calculated with farmers who are specializing in the crop, are investing more into production, and have the opportunity to supply to an exporter. The yields in the cost–benefit are good, suggesting good application of agricultural practices. These are yields which are comparable to Kenya, for example. Note that the farm-gate price in the cost-benefit is also high due to the export connections and to the organization of smallholders into a cooperative. Unorganized farmers with backyard passion fruit will receive less.

Youth agripreneurship in production

Youth membership in cooperatives that are involved in passion fruit provides insight into whether or not youth can take up the farming of passion fruit. Table 69 provides a different picture than that of the previous three crops. Youth participation here makes up only five percent, one-third or one-fourth as much as the three aforementioned crops. Also, female participation is lower in passion fruit than in the three previous crops, making up a slight minority rather than a slight majority. This supports the notion that passion fruit has an additional challenge by being more capital-intensive: it requires more upfront investment, and the first year the gross margin is nihil. This makes passion fruit less attractive for women and youth who, in general, have less money to invest.

Table 69: Membership of cooperatives involved in passion fruit

No	Cooperative	Key crops[79]	District	Male	Female	Total	Men youth	Women youth	Total youth	Youth in leader-ship
1.	CoFFK Ejoheza	Passion fruit	Rwamagana	33	10	43	10	2	12	Yes
2.	Koabibika	Passion fruit, tomato	Karongi	640	372	1 012	14	16	30	No
3.	Abatarambirwa	Passion fruit	Rulindo	66	34	100	0	5	5	Yes
4.	Coopedush	Passion fruit	Karongi	11	13	24	6	2	8	Yes
	Total			**750**	**429**	**1 179**	**30**	**25**	**55**	
	%			**64%**	**36%**	**100%**	**3%**	**2%**	**5%**	

Source: Authors' computation using data from field survey.

Youth employment (wage labour) in passion fruit production

The other employment opportunity, in addition to taking up farming oneself, is to be employed by medium and large commercial farmers and the exporting companies. Table 70 shows a similar trend as the previous three crops: wage labour opportunities are largely seasonal. However, it also shows higher youth involvement. With only three actors interviewed, it is difficult to make conclusions from the data. It is not necessarily a characteristic of passion fruit production but more of the exporters involved, that they have a higher appetite to take on youth employees.

[79] From the four crops included in this study.

Bahage Food Ltd is, for example, a recently established company by a young woman. It is therefore not surprising that she has opted for youth colleagues, and also not surprising if, after ten years, many employees will fall into the adult (above 30) category. The high percentage of women employed can be explained by the tasks for which women are preferred: harvesting, sorting and packaging, as these require more delicate handling. Wage labour rates range between RWF 1 000 and RWF 2 000 per day; this hardly allows for earning a decent income, but it is a characteristic of the rural agricultural sector as a whole (see Section 4.6.3).

Table 70: Employment (wage labour) in passion fruit production

District	Coop, farm, company	Total		Men		Women		Youth 16–17		Youth 18–30		Adults > 30	
		Full-time	Seasonal / casual	Full-time	Seasonal / casual	Full-time	Seasonal / casual	Full-time	Seasonal / casual	Full-time	Seasonal / casual	Full-time	Seasonal / casual
Karongi	NSHIRIKAHE Gaudence medium farmer		10		8		2						10
Kigali City	Garden Fresh exporter	20	200	16	80	4	120			6	150	14	50
Kicukiro	Bahage Food Ltd	22	72	4	10	18	62			20	72	2	0
Total	**324**	**42**	**282**	**20**	**98**	**22**	**184**	**0**	**0**	**26**	**222**	**16**	**60**
% of total full-time and seasonal		**13%**	**87%**	**6%**	**30%**	**7%**	**57%**	**0%**	**0%**	**8%**	**68.59%**	**5%**	**18.5%**
		100%		**100%**				**100%**					

Source: Authors' computation using data from field survey, 2020.

Box 30: Young agripreneur in passion fruit

Alphonse Gatete, 24 years old from Rulindo District, is a self-made young agripreneur, cultivating passion fruit and tomatoes, among other crops. After graduating from university, Alphonse returned to his home village and started his journey in the horticulture business with an initial capital of RWF 20 000. After getting a loan from a SACCO, he was able to kickstart his production. After three years of hard work, Alphonse is cultivating 50 ares using technologies such as irrigation, fertilizers and pesticides. He has been able to build his own house and has started to invest in livestock.

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4.5.5 Farmer cooperatives

Farmer cooperatives are strongly promoted in Rwanda, and almost all the passion fruit producers interviewed were members of cooperatives, which can bias the findings of this study. Cooperatives provide opportunities to improve access to services (extension, finance, support

from government or projects), to improve access to markets (aggregation, bargaining) and market information, and to improve access to inputs.

Cooperative membership has already been presented in this report, with a relatively low membership of youth and women. Table 26 in Section 4.2.5 shows that prospective members need to buy shares usually around RWF 10 000 to 30 000, although when assets of a cooperative increase, so does the value of the shares. For youth this is another challenge, in addition to the challenges of becoming a farmer in the first place, especially with regards to access to land.

Youth employment by cooperatives

Those employed by cooperatives are not directly involved in production but are involved in the organizational and logistical tasks around it, and that is often part-time or seasonal work (70 percent). The low involvement of youth in the cooperative membership (5 percent) could help explain the low youth employment in passion fruit (9 percent). The same holds true for the employment of women. Coopedush has more employees who are not working in its processing centre (see Section 4.5.6) but who are linked to organizing production and supply to the processing unit.

Table 71: Employment by cooperatives in passion fruit

District	Cooperative	Total		Men		Women		Youth 16–17		Youth 18–30		Adults > 30	
		Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual
Rwamagana	CO.F.F.K. Ejoheza cooperative	3		3						1		2	
Rulindo	Abatarambirwa cooperative		3		3								3
Karongi	Coopedush	7	20	4	20	3				2		5	20
Total	**33**	**10**	**23**	**7**	**23**	**3**	**0**	**0**	**0**	**3**	**0**	**7**	**23**
% of total full-time and seasonal		**30%**	**70%**	**21%**	**70%**	**9%**	**0%**	**0%**	**0%**	**9%**	**0%**	**21%**	**70%**
		100%		**100%**				**100%**					

Source: Authors' computation using data from FGDs and KIIs, 2020.

Opportunities for youth

Looking at the employment by cooperatives, employment per cooperative (11 jobs per cooperative) is much less than the membership (as agripreneurship, 295 farmers per cooperative) or the employment per commercial farm or company (108 farmers). However, cooperatives can provide substantial benefits to youth, for example access to land. Once established, cooperatives do not usually give youth substantial preferential treatment, but there are examples where district governments have pushed for substantial youth membership right at the start of cooperative formation, and when this happens in combination with making rehabilitated lands (hill sides) available to the members, youth have a good chance to establish themselves as viable farmers. Districts can even delay payment of land lease until after the harvest. This was not the case in the cooperatives in Table 71, but it is even questionable whether or not this would sufficiently compensate the financial challenges for passion fruit production.

4.5.6 Post-harvest handling and processing

The post-harvest activities in the passion fruit production are harvesting, sorting, packaging, weighing and transport to market; youth are mostly involved in harvesting and transportation, with little or no differentiation between gender or education level. There is not much value addition for the fresh market. There are no specific hubs for passion fruit business; often retailers and wholesaler have direct business relations with individual farmers and farmers' cooperatives, since the volumes are still small. Since the bulk of passion fruit production is happening in the northern provinces, the few aggregators for passion fruit are based in Rulindo and Gicumbi districts and are working mostly for the export market.

Post-harvest losses are a big concern for passion fruit, even though the shelf-life is relatively longer than for other crops such as tomato. All respondents mentioned that some post-harvest losses occur mainly due to the lack of appropriate equipment and facilities to handle the produce (cold room, refrigerated trucks, crates), poor road conditions, adverse weather conditions and inconsistent market demand.

Processing

Processing into fruit concentrate and ready-to-drink juice is emerging as a more important market than the fresh market. In addition to the big fruit juice processors Inyange Industries[80] and Ese Urwibutso, there are 12 small processors based in Gicumbi, Karongi, Ngororero and Rulindo districts. Box 31 further explains a case of the Coopedush cooperative undertaking processing.

Figure 46: Photos of passion fruit processing

A local processor, supported by the USAID-PSDAG project[81]

Ready-to-drink passion fruit juice from Sina Gerard/Ese Urwibutso[82]

[80] In addition to fruit juices, Inyange Industries also produces dairy products and mineral water: www.inyangeindustries.com.
[81] Source: https://rti-intl-dev.medium.com/ripe-for-success-rwandan-passion-fruit-farmers-find-profit-using-new-tech-tools-f4656ca4a5e4.

Processing faces several challenges: although the demand for passion fruit juice is growing; most processors are working with outdated machinery, the prices on the fresh market are high, so farmers are reluctant to supply processors with cheap raw material; supply is not always year-round; and the import of juice and concentrate is still cheaper than the local products. As explained earlier (in Section 4.4.6 on tomato processing), low costs of production and high supply in the fresh fruit market compared to demand are essential to making processing a competitive industry.

Youth employment in processing

Table 72 shows the employment by three passion fruit processors. Both Ese Urwibutso and Inyange Industries, along with Coopedush (see Box 31), produce various juices at their units, including pineapple, strawberry and mango, and this employment does not apply to passion fruit juice alone. Note the high level of full-time employment compared to the earlier production-related tables, and the large involvement of women and youth. While women benefit from jobs where hygiene plays an important role, youth have an advantage because of technical and ICT skills. The latter shows that youth have educational advantages here. Nevertheless, from a youth employment perspective, these numbers do not show much potential: the two big and 12 small processors might have a total employment of about 300, of which all is not purely related to passion fruit. If one wanted to create another 300 jobs (for youth), one would need to more than double the passion fruit juice sector, as many of these processors have likely not fully realized their processing capacities.

Table 72: Employment in passion fruit processing

District	Company, coop	Total		Men		Women		Youth 16–17		Youth 18–30		Adults > 30	
		Full-time	Seasonal /casual	Full-time	Seasonal /casual	Full-time	Seasonal /casual	Full-time	Seasonal /casual	Full-time	Seasonal /casual	Full-time	Seasonal /casual
Rulindo	Ese Urwibutso juice factory[83]	60	19	28	10	32	9	0	0	19 (12f)	9	41	10
Kicukiro	Inyange juice factory[84]	40	63	22	25	18	38	0	0	20	63 (38f)	20	0
Karongi	Coopedush	7	7	4	2	3	5	0	0	4	4	3	3
Total	**196**	**107**	**89**	**54**	**37**	**53**	**52**	**0**	**0**	**43**	**76**	**64**	**13**
% of total full-time and seasonal		**55%**	**45%**	**28%**	**19%**	**27%**	**26%**	**0%**	**0%**	**22%**	**39%**	**33%**	**7%**
		100%		**100%**				**100%**					

Source: Authors' computation using data from survey, 2020.

[82] Source: https://sinarwanda.com/.
[83] Note that this is the employment for the whole juice factory, where they produce several kinds of fruit juices, not just passion fruit juice.
[84] Same as the previous footnote. Inyange also produces mineral water at this plant.

Box 31: Insights into Coopedush

The Coopedush cooperative is based in Karongi District and processes passion fruits and strawberries, which it supplies to local and Kigali markets. It processes on average 4 tonnes of passion fruit per month, producing some 1 000 litres of juice. The cooperative produces 75 percent of the raw material itself, while the rest is supplied by individual farmers (15 percent) and another farmers' cooperative (10 percent) under contract. Seventy percent is distributed directly to retailers around the country.

"Coopedush is an ambitious SME and is planning to optimize its production and grow bigger to hit the international market. Working in horticulture gives me the chance to contribute to the fight against malnutrition," says the 23-year-old food processing technician Juvenal Nshimyumukiza.

Coopedues received a EUR 77 000 matching grant from HortInvest in 2019 to train farmers for cultivation and post-harvest issues, and also to expand its processing capacity. The cooperative is currently buying from more than 1 200 farmers through its processing unit.

Coopedush borrowed approximately EUR 4 137 from Umwalimu SACCO (a teachers' cooperative, of which some are also members of Coopedush) and approximately EUR 6 620 from an individual person to match the grant from the HortInvest project. The Umwalimu SACCO charges an interest rate of 11 percent, which Coopedush will repay in two years. The loan is mainly being used for a passion fruit processing factory and the construction of collection centres.

It also received training from the HortInvest project in the cultivation of passion fruit and in cooperative strengthening. Coopedush has plans for additional machinery and equipment to increase the processing capacity. It also wants to improve its marketing system and advertise its products through local online platforms and social media. See Table 72 for the employment created in processing by Coopedush.

4.5.7 Trade

The number of youth involved in the trade is very limited; less than 30 percent of workers (employers and employees) are under 30. However, there is no gender inequality, with even percentages of male and female youth. Moreover, 70 percent of wholesalers and retailers interviewed do not deal with suppliers younger than 30 years old due to a lack of trust, and the remaining 30 percent that deal with young suppliers claim that they are not satisfied by the services provided. However, youth are usefully engaged in marketing activities and their ICT skills are in demand. Social media platforms are commonly used for advertising food products, and youth are the ones managing the accounts.

4.5.7.1 Wholesale

The field survey findings revealed that wholesale activities in passion fruit are done by small-scale traders who have stands in the Nyabugogo market: they normally buy a small quantity of around 500 kg (five bags of 100 kg), supplied from two main channels, including by small traders (brokers) who collect from farmers or are directly supplied by farmers themselves. Those wholesalers sell to retailers but also turn into retailers later in the day and combine different items. The total number of wholesalers/retailers is 60, of which 35 percent is youth. Transport happens in large reusable plastic bags.

Employment in wholesale is limited, although some large wholesalers who deal with many vegetables and fruits can employ more significant numbers of staff, for example, the second wholesaler in Table 73. Interestingly, youth between 18 and 30 are prominent. Losses are estimated at less than 10 percent. Even broken fruits can be sold, although at lower prices.

Table 73: Employment in wholesale

District	Wholesaler	Total		Men		Women		Youth 16–17		Youth 18–30		Adults >30	
		Full-time	Seasonal /casual	Full-time	Seasonal /casual	Full-time	Seasonal /casual	Full-time	Seasonal /casual	Full-time	Seasonal /casual	Full-time	Seasonal /casual
Rubavu	KOTIBANAYA	2		2						2			
Nyarugenge (Kigali city area)	MIZERO Vedaste	10	5	4	5	6				10	5		

Source: Authors' computation using data from field survey, 2020.

Wholesale prices differ substantially according to the grade: grade A, with big size and a good appearance (smooth skin, without spots) can fetch RWF 500 to 600/kg, while grade B only goes for RWF 100 to 200/kg.

Table 74: Costs and profit margins for wholesalers of passion fruit

District	Crop	Investment per batch (RWF)	% Veg. thrown away	Fees/costs per month (RWF)	% profit margin
Nyarugenge (Kigali Nyabugogo wholesale and retail market)	Passion fruit	200 000–300 000	10%	Rent: 10 000 License: 5 000 Tax: 4 000 Cleaning: 2 000	35%
Gasabo (Kigali Kimironko wholesale and retail market)	Passion fruit	150 000–300 000	10%	Rent: 20 000–30 000 Tax: 25 000	15-25%

Source: Authors' computation using data from field survey, 2020.

Modern suppliers like Get It, Ineza, etc. (see Box 14) also play a role in supplying to hotels, restaurants and supermarket chains, but many of these buyers also buy directly at the wholesale markets.

Youth opportunities in wholesale

The opportunities of passion fruit wholesaling for youth are limited. The volumes are small, but youth can pick up the business when they find cheap supply in their villages and, in this way, learn the trade of wholesale. Just as in the other nodes of the passion fruit and other agricultural VCs, the wage labour rates of RWF 1 000 to RWF 2 000 are low, and even in full-time employment can hardly provide a decent or living wage. As these are wage rates across all sectors, this will not easily improve.

4.5.7.2 Retail

Retail largely happens at the district markets and at the four large markets in Kigali. There are few specialised vegetable and fruit shops, and some of the supermarket chains sell small amounts to expats and sporadic national consumers who are in a hurry.

Retailers at the district and Kigali markets typically sell 5 to 10 different vegetables and fruits to consumers. The investment per batch of one specific crop is around RWF 40 000 to RWF 60 000, although one can expect a starting retailer to start with less. Retailers sell at a price varying from RWF 450 to 900/kg with an average price of RWF 675/kg. Table 75 provides some information about retailing.

Table 75: Reported investments, costs, and profit margins for retailers

District	Crop	Investment per batch of specific crop	% veg. thrown away	Monthly fees/costs (RWF)	% profit margin
Huye	Passion fruit	40 000–60 000	10%	Rent: 15 000–25 000	20%
Gasabo (Kigali Kimironko wholesale and retail market)	Passion fruit	40 000	10%	Rent: 20 000–30 000 Tax: 25 000/year	10%

Source: Authors' computation using data from field survey. 2020.

Youth opportunities in retail

Youth can take up retail of passion fruit, as the initial investment is low. Youth need to apply with the marketing management committee for approval and for space, and learn whether or not space is even available, and register with Rwanda Revenue Authority as a retailer, which means buying a permit.

4.5.7.3 Export

Export is in a very nascent state, around 400 tonnes for formal and informal export, and export to Europe (mainly the UK) has declined to less than 60 tonnes. A kilo can be sold for up to RWF 5 000 (FOB) to the European market, which appears to be highly profitable. However, the export market is slowing down due to high fees, not well-developed logistics and high international shipping costs.

Box 32: Challenges for export

"The logistics and the cost of doing international business is still high in Rwanda."

Robert Rukundo, Chairman of Horticulture Export Association Rwanda

Table 76: Exporters of passion fruit

SN	Company name	Type of products	Own produce only	Only buying (no farm)	Own produc + buying
1.	Garden Fresh	Passion fruit, chilli, French beans			X
2.	Bahage Food Ltd	Passion fruit, chilli, French beans			X

Source: Authors' compilation of data from KIIs and FGDs, 2020

Youth opportunities

As export seems to have stagnated, youth employment opportunities in the short term might be less than expected, but in the medium term, if exports pick up, the sector could provide new opportunities.

4.5.8 Service providers

The market of service providers is not very well developed. Supporting organizations which rely on external funds and subsidies were presented in Section 3.3. Besides the input suppliers and the nurseries mentioned in Section 4.5.3, there are a few other service providers, including financial service providers, which were presented in Section 4.2.8 of French beans. Here, there are only some additional service providers:

- Inyange Industries reported that it provides agricultural extension services to its primary producers.
- If the export of passion fruit develops further, exporters are expected to take up embedded services to their supplying smallholders and to their cooperatives in the case of contractual production/supply agreements.
- The standard plastic bottles for passion fruit juice can be bought in Kigali at specialty suppliers.

- Processing units require their own specific processing equipment, which is ordered from abroad (e.g. China or India), but low-grade equipment is also made locally on order.

4.5.9 Value capture along the passion fruit value chain

Table 77 shows the distribution of the gross output for the fresh passion fruit sold on the local market. Typically, farmer captures the highest gross output of 50 percent, while the retailer captures a gross output of 25 percent. The aggregators and the wholesalers capture around 12.5 percent each, but the aggregator function is often not a separate actor, and wholesalers are often also retailers.

Table 77: Value capture along the domestic passion fruit value chain

Price per kg	Farmer	Local aggregator	Wholesaler (Kigali)	Retailer	Consumer	Total
Selling price/kg (RWF)	400	500	600	800	Consumer in Kigali	
Gross value added (RWF)	400	100	100	200		Total gross margin created: 800
Percentage of value capture	**50%**	**12.5%**	**12.5%**	**25%**		**Total: 100%**

Source: Authors' compilation of data from KIIs and FGDs, 2020

4.5.10 SWOT analysis and key opportunities

Table 78 provides the SWOT analysis for the passion fruit

VC. **Table 78: SWOT analysis for passion fruit**

STRENGTHS	OPPORTUNITIES
Production: • Less prone to pests and diseases than chilli and tomato, it is the least perishable of the four crops. • High source of vitamins A and C, so a good crop to support malnutrition in Rwanda. Rural population is accustomed to eating it. • Second crop after tomato in terms of acreage and volumes, bigger than French beans and chilli. • Showing increasing yields. Market: • Crop with various markets: domestic fresh, domestic processing, international export and cross-border trade. • Farmers see good income opportunities by supplying to the domestic market as well as to processors. Profitable crop. • Regional export, especially to DRC, is considerable and less demanding than international export. • Some export companies undertake contract farming, provide inputs and provide agronomic advice. • Rwanda has a competitive advantage in agro-ecology and low-wage labour compared to competing export countries. • Special opportunities for women exist, as they perform	Production: • Cost of production can be reduced, and yields can easily be increased by applying proven GAPs. • Professional nurseries and new (hybrid) varieties can boost the production of passion fruit. • Crop insurance scheme supporting farmers to manage agriculture risks could be applied to passion fruit. • Introduce crates to reduce losses (for harvesting and marketing). Market: • Although the export recently started, and is challenging, some evidence suggests that both international export and cross-border trade can grow. This creates political backing. Youth employment-related: • Still sufficient political interests to avail rehabilitated lands to youth for passion

Table 78: SWOT analysis for passion fruit

better in some activities (e.g. 90 percent of workers at export packhouses are women). • Horticulture exports strongly promoted by the NAEB (central packhouse, temporary airfreight subsidies), direct projects to invest in export. • Large number of women involved in informal cross-border trade. Youth employment-related: • Districts are key in access to land by availing rehabilitated hill sides. • Cooperatives can be very supportive for youth, if youth are a key focus right from the start. • Youth are given a big role in activities such as harvesting, sorting and transport. • Platforms with government support (e.g. RYAF, YEAN, HoReCo) facilitate youth involvement (e.g. with interns in coops).	fruit production. • Youth have keen interest in GAPs. • High potential to employ both educated youth (harvesting, post-harvest handling, value addition) and uneducated youth (farming and retailing). • Youth employment increasingly getting attention from government agencies and policies. • New programmes are increasingly focusing on youth and on horticulture (e.g. World Bank, SAIP, Kilimo, IFAD, DMZ, IMSAR, MasterCard Foundation, HortInvest, HingaWeze, Agriterra). • Increasing attention for horticulture in IPRCs (ATVETs) and UR-CAVM, RICA. • Financial facilities, including the BDF (guarantee schemes, matching grants) for educated, well-off youth.
WEAKNESSES Production: • PWV have reduced harvests by one-third in some districts. • Most extension staff/TM are not well-trained in passion fruit production. • Use of own saved seeds hampers further growth of yields. Market: • Substantial domestic demand and demand by processors. • Regional exports are growing but still small and unstable to European destinations. Youth employment-related: • Although a profitable crop, it requires more upfront investment and the first year of passion fruit production does not provide a substantial income, thereby making this a complicated crop for starting youth farmers. • Access to land is a key issue for youth to start farming. • Access to finance (for inputs, for land) is a limiting factor; most youth cannot provide collateral. Slow processes lead to untimely finance for the production season. • Youth prefer white-collar jobs to those in agriculture. • Less skills, less know-how, therefore, youth in fewer better paid positions/mainly in casual work in companies/VCs. Youth are perceived as less responsible/reliable than adults. Wage labour rates are low. • Once established, most cooperatives are not making special facilities/regulations to support youth.	**THREATS** Production: • Not perceived as an essential food crop; demands are sensitive to status of economy. • With horticulture sector growth, pests and diseases will increasingly impact yields. Access to knowledge for smallholders on GAPs practices is not sufficiently organized. Market: • Export remains vulnerable to shocks (COVID-19, Ebola, competition, possible impacts of future EU bans). • Weak domestic infrastructure (storage, packhouses, refrigerated transport); possibly a bottleneck to further growth. • Limited flights, destinations and costly freight (currently USD 1.80/kg). • Difficult to meet market standards and certification with high-cost implication. Youth employment-related: • Without irrigation investments, passion fruit production on hill sides will increasingly be risky due to climate change.

Key employment opportunities for youth

Table 79 provides an indicative overview where youth employment opportunities – additional ones – can be found in the different nodes of the VC of passion fruit. Opportunities are divided in two groups: those for youth agripreneurship (self-employment, starting one's own business, including farming) and those for youth employed by others (wage employment). Opportunity is given in

terms of low, medium or high, from a short-term perspective (two to four years), and from a production perspective (only in areas where the respective VC is considerably well-established). As Table 67 shows, passion fruit is mainly produced in eight key districts, although the whole VC operates across more. A key factor in youth employment creation is market demand; while passion fruit export is just starting and is showing some initial challenges, it also has strong demand on the domestic market. Demand for passion fruit juice is also high, providing opportunities for several processors. For this exercise, it is assumed that a commercial (medium or large) farmer has at least 0.5 ha of open field for the production of passion fruit. Smallholders have a field production area of less than 0.5 ha, often only 5 to 20 ares. Although the opportunities depend on many factors, including the amount and kind of support provided to youth to gain employment, the willingness of other VC actors to invest in youth employment, etc., the following has been used as a guideline:

- Low: fewer than 50 new jobs can be created (assuming the production within those eight key districts combined)
- Medium: 50 to 200 new jobs
- High: more than 200 new jobs.

Table 79: Youth employment opportunities in passion fruit value chain

SN	Node	Agripreneurship	Employment	Remark
1.	Input supply	Medium	Medium	For educated youth in agripreneurship: starting small agroshops. In employment: as agents of existing agro-wholesalers and agroshops. Should focus inputs for multiple crops. Opportunities with nurseries selling passion fruit seedlings.
2.	Production by smallholder	High	Medium	For agripreneurship: land and market access preferably through cooperative and government support. Also, uneducated youth fit well if they can access training. For employment: seasonal wage labour on smallholder farms. Still little international export. Wage labour rates are low for unskilled work.
3.	Production by commercial farm	Low	Medium	In agripreneurship: requires large investment to set up commercial farm by youth from scratch. In employment: various tasks for educated and uneducated youth. Number of commercial farms and exporters are limited. Wage labour rates are low for unskilled work.
4.	Aggregation and wholesale	Low	Medium	In agripreneurship: volumes are still small, with little specialization in this VC. In employment: mainly occasional wage labour with existing brokers/wholesalers. Also, sourcing by processing units from various districts and Burundi.
5.	Processing	Low	Medium	There is growth potential in processing, but agripreneurship growth will still be low (less than 50 new MSMEs, compared to current 14), which will contribute to employment. Employment cam also be sought in increasing business of existing processors.
6.	Retail	Medium	Low	Good domestic demand for fresh product, but

Table 79: Youth employment opportunities in passion fruit value chain

SN	Node	Agripreneurship	Employment	Remark
				volumes low per retailer, so less employment.
7.	Export	Low	Medium	In employment: export just started but is growing.
8.	Service providers[85]	Low	Low	Private extension (e.g. HoReCo, TM), logistics (transporters, loaders), marketing, export consultants, import of packaging materials, ingredients and equipment for processing, etc. Especially for educated youth. Although opportunities for youth employment are few, effect of service providers on upgrading the VC could be considerable.

Source: Authors' compilation based on FGDs and KIIs undertaken for this study, 2020.

4.6 Child labour, OSH, wages, and COVID-19 impact

4.6.1 Child labour

The use of child labour is illegal in Rwanda and the country has ratified ILO Conventions C. 138: Minimum Age; and C. 182: Worst Forms of Child Labour. Every adult that employs children younger than 16 (or employs children older than 16 but younger than 18 in hazardous work) can be persecuted by law.[86]

MIFOTRA has drafted a light-work framework allowing children aged 13 to 15 to engage in apprenticeship, but the draft is not yet publicly available and still needs to be approved.

Due to the illegal nature of employing children, it was very complicated to get information on the level of underage workers, and during the data collection, nearly all respondents refused to answer any questions related to child labour. However, according to the data from ILO, 5.4 percent of children between ages 6 and 14 are involved in working activities, and the vast majority of those children are in the agriculture sector (78.9 percent). An additional 4.9 percent is combining work and school, and the rate rises sharply during school breaks (ILO, 2020;[87] USA Department of Justice, 2019). The fact that national education laws make education compulsory only up to age 12 makes children between 12 and 16 vulnerable to child labour, as they are not legally required to attend school but are not legally permitted to work. The most common activities for children involved in agriculture are applying fertilizers, carrying heavy water cans, planting and weeding.

Rwanda's rate of child labour is relatively low by African standards, where an estimated 20 percent of all children are involved in child labour. However, the low child labour rate in Rwanda should not be taken as a point of arrival, and the GoR passed several child labour-related laws in 2019 in order to eradicate the use of underage children in work-related activities and to increase school enrolment.

[85] Other than input suppliers, although some do both.
[86] Article 5 of the Labour Law; Article 9 of the Ministerial Instruction Relating to Prevention and Fight Against Child Labour (23, 24).
[87] ILO's analysis of statistics from the Integrated Household Living Conditions Survey (EICV), 2016–2017.

4.6.2 Occupational Safety and Health

Different agencies have different roles in promoting OSH, such as RICA for pesticide import and distribution, and RAB for extension on judicious and safe use of pesticides. However, the Rwanda Labour Law and related safety and health at work falls under the authority of MIFOTRA. The persons dealing with family agricultural, breeding, commercial or industrial activities (household-based businesses, including farming) shall not be subjected to the provisions of this law, except for provisions related to OSH, as well as to the specific prohibitions related to child labour and to pregnant and/or breastfeeding women.

There is also a National Labour Council which undertakes consultation, collaboration and co-operation between the government, the workers and the workers' representatives.

Within the four selected VCs of this study, the following concerns related to OSH were identified as those related to pesticides, safety in processing, safety in loading and unloading, and COVID-19.

Pesticides

The misuse of pesticides (crop protection chemicals) is a key concern from the OSH perspective. This starts in the agroshops when the shopkeepers divide larger containers of liquid or powder pesticide concentrates into smaller portions that are suitable to sell to smallholder farmers; no Personal Protective Equipment (PPE) kits are used, neither is there concern for sufficient ventilation. Also, labels with instructions are not placed on the smaller containers. RICA has urged agro-importers to prepare smaller containers before distributing them to agroshops.

Farmers also do not always lock away pesticides in the house to ensure that children cannot get hold of them, and sometimes pesticides are stored in the kitchen, increasing the chances of affecting food items.

Furthermore, farmers mostly do not use PPE kits when they prepare pesticide solutions for spraying, nor do they use them while spraying. Masks are rare but sometimes an apron is worn. PPE kits are not often for sale at the agroshops in the districts, and they are also expensive, costing between RWF 20 000 and RWF 30 000 for a full PPE kit in Kigali at the import shops. But the starting point is the lack of awareness among farmers about the health (and environmental and food safety) impacts of pesticides. Many think the nausea and headaches last a day, and then the effects are over. Both re-entry intervals (between spraying and re-entering the field without a PPE kit) and pre-harvest intervals (between spraying and harvesting) are little known, the first related to OSH and the second to food safety for consumers. There is also no safe and effective disposal of empty pesticide containers, which is more of an environmental risk than an OSH risk, although in other countries cases are known of adults and children reusing these containers.

Processing

Although processing units are few, the smaller units in particular rely on locally made equipment with fewer safety measures. Risks refer to dangers to limbs by rotating elements, and danger of boiling-hot liquids and equipment, possibly causing severe burns. Modern factories like those of

Ese Urwibutso and Inyange Industries are better equipped with safety measures to protect their staff from injuries.

Loading and un-loading

There is no weight limit to the bags of vegetables and fruits during transport, and some weigh up to 100 kg. This brings loaders and un-loaders the risk of chronic back injuries. As they are often casual workers, they have little power to demand improved ergonomic practices or maximum weights.

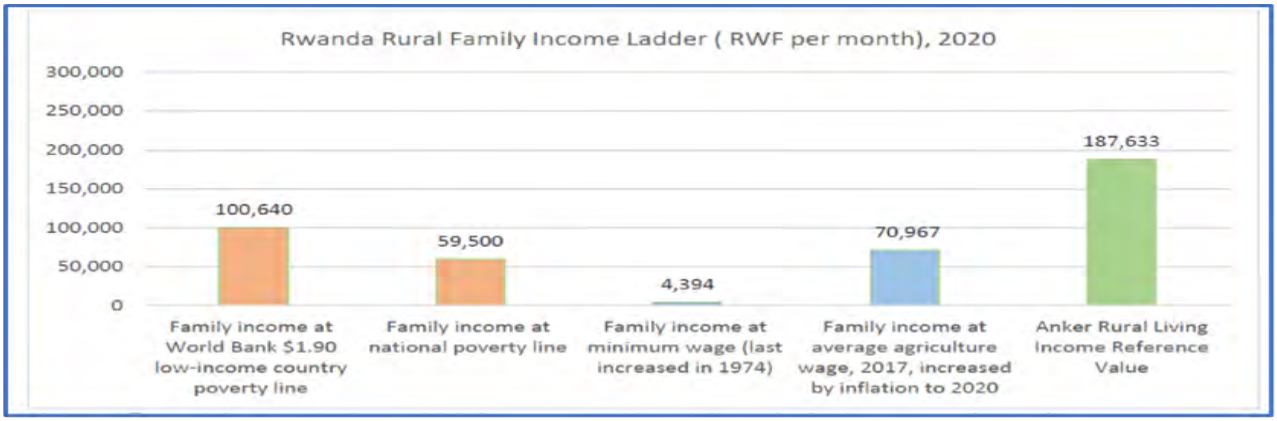
COVID-19 impact

Rwanda is doing reasonably well in maintaining the spread of the COVID-19 virus. Although the measures are strict and people keep well to them, working in places with many other employees in situations where social distancing is difficult will always contain a risk of infection by the virus, for example in meetings at cooperatives, in the busy wholesale and retail marketplaces, in processing units or in exporter packhouses. Handwashing often occurs at the entrance of public places, and the wearing of masks is compulsory in public spaces such as on roads and in all offices. To date, it seems that these risks are well contained, although the pandemic has also taught everyone to remain alert. The risk of infection is smaller in the open air, which often applies to many agricultural activities. The impact of the pandemic on the horticulture VCs are described in Section 4.6.4.

4.6.3 Wages

There are different views and ways of calculating poverty lines and minimal required incomes in the Rwandan context (see Figure 47). The minimum wage adopted decades ago still stands at RWF 100 per day,[88] and in 2013, sector-specific guidelines for minimum wages were adopted: minimum wage rates range from RWF 500 to RWF 1 000 per day (USD 0.83 in the tea industry), and RWF 1 500 to RWF 5 000 per day (USD 2.50 to USD 8.30) in the construction industry.[89]

Figure 47: Rwanda rural family income ladder



Source: Anker Research Network, 2020.

[88] Source: www.newtimes.co.rw/news/labour-law-minimum-wage
[89] Source: www.minimum-wage.org/international/rwanda

The Anker Living Income Reference Value for 2020 for rural Rwanda was calculated by the Anker Research Network to be RWF 187 633 per month (USD 204). Its method is a widely accepted method for calculating decent wage. This Anker Living Income Reference Value is the monthly cost of a basic but decent standard of living for a typical family in rural Rwanda in 2020. "A living income is the net annual income required for a household in a particular place to afford a decent standard of living for all members of that household. Elements of a decent standard of living include food, water, housing, education, healthcare, transport, clothing, and other essential needs such as provisions for unexpected events" (Anker Research Network, 2020).

The interviews for this study on horticulture VCs found daily or seasonal wages to be between RWF 1 000 and RWF 2 000 for unskilled work. This aligns with the data presented in Table 80. In rural areas women earn less than men, and the difference is even bigger in urban areas. In terms of seasonal wage labour on commercial farms and with export companies, apparently there is no difference in wage labour rates between women and men (Ntezimana, 2016), but in practice women, who usually take care of their households, work fewer days than men and thereby earn less per month.

Table 80: Medium monthly cash incomes of employees from employment

	Rwanda			Urban			Rural		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Total (16+ yrs)	21,667	26,000	18,200	52,000	66,667	30,000	20,800	26,000	18,200
Age group									
16-24 yrs	18,200	20,000	18,000	20,000	21,667	15,000	18,200	20,000	18,200
25-34 yrs	26,000	31,200	20,000	65,000	70,000	45,000	20,800	26,000	18,200
35-54 yrs	26,000	31,200	20,000	130,000	150,000	100,000	20,800	26,000	18,200
55-64 yrs	20,800	26,000	18,200	106,000	180,000	70,000	18,200	22,967	18,200
65+ yrs	18,200	20,800	18,200	35,000	35,000	18,200	18,200	20,000	18,200
Education level									
None	18,200	20,800	18,200	20,800	26,000	20,000	18,200	20,800	18,200
Primary	20,800	26,000	18,200	26,000	40,000	20,000	20,800	26,000	18,200
Lower secondary	32,500	50,000	22,000	50,000	66,667	25,000	26,000	37,500	20,800
Upper secondary	56,000	66,667	48,000	66,667	86,667	50,000	50,000	52,000	44,000
University	200,000	200,000	200,000	200,000	200,000	200,000	137,000	137,000	130,000

Source: NISR. 2019.

When comparing Table 80 with a "family income at the national poverty line" (see Figure 47, RWF 59 500), this shows that seasonal wage labour on commercial farms and with export companies cannot be the sole source of income for unskilled workers and their families. They engage in wage labour to earn additional cash to supplement what they earn from their own farming activities or from wage labour in other sectors. Subsistence strategies of producing food for the household on one's own land and living on one's own land (no house rent) are equally part of such livelihood strategies.

The labour law adopted in August 2018 failed to stipulate minimum wages, and at the time of the writing of this report, a ministerial order is still awaited on this topic.[90]

Although businesses, and exporters in particular, may face increased costs in the short term, they will benefit in the long run from more resilient communities, and exporters in the near future will

[90] Source: www.newtimes.co.rw/news/labour-law-minimum-wage.

need to obtain social certifications if they wish to increase their market shares in Europe. Then improving wages will be an important topic for Rwanda in the near future.

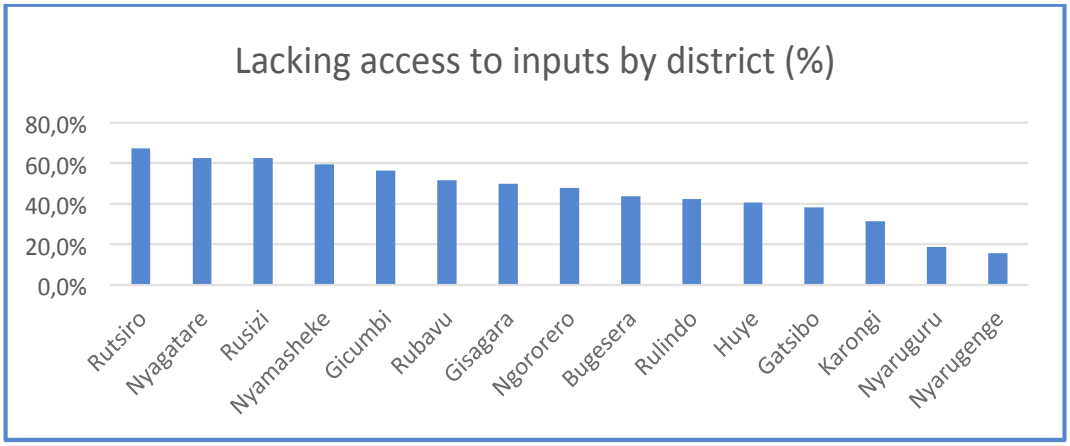
4.6.4 COVID-19 impacts on horticulture

The most immediate impacts of the COVID-19 pandemic to horticulture VCs in Rwanda are related to travel and transport restrictions within the country, at the borders and with (cargo) flights, and are also related to an overall economic slowdown.[91] The most stringent restrictions were the measures taken at the start of the pandemic, namely, a complete lockdown beginning on 22 March 2020 and lasting for six weeks. In some districts, this was extended to the end of June 2020. There have been other temporary lockdowns for selected districts, and another three-week lockdown lasted from 19 January 2021 to 4 February 2021. Agricultural actors (companies, traders, input suppliers) received permits to travel after the initial lockdown. At the same time, a reduction of sales at the retail markets was observed, reflecting the reduced purchasing power of consumers.

Impact on smallholders

In December 2020, 685 households/respondents, of whom 47 percent women in 15 districts, were surveyed for the HortInvest project. Figure 48 shows the percentage of surveyed farmers who experienced a lack of access to inputs. Since the start of the pandemic, 81 percent reported fertilizers being difficult to access, followed by seeds (44 percent) and pesticides (28 percent). The most common reason for not accessing fertilizers was due to not having the money to purchase them (52 percent) and limited access to agro-dealers (22 percent), showing that reduced incomes were a more important reason than travel restrictions (Three Stones International, 2021).

Figure 48: Percentage respondents with problems in accessing inputs



Source: Three Stones International, 2021.

[91] The second quarter of 2020 saw a GDP drop of 12.4 percent, and the third quarter saw a drop of 3.6 percent (compared to a 9.4 percent GDP growth in 2019). In the third quarter, general whole and retail trade were back up to pre-COVID-19 levels: 0 percent compared to a drop of 22 percent in the second quarter (see https://www.statistics.gov.rw/press/press-release/press-release-gdp-q3-2020-english). World Bank Rwanda Economic Update, Protect and Promote Human Capital in a Post-COVID-19 World, said that the country's GDP dropped an estimated 0.2 percent in 2020, compared to a projected expansion of 8 percent before the COVID-19 pandemic. The poverty 37 percent headcount is likely to rise by 5.1 percent (affecting more than 550 000 people) in 2021 (up from 37 percent pre-COVID, March 2020), with more than 80 percent of the new poor in rural areas (see www.worldbank.org/en/news/press-release/2021/02/08/covid-19-pandemic-pushes-rwanda-into-recession-severely-impacts-human-capital).

The same study showed that 51 percent of the households surveyed experienced income reduction as a result of selling less produce. Reasons given are presented in Figure 49.

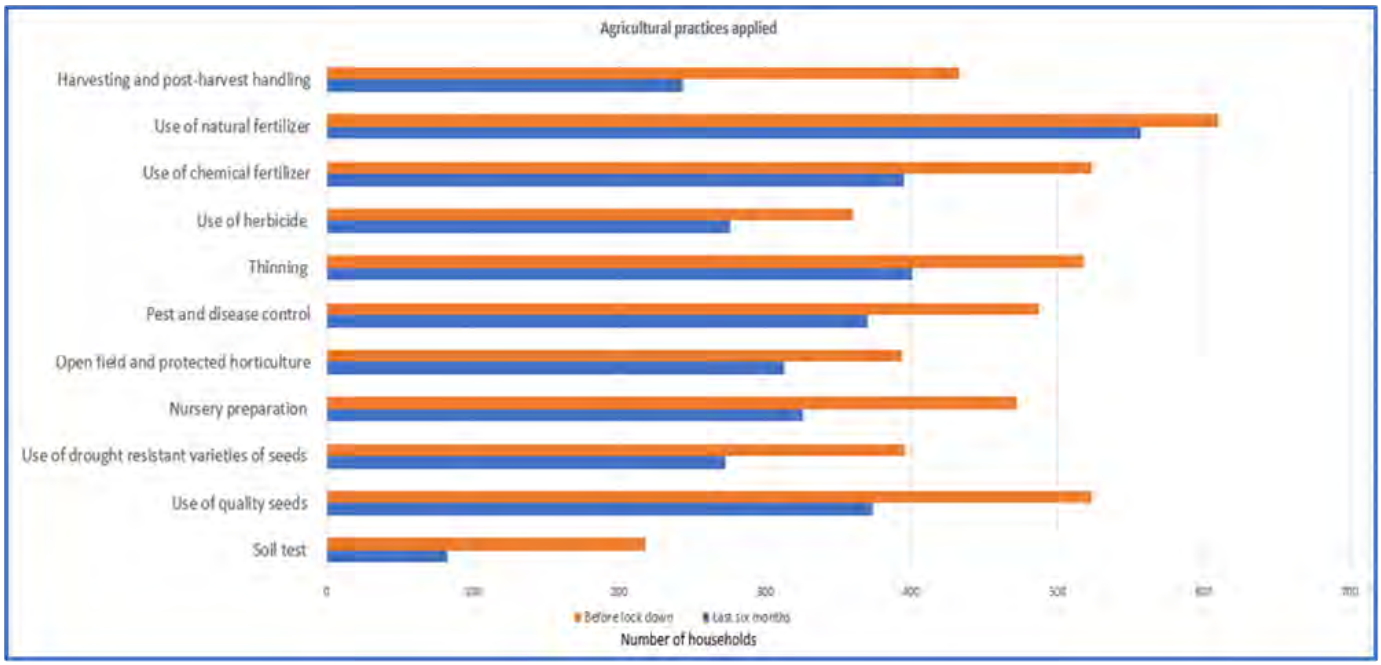
Figure 49: Main reasons mentioned for selling less produce

Source: Three Stones International, 2021.

The income reductions induced by the COVID-19 pandemic led 35 percent of farmers to sell one or more assets, including small livestock, radios, mobile phones and even kitchen utensils.

In all of the 15 surveyed districts, where horticulture farmers have been trained in specific GAPs, the respondents showed that less investment into production also led to less application of modern practices.

Figure 50: Number of households implementing GAPs
(Before the lockdown in orange and after the lockdown in blue)



Source: Three Stones International, 2021.

Also, seasonal work on commercial farms and with exporters has reduced due to the export challenges (see following comments). The impact of the pandemic has disproportionately affected women, in part because (according to the recent labour market survey) women are more likely

than men to be seasonal workers (44 percent compared to 31 percent) and are more likely to be taking care of sick relatives (4 percent compared to 1 percent).[92]

Governments and projects have taken several measures to support companies and farmers since the start of the pandemic, including:

- MINAGRI and various projects distributed inputs to kickstart production after the stringent lockdown at the start of the pandemic.
- NAEB supported exports by linking exporters with packaging material factories, reducing air cargo transport prices, and distributing seeds and fertilizers to farmers.
- RICA eased the import of inputs through an online registration system (an example of building back better), and provided documents to allow for the domestic distribution of inputs.
- Hygiene measures and handwashing facilities were provisioned at the selling points in HortInvest districts.
- HortInvest linked producers, who used to supply to exporters, to traders in the Kigali markets.
- Additional funds were provided to companies to kickstart production by smallholder suppliers, to retain staff and/or to support domestic demand through marketing campaigns.

Impact on cross-border trade

As reported during the study by the Tuzamurane cooperative in Rubavu, "due to the COVID-19 pandemic, it is currently almost impossible to send our products to DRC, Uganda and [the United Republic of] Tanzania. Also, we have experienced losses due to weight loss and spoilage. Sometimes they reach DRC when damaged and have to be disposed" (This was during stringent lockdown measures in May 2020). At the time of the writing of this report (December 2020–February 2021), the border was open for formal and informal or small traders, and they were required to take COVID-tests every 15 days, creating additional costs. The costs were initially RWF 50 000 per test but later reduced to RWF 5 000.

The *jeton* (a day pass), which was issued to small traders for free before the pandemic began, has now been replaced with a *laissez passer*, which costs about USD 10 for small traders crossing the borders between the DRC and Rwanda. Also, small traders were requested to form clusters. Representatives of the clusters are then allowed to cross the border to sell or buy products on behalf of an association's members. For example, 2 292 small traders in fruits and vegetables at the Goma-Rubavu border were organized into such clusters to undertake cross-border group trade (Mvunga *et al.,* 2021).

Impact on international export

As mentioned earlier, exports also suffered from the COVID-19 pandemic: cargo prices increased, the number of flights decreased, and exporters often could not purchase from producers due to cancelled orders. Exporters were hit hard in the first three months of the pandemic, but

[92] Source: www.worldbank.org/en/news/press-release/2021/02/08/covid-19-pandemic-pushes-rwanda-into-recession-severely-impacts-human-capital.

afterwards, things improved and many exporters say they are 70 to 90 percent back to pre-COVID volumes. This especially applies to seasonal workers, but also to supplying farmers, whether commercial or smallholder farmers have been impacted by these export slumps.

The overall agriculture exports decreased by 10 percent, from USD 465 million in 2018/19 to USD 419 million in 2019/20. Horticulture exports (vegetables, fruits and flowers) also saw a decline of export volumes but an increase in export value: a 15 percent drop in export volume from 37 343 tonnes in 2018/19 to 31 788 tonnes in 2019/20, but a 5 percent value increase from USD 27.1 million in 2018/19 to USD 28.7 million in 2019/20. While export prices increased, COVID-19 related measures, transport uncertainties and related cost increased, and also led to order cancellations.[93]

[93] Sources: www.newtimes.co.rw/news/rwandas-agric-export-revenues-drop-55 and www.newtimes.co.rw/news/rwanda-fetches-rwf27bn-horticulture-exports.

Chapter 5: Conclusions and recommendations for a youth employment strategy

In this chapter, the proposed youth employment strategies are presented. These are based on the VC analysis of the four selected crops, as presented in Chapter 4, but are presented here as proposed strategies to facilitate youth employment in the horticulture sector in general. These have been validated and enriched during the validation workshop and the three subsequent discussion groups,[94] which were held soon after the validation workshop (see Annex 4 for the list of participants).

The first section provides a summary of the key challenges for youth to find employment in the horticulture VCs. The second section presents a selection of recommendations coming from the KIIs and the FGDs. The third section provides a start to a target and visioning exercise: if the target is set ambitiously, then where could these jobs be found, facilitated and created within the horticulture VCs? The final section provides short-, medium- and long-term strategies to realize substantial youth employment in horticulture VCs, as well as ways to increase horticulture growth in general, which will also provide youth jobs and youth opportunities.

5.1 Summary of challenges for youth employment

Key challenges for youth employment are here presented. They differ when seeking self-employment, which requires entrepreneurial attitude and smaller or bigger investments, or when seeking wage employment.

Limited access to capital and financial inclusion

Starting a business, whether formal or informal, individual or group-based, will require some form of capital. Access to start-up capital and financial inclusion is identified in the study as a major barrier that hinders young men and women from venturing into the world of business, and particularly within the various horticulture VCs. Youth are perceived as “risky” and lacking in collateral, thus financing by mainstream financial institutions and MFIs remain a key challenge faced by young men and women. Even with the BDF, providing guarantee for 70 percent on a commercial bank loan, this is only an option for a few already well-off youth who can meet bank eligibility criteria and provide collateral for the other 30 percent. The culture of saving being quasi inexistent for youth in Rwanda, mainly due to unemployment and low financial literacy, very few youth meet eligibility criteria for benefiting from loans. This challenge does not apply to wage workers.

The issue of access to finance becomes even more challenging for young women aspiring agripreneurship. The inheritance law in Rwanda does not discriminate women from inheriting land or other properties from their parents, but likely there are still culture barriers that prevent the

[94] Due to a strict lockdown in Kigali, the validation workshop (22 January 2021) was held online, and it was decided to organize three additional smaller online interactions where stakeholders could more easily present their views (two groups on 3 February 2021 and one group on 4 February 2021).

implementation of the inheritance law and hence perpetrate masculinity preference, leading therefore to deprivation of inheritance rights to women. The differences in inheritance between men and women were not further investigated by the team.

Limited access to land and to water

In addition to the agricultural land in Rwanda being hilly and less favourable to commercial agriculture, land in Rwanda is increasingly becoming scarce due to the high population density and the related fragmentation of agricultural land. Additionally, youth often have to wait for land through inheritance, which they will also have to share with their siblings, therefore youth increasingly will want to buy their own land, which has its financial challenges.

Next to land, access to water is also crucial. Although Rwanda has sufficient rains for horticulture production in season A and B, for Season C access to water is more crucial. Irrigation should allow for production during the off season. If one wants to promote high-yielding technologies, like GAP practices, these require higher investments and then irrigation becomes critical to reduce risks. With changing weather patterns, the need for irrigation will only increase. However, hillside irrigation is a costly affair requiring huge investments that only government and very strong investors can afford.

Limited access to knowledge and skills

Horticulture production requires high levels of technical know-how that most young people lack. This is certainly the case for inputs, modern farming practices, including integrated pest management, and new technologies of horticulture farming and off-farm value addition. This applies for employment by others but certainly for agripreneurship. Without improved knowledge and skills, cultivation will not deliver those higher incomes, and employability will be limited to unskilled, casual and wage labour jobs. There is considerable need to strengthen the skills capacity for youth, matching the skills required in the labour market.

Negative mindset of youth towards agriculture and farming in particular

Youth often have the perception that farming is for the poor and uneducated, that it is a “dirty job” and that remuneration is low, as revealed during the FGDs and KIIs. It is indeed correct that wages in in agriculture remain generally low, and that jobs are often also seasonal and less formal, making it difficult to save money, build and own a house, send children to good schools, etc. A traditional livelihood outlook and a lack of exposure to modern off-farm and on-farm opportunities in agribusiness has hindered youth from pursuing employment opportunities in agriculture and related VCs. There is a general belief that educated people should go for office jobs. Without motivation, interest and perseverance, seeking jobs as well as entrepreneurship in the sector will be tough.

Youth perceived as undependable

Private sector companies are reluctant to engage with youth in decent employment, as youth are considered to lack the desired skills and competencies. Female youth face extra obstacles regarding access to employment and enterprise opportunities due to cultural and social factors

which limit their labour mobility. It was reported during FGDs that financial institutions are very reluctant to finance youth because they are not considered competent to run businesses. Banks are often not confident with the youth capacity to pay back loans, even if they can manage to present collateral.

These key challenges, which came from the FGDs and KIIs undertaken for the study, and possible solutions are integrated in the strategies as presented in the next section.

5.2 Recommendations from the KIIs and FGDs

A selection of the recommendations noted during the KIIs and FGDs are presented in Table 81, while also avoiding repetition:

Table 81: Recommendations from KIIs and FGDs

Mr Jonas Munyarangabo, Director General, Planning, Monitoring and Evaluation, MINICOM	• The private sector is the engine for employment creation, including for youth, therefore, its development and growth should be our priority. • We need to strengthen the skills and capacities for youth in entrepreneurship, in business management and in how to apply for bank loans. This should include coaching and mentorship. • Access to finance is a key challenge for youth seeking entrepreneurship. An assessment is required to identify possible solutions, for example, working in close collaboration with banks such as Equity Bank, the KCB and Urwego Opportunity Bank to develop financial products appropriate for youth. The current interest rates are still too high. For youth, investment (equity) options are better than loans. • The BDF guarantee fund scheme for youth loans should be improved and expanded so that the less fortunate youth can benefit.
Mr Aimable Ntukanyagwe, IFAD Country Representative in Rwanda	• Matching grants are an appropriate approach to stimulate youth and to help them start businesses (as, for example, the projects PASP, PRICE, RDDP are doing). Matching grants can also be applied for value addition. • Especially in horticulture, there are export opportunities, also for youth farmers, but they lack the capacity and investments to meet the export requirements (e.g. certification). • Land access can happen through making rehabilitated land available to youth, which has already been a proven approach in districts like Ntashyo, Bugesera, Gabiro and Muyanza. • Youth can find employment opportunities in post-harvest activities, transport and value addition.
Mr Jean Claude Turambane, Youth Capacity Development Officer, MINAGRI	• Encourage the formation of youth cooperatives, fora and associations by providing relevant training. Working with peers makes youth interested and aware of agriculture opportunities. • Mobilize financial service providers to trust youth and to provide them grants and loans, but at discounted costs, and repayment after harvest. • A possibility is to provide additional subsidies on fertilizer through the Nkunganire system for youth.
Mr Jean Bosco Rwayitare, Specialist youth employment promotion, Ministry of Youth and Culture	• Youth are opting for white-collar jobs, but we should change the mindset of youth and show that professional farming is rewarding and profitable. • We need to match the supply and demand of labour (i.e. we need to

Table 81: Recommendations from KIIs and FGDs

	know the skills required on the labour market and match accordingly). • Review and enforce the implementation of youth employment policies and strategies. • It is important to facilitate and support youth to access to the local, regional and international markets. Youth can also be supported to find opportunities in import substitution. • Support the promotion of youth savings groups.
Rulindo government staff, including the Vice Mayor of Economic Affairs, Mr Prospere Mulindwa	• We need to sensitize and mobilize youth and showcase the opportunities in horticulture. • Self-discipline is key for success, and elders should coach youth in this. • The demand for collateral by banks is a key challenge, and we should find ways around it, or develop other approaches to access finance.
Mr Boniface Kagiraneza, Head of Horticulture Department, RAB, Huye	• For youth to succeed in horticulture, they need appropriate extension services and linkage to markets. • We need to provide seed funding in the beginning for them to start production.
Mr Olivier Muvadimwe, CSAE Program Manager RYAF, Gasabo	The key is to change the mindset towards farming and agribusiness among the youth. Like RDB, we should initiate National Agribusiness Competitions, or Miss or Mister Young Agripreneur awards. This will boost the morale of youth to participate in horticulture activities.
Mr Ishimwe Emmanuel, Chairperson, HoReCo	• It is important to facilitate access to finance by youth, for horticulture production and value addition. • Access to land is also key. • Capacity-building of youth whether on irrigation, production, value addition or cooperative management, should be given substantial attention
Additional FGD comments received in the visited districts	Skilled youth can find employment in: • Post-harvest activities, processing (value addition) and marketing; • Processing, selling, agrodealership and wholesale; and • Production, trading, aggregation, distribution, processing and input selling. Less skilled youth can find employment in: • Primary production like land preparation, planting, weeding and pest and disease control; and • Transport, sorting, packaging and post-harvest activities. Activities that are seen as particularly women-friendly include: • Fruit tree nursery establishment and management (potting, grafting and planting); and • Fruit harvesting and post-harvest handling (sorting, cleaning and packaging).

5.3 Opportunities for employment creation at scale

The key targets for employment creation in Rwanda are provided by the National Strategy for Transformation (2017–2024, see Section 3.1), which states that 214 000 new decent and productive jobs need to be created annually. With the scenario of significant productivity growth in

agriculture, PSTA4 (2018–2014) projects that 45 000 jobs will be created annually within the agri-food system, representing 21 percent of the jobs projected in NST1 (MINAGRI, 2018). A further breakdown within agriculture is not provided. Without targets for horticulture specifically, it will be difficult to allocate budgets and to hold agencies accountable for youth employment creation in horticulture.

Although the contribution to GDP is declining, agriculture has been responsible for one-third of the poverty reduction in the period 2000–2020 (MINECOFIN, 2020) and for 36 percent of the employment during that period (RDB, 2019). Table 82 provides additional insights into developing both a common vision and targets for employment creation; although independent farming has decreased from 52.5 percent in 2014 to 45 percent in 2017, if one includes farm wage labour as part of employment in production, then this decline is less dramatic (64.0 percent to 61.3 percent). Around 60 percent of the youth still find their work in agricultural production.

Table 82: Work status of youth (aged 16-30) in 2014 and 2017

Work status of youth	EICV4 (2014)			EICV5 (2017)		
	Male	Female	Total	Male	Female	Total
Wage farm	13.0	11.9	12.4	14.8	17.7	16.3
Wage non-farm	33.6	15.3	24.2	38.5	18.6	28.1
Independent farm	41.2	63.2	52.5	35.8	53.2	45
Independent non-farm	11.4	8.0	9.7	10.2	8.4	9.3
Unpaid non-farm	0.8	1.5	1.2	0.7	2.0	1.4
Total	**100**	**100**	**100**	**100**	**100**	**100**

Source: NISR, 2015 and NISR, 2018.

Considering that around 60 percent of the youth find employment in agricultural production, one would expect that agriculture would then create at least 100 000 of these 214 000 decent and productive jobs, if not more. But we have seen that PSTA 4 is less ambitious.

What number of new jobs the horticulture sector should take for its account is a difficult question. The draft National Horticulture Policy and Strategic Implementation Plan calculates the horticulture contribution to agriculture at 9.7 percent (MINAGRI, 2014). However, if one takes into account that horticulture export is expected to increase from USD 23 million (2017/18) to 130 million (2023/24), that vegetable market prices are increasing faster than prices of other food items (see Section 4.1.3), and the attractiveness of many high-value, short-duration crops under horticulture, one might want to set an ambitious target, for example at **15 000 decent and productive jobs created in horticulture *annually***. Of course, this can be debated, but within agriculture, horticulture is one of the most dynamic subsectors. For the matter of this study, the earlier-mentioned target will be used.

One of the inputs during the validation workshops was that Rwanda has sufficient policies in place related to youth employment creation, but that the actual opportunities need to be better identified. This report and the FAO-ICA project, which aims to initiate the development of a National Youth Employment Strategy in Agri-food Systems, in collaboration with MINAGRI and other stakeholders, are steps towards detailing opportunities and identifying related strategies.

Setting targets should be part of this process as well as identifying key agencies and stakeholders to be involved.

A summary is presented here of the employment data presented in Chapter 4, which is only differentiated for the four VCs if deemed relevant. Although these data only provide an indication and are not based on statistical sampling, they can support the further formulation of a vision for employment creation in horticulture.

Input supply

With seven key input importers/wholesalers (four interviewed; see Table 83) and 2 000 agroshops (10 interviewed, see Table 84), the conclusion is that there is more potential for youth employment with agroshops, especially considering the larger percentage of full-time youth (42 percent in agroshops against 21 percent in input wholesalers), and the fact that the number of agroshops is increasing due to increased demand for agricultural inputs. Also, three of the 10 shops interviewed were owned by youth. Box 33 provides an overview of the estimated investment of establishing an agroshop, not to say that this would be the funding which a youth employment programme should provide, as there are possibilities to bring in own funding or loan money. As the employment per agroshop is only 3.1 persons, the target for new agroshops would need to be considerable, and it would require a district assessment for the potential increase in shops. This limited employment per shop also raises the question of whether or not employment per agroshop can be increased, by offering more services like tractor services, spray services, pruning services (for orchards), etc. This is happening in other African countries, but most agroshop owners still prefer to remain with their own shops, as opposed to looking for customers, managing staff, managing payments, etc.

Table 83: Employment with input wholesalers/importers

	Total employment	Full-time	Seasonal/casual	Men		Women		Youth 16–17		Youth 18–30		Age >30	
				Full-time	Seasonal/casual	Full-time	Seasonal/casual	Full-time	Seasonal/casual	Full-time	Seasonal/casual	Full-time	Seasonal/casual
4 input wholesalers/ importers: Agrotech, Balton, Holland Greentech, Sodiaco	**112**	46	66	24	65	22	1	0	0	23	14	23	52
% of total full-time and seasonal		**41 %**	**59 %**	**21 %**	**58%**	**20%**	**1%**	**0%**	**0%**	**21%**	**12%**	**21%**	**46%**
		100%		**100%**				**100%**					

Source: Authors' computation using data from FGDs and KIIs, 2020.

Table 84: Employment with agroshops

	Total employment	Full-time	Seasonal/casual	Men		Women		Youth 16–17		Youth 18–30		Age >30	
				Full-time	Seasonal/casual	Full-time	Seasonal/casual	Full-time	Seasonal/casual	Full-time	Seasonal/casual	Full-time	Seasonal/casual
10 district agroshops **Adult: 7** **Youth: 3**	**31**	22	9	16	7	6	2	0	0	13	4	9	5
% of total full-time and seasonal		**71%**	**29%**	**52%**	**23%**	**19%**	**6%**	**0%**	**0%**	**42%**	**13%**	**29%**	**16%**
		100%		**100%**				**100%**					

Source: Authors' computation using data from FGDs and KIIs, 2020.

Extrapolating the potential, with the current 2 000 agroshops in Rwanda and around 6 000 persons employed, one can estimate whether or not 10 new shops per district is feasible, and whether or not the potentially resulting 1 000 new jobs[95] can sufficiently contribute to realising the daunting target of 15 000 newly employed persons in horticulture on an annual basis.

Box 33: Starting an agroshop

The following table shows the estimated investment, assuming that a one-month stock is sufficient to start a business, the requirement to advance a three-month rent, etc. The requirement for registration is only A2-level (Technical Secondary School).

Items	Cost (RWF)
1-month (small) stock (seeds, pesticides, fertilizers, etc.)	500 000
3-month rent, very small shop	3 × 30 000
1-month livelihood	70 000
Others (shop shelves, table, chairs, transport)	120 000
District/sector permit	10 000
TOTAL	**790 000**

Source: Authors' computation using data from FGDs and KIIs, 2020.

Youth employment in production: agripreneurship

Here agripreneurship entails youth starting with farming. Table 85 provides a summary of the 20 cooperatives interviewed, and shows a 1 percent youth membership,[96] and more females than males. The youth interviewed mentioned the challenges of agriculture, but they were also inspired as they realized that they were part of modernising horticulture, with increasing technologies like improved seeds, irrigation, etc., and many of them even being part of export chains. In

[95] Nearly 1 000 jobs can be created from 10 new agroshops per district × 30 districts × 3.1 staff per shop.

[96] As the study did not include youth who are farming but not a member of a cooperative, there might be a bias in the data to either side.

Section 4.5 the challenge of passion fruit was described, as it is a three-year crop with little gross margin (profit) in the first year. Although there is a general disdain among youth towards agriculture, there are sufficient numbers who see farming as a good business opportunity. Box 34 provides an example of French bean production by youth, to illustrate what needs to be taken into account when supporting youth to take up farming. The Case 1 in Annex 5 also provides some good insight into how youth can experience taking up farming as empowering.

Table 85: Membership of cooperatives

Cooperative	Male	Female	Total	Male youth	Female youth	Total youth
20 Coops	4 464	3 549	8 013	590	865	1 445
% of total	56%	44%	100%	7%	11%	18%

Source: Authors' computation using data from FGDs and KIIs. 2020.

Box 34: Starting French beans farming

For starting youth farmers, several conditions have to come together to make it a viable business:

- Access to land and water: Parents can avail land, one can rent land from other farmers, or one can lease government land prepared for farming (e.g. drained marshlands, rehabilitated lands by terracing). Although many farmers traditionally grow rain-fed vegetables, due to climate change and the wish to increase yields, access to irrigation should be a requirement. The GoR has installed irrigation schemes on much of their lands made available for horticulture farming.
- Access to knowledge: Knowledge can be provided by peers in the cooperative, TM farm promoters and facilitators, training and advice by projects, and embedded services by exporters.
- Access to markets: Sales can take place on district markets, and to brokers and wholesalers, and often cooperatives take an organizing and aggregation task.
- Access to finance: Borrowing money from relatives and using personal savings can be the basis for investment, while some projects also provide matching grants or so-called start-up kits. SACCOs and cooperatives also manage savings and credit schemes, but one first has to start with saving before being able to receive a loan, which might not always be possible.

District governments have been key in availing government land to farmers at very low lease costs. They can also be key in prioritising youth and facilitating the formation of a youth cooperative. In addition to several projects, youth organizations have also been key in organizing irrigation, extension services and cooperative strengthening.

Focusing on the production of French beans as an example here, it has several advantages, including the relatively low upfront investment and the first harvests starting 1.5 months after sowing. Such advantages are especially of interest to a starting youth farmer who likely has little working capital. The table provides an overview of costs for production on 10 ares (0.1 ha), which seems very small but is not unreasonable in the Rwanda context, and is based on the cost–benefit presented in Section 4.2.4. Also included in the costs is cooperative membership (cost of a share) to facilitate market access, and additional livelihood costs for the first 1.5 months. The upfront cash requirement can be less, for example by borrowing land from parents, doing all labour oneself rather than hiring labour or undertaking wage labour for other farmers during the production season.

Item	Cost (RWF)
Production French beans (including rent of land, labour)	33 000 × 10 are = 330 000
Coop membership	15 000
Livelihood 1.5 months	25 000 × 1.5 = 37 500
TOTAL	**382 500**

Source: Authors' computation using data from FGDs and KIIs 2020.

French beans are mainly an export product, so the market linkage, especially for a starting farmer with a small production volume, likely has to occur through the cooperative, which in turn has connections with an exporter.
Other low investment and short-duration crops are head cabbage, broccoli, cauliflowers, cucumber, carrot, Swiss chard, beetroot, and amaranthus, but they are only of interest for the domestic and/or regional markets.

As this report provides short-, medium- and long-term recommendations for youth employment creation, potential future horticulture developments also need to be taken into account. One trend observed in Kenya, after several export bans to Europe due to pesticide residues, is that exporters are increasingly not buying from smallholders, as they are accused of not following EU pesticide application guidelines and norms. Moreover, various certification requirements by European importers, which require substantial efforts and related costs from exporters and the many smallholders, also make out-grower schemes and embedded services less attractive. With the larger role of government and stricter implementation of rules and guidelines in general in Rwanda, Rwanda will hopefully be able to show that export remains possible even with smallholder suppliers involved, but this point (pesticide use) will need consistent attention. At the same time, this also suggests that in case of small-scale agripreneurship, the focus should include domestic and regional markets, which in terms of food and nutrition security are also important, while diversification of markets contributes to resilience. The vulnerability of export channels has been shown during the COVID-19 pandemic, although the HortInvest project noted that most exporters are back to 70 to 90 percent of their pre-COVID export volumes at the time of writing.

Again, extrapolating the aforementioned data, one can consider whether or not 20 or 40 new cooperatives are possible in horticulture, with members profitably engaged in horticulture production. This would start making some impact towards the tentative target of 15 000 new annual jobs. By increasing yields with available knowledge, reducing production costs and improving efficient VC functioning in the current condition of growing demand in domestic, regional and export markets, large employment results seem realistic. However, this will not happen overnight and will require concerted efforts. Of course, this assumes that these 20 or 40 new cooperatives and related efforts will be largely prioritising youth. This can be of interest to both educated and less educated youth, if they have interest in and some affiliation with agriculture. For many less-educated youth, they will likely have gained farming experience on their parents' farms, and this might give them a head start and more realistic views on the various aspects of farming.

As mentioned before, the high percentages of young women involved can be described in terms of the feminization of agriculture. Validation workshop participants identified lower labour mobility as one of the additional challenges for young women, often also linked to their care-tasks in the household and to farming revenues invested into the family rather than into the farming business. While the feminization of agriculture has often implied that women are left behind into subsistence farming because men left for better jobs in other sectors, opportunities do exist for women to harness the potential of market-oriented horticulture production, to feel inspired and empowered. Although the triple burden faced by women does bring additional challenges, horticulture is profitable enough to allow for the hiring of wage labourers. Support from husbands and other relatives, as well as gender-responsive public services, will likely contribute to successful women-led agripreneurship, reduced vulnerability related to risks that are inherent to agriculture and, to some extent, reduce the triple burden. Time-saving technologies (tractor services, sprinklers) can also contribute, as well as services provided by cooperatives (joint purchase of inputs, aggregation for marketing, etc.). Such measures should be considered for supporting female youth agripreneurship by relevant agencies in the development of their programmes.

Youth employment by cooperatives

Cooperatives do not only have members who are farmers, but cooperatives also can employ wage workers to undertake tasks such as aggregation of produce, networking with potential buyers, accounts, distribution of inputs, etc. Most of these people employed are also members of those cooperatives and therefore farmers. Table 86 shows that 11 (of the 20 cooperatives in this study) do employ staff: 85 percent of that is seasonal, and youth aged 18–30 participate more (37 percent) in both full-time and seasonal employment than their membership (18 percent) would suggest. Women are represented in employment (45 percent), as their membership suggests (44 percent). Cooperative Gwiza is an outlier with 195 employees (five full-time and 190 seasonal): it manages 230 ha of leased land for French beans and other vegetable production, and undertakes many tasks like sorting and packaging, which one would expect an exporter to do. This shows what cooperatives can potentially achieve in Rwanda.

If one would take out Cooperative Gwiza from the data and included the 10 cooperatives without any paid employment, then cooperatives provide 11.7 employees per cooperative[97] on average.

Table 86: Employment by cooperatives

Coops and associations	Total employed	Total		Men		Women		Youth 16–17		Youth 18–30		Adults >30	
		Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual
10	428	63	360	42	192	21	168	0	0	25	130	40	228
		15%	85%	10%	45%	5%	40%	0%	0%	6%	31%	9%	54%
		100%		100%				100%					
9 (without Coop Gwiza)	222	53	169	35	66	18	103	0	0	23	58	32	109
		24%	76%	16%	30%	8%	46%	0%	0%	10.4%	26.1%	14.4%	49.1%
		100%		100%				100%					

Source: Authors' computation using data from FGDs and KIIs 2020.

In light of the stated target of 15 000 new jobs in horticulture, the employment contribution of cooperative is still limited but with potential for further expansion, while also contributing to the provision of meaningful services to the youth members themselves, as the farmers/ agripreneurs.

Youth employment with commercial farms and exporters

Table 87 is a collation of employment data of 11 medium, large and exporters interviewed for this study who undertake production of one or more of the four selected horticulture crops of this study. The table shows how the employment is mainly seasonal (93 percent), that youth participate less in seasonal labour (4 percent against 71 percent by those older than 30), and that women participate substantially in seasonal labour (68 percent). Women are sought for tasks such as harvesting, sorting and packaging, as women handle delicate produce with more care. Men are

[97] Determined by dividing 222 employees amongst 19 cooperatives.

involved in other cultivation (land preparation, weeding, spraying, etc.) and tasks related to logistics.

Table 87: Employment in medium, large farms and with exporters

Medium, large farmers, exporters	Total employed	Total		Men		Women		Youth 16–17		Youth 18–30		Adults >30	
		Full-time	Seasonal/casual	Full-time	Seasonal/casual	Full-time	Seasonal/casual	Full-time	Seasonal/casual	Full-time	Seasonal/casual	Full-time	Seasonal/casual
11	2 603	183	2 420	98	647	85	1 773	20	0	89	565	74	1 855
		7%	93%	4%	25%	3%	68%	1%	0%	3%	22%	3%	71%
		100%		100%				100%					

Source: Authors' computation using data from FGDs and KIIs, 2020.

Youth were said to be less skilled and also less responsible and reliable than adults, and therefore, farm managers are not specifically employing youth. Still, youth employment is at 25 percent, which is higher than the youth membership (18 percent) of cooperatives. On the other hand, youth were found to be interested if the tasks were perceived to be part of modern practices like irrigation, logistics, etc.

In light of the tentative target of 15 000 new jobs in agriculture, this node is interesting if one considers that seasonal jobs are an important (additional) source of cash for rural households. To increase youth employment by employers requires additional attention: in line with expectations from employers, some forms of preparatory training before and coaching in the initial months can be developed. The OYE experience of SNV (see Annex 6) emphasizes that in addition to technical skills, this should also include general life skills, [98] and for all youth employment efforts, independent of the sector or the VC node. Although many youth and adults already work in this node, Section 4.6.3 shows that wages for unskilled (seasonal) labour are low in Rwanda.

Youth employment in processing

Two tables are presented here, separating chilli and ketchup processing (Table 88 shows one processing unit producing two products) and juice production (Table 89). Note that the juice processing units produce different fruit juices (passion, mango, orange, etc.) while Inyange Industries also produces mineral water. One's attention is drawn to the higherpercentages of full-time staff, women and youth. Women are preferred for tasks where hygiene is important. Youth are preferred because of their higher levels of education in processing technology and ICT.

entrepreneurship, financial literacy and cultural barriers (particularly for female youth).

[98] Life skills often include communication skills, work ethic, curiosity, analytical skills, lifestyle choices,

Table 88: Employment in processing chilli oil and ketchup

Ese Urwibutso chilli oil and ketchup processing unit	Total		Men		Women		Youth 16–17		Youth 18–30		Adults >30	
	Full-time	Seasonal / casual	Full-time	Seasonal / casual	Full-time	Seasonal / casual	Full-time	Seasonal / casual	Full-time	Seasonal / casual	Full-time	Seasonal / casual
8	8	0	2	0	6	0	0	0	6	0	2	0
	100%		100%				100%					

Source: Authors' computation using data from FGDs and KIIs 2020.

Table 89: Employment in juice factories

Ese Urwibutso juice factory, Inyange juice and mineral water factory, Coopedush passion fruit	Total		Men		Women		Youth 16–17		Youth 18–30		Adults >30	
	Full-time	Seasonal / casual	Full-time	Seasonal / casual	Full-time	Seasonal / casual	Full-time	Seasonal / casual	Full-time	Seasonal / casual	Full-time	Seasonal / casual
196	107	89	54	37	53	52	0	0	43	76	64	13
	55%	45%	28%	19%	27%	27%	0%	0%	22%	39%	33%	7%
	100%		100%				100%					

Source: Authors' computation using data from FGDs and KIIs, 2020.

One should also note that these tables contain the main processors, and those not accounted for are very small, forcing the conclusion that although on first sight this is an advantageous node in the VC, it is not going to increase employment opportunities on a large scale in the near future; even if the industry increased 10-fold, the employment generated, as suggested by these data, would only be around 2 000 jobs. Likely it would be less, as many of the processors are not even working at full capacity.

Youth employment opportunities in retail

Table 90 provides data not presented in Chapter 4, as it is not related only to one of the four selected crops of this study. Nevertheless, it does provide insight into opportunities for youth in retailing, regardless of the agricultural crop; note the 88 percent female retailers, 28 percent of them being between ages 16 and 30. Further analysis also bears to light that: (a) at Karongi market the sales were growing pre-COVID, and they have space for new retailers; (b) at Rubavu market[99] sales are growing, but it is running out of space and, therefore, will not quickly allow for additional sellers; and (c)the Nyabugogo (Kigali) market sales are also increasing, and they do have sufficient space for more retailers. Market management committees approve new retailers, who need to get a retail permit with the Rwanda Revenue Authorities. They also stated that they would not oppose new retailers because of fear of more competition, as long as there is sufficient marketing space for the new retailers.

[99] In addition to the district market for local consumers, there is also the Mbugangari market right at the border, which mainly focuses on cross-border trade.

Table 90: Number of retailers at three markets

No	District Market	No of Retailers at the market					
		Total (all ages)	Male (all ages)	Female (all ages)	Male youth (age 16–30)	Male youth (age 16–30)	Adults >30
1	Karongi (Gitesi) district market	43	1	42	0	15	28
2	Rubavu (Gisenyi) district market	165	0	165	0	18	147
3	Kigali Nyabugogo market	600	100	500	60	140	400
	Total	**808**	**101**	**707**	**60**	**173**	575
% of total		**100%**	**12.5%**	**87.5%**	**7.4%**	**21.4%**	**71.2%**
			100%		**100%**		

Source: Authors' computation using data from FGDs and KIIs. 2020.

Restrictions due to COVID-19 have impacted sales. At Rubavu market in early 2021, only 50 percent of the usual retailers were allowed to sell at any given time, while each retailer also had reduced sales and increased food losses. Also, in Karongi, overall sales have decreased during the pandemic.

Table 90 shows that retailing is a possibility for youth agripreneurship but that market assessments are required, as the local situations (especially the availability of space) can differ substantially from market to market. The table also shows that promotion of retailing should wait until after the COVID-19 pandemic subsides.

Comparing the earlier-mentioned nodes and their youth employment opportunities, the study concludes that if one assumes ambitious employment targets such as 15 000 youth to be annually employed in horticulture VCs, then agripreneurship as farming, and employment by commercial farms and exporters, stand out as key opportunities for the short term. Women are already well represented, although supporters and other private entities should develop gender-sensitive services and approaches to ensure the triple burden women face does not increase and does not interfere with their capacity to harness productive employment opportunities. It must be noted that employment by commercial farms and exporters is largely seasonal and that wages are substantially low compared to different ways of calculating minimum wages (see Section 4.6.3). Nevertheless, they provide relevant income opportunities in addition to farming.

As follows, it is argued that for the middle- and longer-term strategies, the focus should also be on the growth of the horticulture sector, which will in turn generate more opportunities for youth agripreneurship and employment.

The nodes of wholesalers and service providers are not presented, as Chapter 4 did not see large opportunities there for youth employment.

5.4 Proposed short-, medium- and long-term strategies

While Chapter 4 provided youth employment opportunities for the four respective VCs, here the strategies will be presented for the short term (1–2 years), medium term (1–5 years) and long term (1–10 years), while taking into account the analysis results of Chapter 4 and the recommendations presented in sections 5.3 and 5.4. If adopted, the proposed longer-term strategies will need to start soon, not, for example, after five years when the medium-term strategies have finished; the proposed change processes will also take more time to implement. The three strategies are differentiated as the following:

- Short-term (1–2 years) strategies: These strategies entail immediate opportunities for creating youth employment, without necessarily focusing on any additional growth of the horticulture VCs.
- Medium-term (1–5 years) strategies: These strategies focus on the growth of the horticulture VCs, which will then generate additional youth employment opportunities.
- Long-term (1–10 years) strategies: These strategies focus on higher-level enabling issues, as government strategies, infrastructure development, education development, etc.

The previous section concludes that in the short term, it seems likely that more jobs can be created at the production level than in other nodes of the horticulture VCs. At the same time, looking further into the future, employment will certainly increase faster in other nodes than at the production level. Also, in developed countries, this shift has taken place in the last century, with increased farm sizes and improved mechanization leading to reduced labour demand, while value addition and processing in the same VCs has created more off-farm jobs.[100] For this reason, medium- and long-term strategies for employment creation, as presented hereafter for horticulture VCs, should go beyond the production nodes as well.

Short-term strategic directions

For the facilitation of youth employment in the short-term, the following strategies are recommended and, if adopted, need to be further detailed. These strategies are drawn from the analysis of the four VCs presented in Chapter 4 and the analysis provided above, and have been further generalised to other potential horticulture crops.

(1) Develop a **National Youth Employment Strategy in Agri-food Systems**, thereby taking into account identified opportunities, aligned strategies, employment targets and key agencies to be involved. Such as strategy has already been prioritized by MINAGRI, which has requested FAO and namely the ICA project to provide the needed technical support. The forthcoming strategy should address the different needs and challenges of both educated and less-educated youth, well-off and more vulnerable youth, as well as

[100] As an extreme illustration, in the Netherlands, which is well-known for its agriculture, for every farmer there are 10 non-farming jobs related to the agricultural sector, including imported and exported food stuffs (Source: Vogels, P. 2019, in Het Parool, 1 October 2019, Dit draagt het boerenbedrijf bij aan de welvaart).

female and male youth. By taking into account to current trends in terms of feminization of agriculture in Rwanda, the strategy should strive to promote gender equality. Also, it should be taken into account that during the validation workshop it was reported that sufficient policies are in place for youth employment promotion, but what is required is the identification of concrete opportunities and practical strategies to capture those opportunities.

Box 35: Changing perceptions on agriculture
The RYAF uses different methods to improve the image of agriculture such as testimony from successful youth entrepreneurs, agri-shows, continuous mobilization through RYAF online and social media platforms and RYAF Online TV, agribusiness competition (YouthConnekt), Youth caravan, study tours and youth knowledge exchange sessions.
Olivier Muvadimwe, RYAF

(2) **Make additional efforts to improve youth perceptions towards agriculture, and horticulture in particular** by promoting competitions, awards, news stories, role models, etc. This can be undertaken as a short- or medium-term strategy: support towards positive attitudes is equally important for the success of other strategies mentioned here. This awareness campaign should also spread the information in a more structural manner about what kind of support is available from which sources; already a lot is being done, but there is little awareness about this among youth. While different organizations, like RYAF, already contribute to this objective, the assessments conducted for the purpose of this study revealed that additional efforts are needed. One should ensure that rural areas and less educated youth are sufficiently reached.

(3) **Mainstream youth employment in different horticulture programmes and investments** to take advantage of the ongoing substantial investments made by government and development partners into horticulture VCs. This demands generating awareness and commitment among many stakeholders, which can be made a priority in the aforementioned National Youth Employment Strategy in Agri-food Systems.

(4) **Foster internships for youth** with various private sector actors active in the different nodes of the VC to create on-the-job experience and interest and opportunities to pursue a career in the horticulture sector. In addition to coaching and training, some income support should be offered to the youth, at least covering their living costs, to guarantee that also vulnerable youth can apply. It should also be taken into account that private sector actors will be reluctant if they perceive the whole process as being too bureaucratic.

(5) **Enhance youth access to finance,** especially by identifying possibilities that do not require collateral. It is critical to increase the awareness of SACCOs and MFIs on the profitability of horticulture, specifying under which parameters (crops, technologies, market access, cost benefits). The latter will enable both SACCOs and MFIs to assess youth applications for loans. Also, guarantee systems with SACCOs and MFIs (in addition to those with commercial banks) might be a more appropriate way of facilitating access to finance for starting youth without collateral. Interest rates can be decreased by providing subsidy to the loan provider ("buying down interest rates"), in the form of special loan products for youth. Guarantee systems can also be a way to reduce interest rates, while matching

grants can further reduce the loan amounts. At the same time, youth should be coached towards a savings culture.

(6) **Promote youth agripreneurship in horticulture farming.** For educated and less-educated youth with an affinity for farming, horticulture provides opportunities to start farming as a business. This involves mobilizing district governments and eventually cooperatives to participate in dedicated/direct support (project modality) on access to rehabilitated land and marshlands, water, finance, production knowledge and markets. This is already happening, and the recommendation is here to learn from previous experience and to upscale the approach. As agriculture land is in demand, the focus should be on intensifying production, which can also benefit those peers who are already into farming. In the very short-term, matching grants or start-up kits might be required for youth to start farming, as the current services by financial institutions do not offer sufficient access to finance.

(7) **Enable less-educated youth to work on commercial farms and for export companies.** Although female youth are favoured for certain tasks like harvesting, sorting and packaging, and male youth have opportunities in cultivation work (sowing, irrigation, weeding, spraying, etc.) and logistics/transport, one can also try to break such gender biases. Considering that benefiting from the COVID-19 pandemic subsides, commercial farms and export companies are expected to grow in the near future, collaboration can be initiated with selected farms and companies where carefully selected candidates receive job-related training and coaching, and prove themselves during their internship period. This can, for example, be linked to programmes which are supporting export companies to increase their businesses. A monitoring mechanism for wages should be put in place (to ensure they cover at least a basic living wage) and safe working environment for both men and women should be ensured. Results-based interventions to link youth in the horticulture sector should be actively pursued, for example, the youth employment programme and the respective horticulture company agree that the company will organize training, internship and employment, while the programme will reimburse agreed amounts of money based on the number of youth still employed after certain agreed periods (e.g. after six months, after one year, etc.). This could also be done with youth with disabilities, although the types of jobs would need to be appropriate (e.g. grading, sorting, packing, etc.) based on competency levels. The approach can be up-scaled to other kind of companies active in horticulture value chains.

(8) **Support better educated youth in capturing off-farm employment and agripreneurship opportunities within the VC.** Considerable potential in the short-term can be created by supporting the initiation of agroshops. This will require access to finance and some specific business orientation and training. Support from specific agrodealers/importers can also be integrated, as they can increase their market shares.

(9) **Facilitate market linkage for youth farmers**. Youth expressed the need to be better linked to (lucrative) markets. Although this does not immediately create jobs, it will create increased incomes and more commitment for youth to remain in the sector. It is wise to not only focus on supporting new youth employment in horticulture but also to ensure that youth who are currently struggling are supported to ensure that they persevere and feel inspired by their achievements and progress.

(10) **Explore opportunities for less-educated youth with no farming affinity in retailing.** First, working capital will need to be organized, although this could potentially be loaned from personal sources as amounts of cash required are relatively small. Second, market space will need to be accessed. Before COVID-19, sales were increasing in the Kigali and district retail markets, but because of reduced purchasing power and movement restrictions, sales have reduced. This warrants waiting on this youth employment strategy until the situation has normalised.

Each of these strategic directions can be developed into detailed approaches. When detailing the approaches, it is important that: (1) youth are prepared and their employability is strengthened (push); (2) there is a good match between the ambitions and skills of the youth and demand from either market (in the case of agripreneurship) or the employer (match); and (3) youth are further supported to meet those demands (pull). The OYE model presented in Annex 6 provides more insights into this Push–Match–Pull model.

Medium-term strategic directions

As mentioned above, these mid-term strategies do not focus on the immediate creation of youth employment, but on supporting further development of horticulture VCs. Growth of these VCs will contribute to increased (youth) employment opportunities. The proposed medium-term strategies are:

(11) Support MINAGRI in the further development of the **Horticulture Policy and Strategy** [101] dedicated to the further development of the horticulture VCs for domestic, regional and export markets for fresh produce, value addition, processing and improved nutrition. Attention to both on-farm and off-farm youth employment opportunities can be integrated into the policy. Several of the points presented as follows will likely also be part of a future horticulture policy. This will likely mean that government and development partners will need to increase investments into the horticulture sector. Adopting a horticulture policy and strategy itself will likely translate into a budget commitment by the government to support its implementation. Of course, that would be more than welcomed by the horticulture sector for creating additional youth employment, but with budgets under pressure due to the COVID-19 pandemic, there might be some reluctancy and difficult decisions to be made.

(12) Support the GoR, MINAGRI, RAB, RICA, the RSB and the NAEB as the specific lead agencies, and the specific actors like export companies, to further **strengthen horticulture export growth**. This will create (youth) jobs and also promote the use of modern horticulture practices and technologies, benefiting the whole horticulture sector in the longer run. The opportunities for youth employment in export can be given more structural attention (mainstreaming). From an employment perspective, the horticulture sector will need to discuss the possibilities to increase wages towards providing a “living income”, also for the seasonal workers, which form the largest part of the employment in

[101] A draft of the National Horticulture Policy and Strategic Implementation Plan from 2014 exists. Regarding youth, the policy states that they need to learn at school about kitchen gardening, and from a nutrition awareness point of view (MINAGRI, 2014). Clearly this is a different age range and different issue from youth employment creation in horticulture.

export. Although Rwanda exporters see the low-wage labour rates as a comparative advantage, businesses in the long run also benefit from resilient communities where people earn better incomes. Furthermore, social certifications, which focus on decent wages among others, will be a future requirement to increase Rwanda's market share in the European market.

(13) **Scale up irrigation**. Subsidies for irrigation equipment are already mentioned in the short-term strategy as one of the requirements for starting youth farmers; here the main focus is on the need to scale up this, and to increase the number and choice of technologies available. This includes (commercial) service providers which can support farmers with appropriate, affordable farm-led irrigation technologies and services, as well as the further development of irrigation schemes. The focus should include the irrigation of hillsides, not only the utilisation of marshlands. This should be accompanied with other horticulture technologies and practices to increase yields and to reduce production costs. On the market side, off-season opportunities with better market prices should be part of the package to make such investments worthwhile.

(14) Support the implementation of the **Customized Agriculture Extension System (CAES)** and strengthening horticulture extension specifically. Horticulture production is relatively knowledge-intensive and is only more recently been given more attention as an extension specialization. One example of support is training the existing Twigire Muhinzi farmer promoters and farmer facilitators in the production, in those horticulture crops which are of specific interest to their area or district. Good extension on Good Agricultural Practices should be accompanied by cost benefit analysis to show whether and how increased investments in production will lead to increased incomes for smallholders.

(15) **Increase knowledge on climate-smart horticulture technologies** among all stakeholders of horticulture VCs, targeting explicitly the youth, and support organizations. Farmers are already bearing the impacts of climate change, but they will need to continue to adapt to the increasing volatility. Also, the input and output markets will need to assess their climate change implications and implement adaption measures accordingly, for example supply by seed importers of new varieties which are more adapted to the new climate (uncertainties),[102] or how processors are going to ensure steady supplies of raw materials despite climate change.

(16) Increase access and **availability of quality inputs** in Rwanda's key horticulture areas. Application of improved technologies and Good Agricultural Practices will need to be aligned with better inputs. At the same time, counterfeit inputs should not be allowed to enter the country.

(17) Promote the **development of a service providers market** that is relevant to horticulture and move away from full subsidised services. An entry point is the existing agroshops, which can be supported to extend their services to extension services, spraying services, pruning services and services related to mechanization (e.g. the use of power tillers). These services can be implemented by less-educated youth with additional training, who also act as marketing agents of these agroshops. Or these services can be initiated by

[102] Currently there are plans to produce seeds within the country, but not for vegetables.

individuals (agripreneurship) or cooperatives. Nurseries for vegetable seedlings are another example.

(18) The RCA and youth-centred ministries should stimulate the formation of and **strengthen capacities of youth groups and cooperatives,** within which they can build collective capacities to access funding, inputs, markets and other services in the horticulture VCs. Cooperatives should act more as service providers to their members, not merely as means to attract project or government support. Payment of cooperative fees or shares should be made possible in instalments for youth.

(19) **Expand post-harvest processing opportunities** to contribute to the stability of produce prices during harvest times. Processing factories could also provide employment for youth, although at a limited scale.

(20) Support the **development of a holistic IPM strategy** with MINAGRI to strongly promote non-chemical crop protection measures, and the safe and judicious use of chemicals as a last resort. This is particularly of interest to horticulture, as it is more prone to pests and diseases than other crops are. Commercialisation will otherwise quickly lead to increased use and misuse of pesticides, with OSH, environmental and food safety consequences.

(21) Further **assess the viability of protected agriculture** – the cultivation of high-value vegetables and other horticultural crops in greenhouses – for some horticulture crops (tomato, chilli, capsicum, etc.) by smallholders; determine the required production skills and knowledge, the financial feasibility, etc. Protected horticulture can strongly contribute to climate change adaptation, intensification and increase of yields, and reduced use of pesticides. A rule of thumb is that if a farmer is not able to apply GAP in the open field production, he/she is also not ready for protected horticulture.

(22) **Assess the possibility to expand storage facilities and collection centres**, which can greatly contribute to reducing losses in the VC and generate further employment opportunities for youth. Some facilities are already operated by government agencies, others by the private sector or by cooperatives. Assessments can provide insights into how this can be scaled up, ensuring financial sustainability and effective operations.

Box 36: Identification of land for agriculture
Under the Hinga Weze project, the RYAF is identifying government land in eight districts which can potentially be made available for agriculture, in collaboration with district governments.
RYAF technical advisor

(23) Continue the GoR strategy of **availing marshlands and rehabilitated lands with irrigation** to youth. This seems a worthwhile strategy to continue, although local and community perceptions and concerns need to be taken into account. The RYAF experience (see Box 36) could be a starting point to develop a structured approach to identifying and distributing such land.

(24) **Further discuss and question inheritance practices**. This might include facilitating youth access to land at a younger age, while the older generation is still alive, so that they

can start a livelihood based on farming.[103] More radical would be changes in farm succession customs with less fragmentation of land. For example only one of the children, with commitment to farming, would inherit the farm land while the other children receive some form of often limited financial inheritance but would not inherit any of the land.[104]

Long-term strategic directions

These long-term strategies focus on higher-level enabling issues which can even go beyond the horticulture sector. Proposed long-term strategies include the following:

(25) **Support the government with the implementation of the earlier-mentioned and other still-to-come relevant policies and strategies**: There could be the need for technical assistance, capacity-building, additional regulations, etc. An example could be supporting the rollout of an IPM strategy.

(26) **Further strengthen horticulture production knowledge and skills, entrepreneurship and agribusiness skills in the existing education structures.** As horticulture VCs develop, education also needs to develop along at the IPRCs, VTCs and higher education CoTs. Curricula will need to be adapted to ensure that students are better prepared to meet the demands and skills required, and at the same time, it should be ensured that students gain practical, hands-on experience on so-called student plots, during internships, etc.

(27) **Strengthen agricultural research centres**, especially in terms of action-oriented research to support the continued growth of horticulture VCs and required adjustments to changing contexts.

(28) **Further strengthen the consolidation of agriculture land**.[105] This is also included in the Vision 2050 (MINECOFIN, 2020). To some extent, this will happen naturally, as new generations grow up in urban settings and as off-farm employment increases. Yet, it remains a sensitive issue, as it is influenced by cultural values, property rights, inheritance practices, etc. Current positive trends could be identified and enhanced, for example by tax incentives.

(29) **Invest in rural infrastructure** to improve the efficiency of the VCs and the working conditions of actors, including youth. This includes roads, electricity (stability of supply but also price), larger irrigation infrastructure (dams, canals), etc.

(30) **Support the government to initiate other de-risking facilities** including but not limited to strategies of interest rates reduction. This mechanism should have special products for women as a category that is more represented in subsistence farming.

[103] Case study 1 in Annex 5 provides a nice example how parents support their daughter to start farming by contributing land and finance.

[104] This has become the practice in many developed countries, where equal division of land would immediately mean the end of an economic viable farm, thereby the closure of the farm and the end to a long farming tradition.

[105] Note that land consolidation, here meaning (fewer) farmers owning bigger plots, often in Rwanda also has the meaning of prioritising certain crops for certain areas.

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Annex 1: Consultation workshop

Stakeholders' consultation workshop for "implementation of the study."
List of participants
10 July 2020
Lemigo Hotel, Kigali

No.	Name	Position	Organization
1.	BIMENYIMANA A. Cedric	PSDYE coordinator	MINICOM
2.	BIZIMANA Appolinaire	Labour market intervention specialist	Ministry of Labour
3.	CHAVES Bernie	Country director	SNV
4.	COLANTUONI Marzio	SNV consultant	SNV
5.	Dr NDEREYIMANA Assinepal	Horticulture Research	RAB
6.	GUPTA Banjara	Project manager HortInvest	SNV
7.	IRAGUHA Charles	Kigali coordinator	HoReCo
8.	KAGWERA Edith	Agriculture Financing Specialist	MINAGRI
9.	KAYILISA Caritas	Project Coordinator ICA	FAO
10.	KIIZA David	Provincial manager	Rwanda Development Organization
11.	MUKASERIRE Devothe	Chairperson	Rwanda Federation of Horticulture Cooperatives
12.	MUSAFIRI Theophile	CEO	AgriWin Ltd
13.	MUSANEZA Belise	Agribusiness Manager	Equity Bank
14.	MUTANGAMPUNDU Henriette Aimee	Social-media reporter	Youth Engagement in Agriculture Network
15.	MUVADIMWE Olivier	CSAE programme manager	Rwanda Youth in Agribusiness Forum
16.	NIZERE Sylvie	National coordinator	IDH
17.	NSHIMIRIMANA Polycarpe	PPP expert	SNV
18.	NSHIMIYIMANA Arcade	Chairperson	Youth Engagement in Agriculture Network
19.	NTAGANDA Peter	Advisor to the State Minister of MINAGRI	MINAGRI
20.	NTANKIRUTUMANA Frank	Youth entrepreneurship DVPT specialist	Ministry of Youth
21.	RUMENERA Philippe	Project manager	SNV
22.	RURIGAMANZI Eric	Business advisor	SNV
23.	TUYISHIME Denyse	Head of communication of Business Development and Entrepreneurship	BDF (Rwanda Development Bank)

Annex 2: Key informants

Persons interviewed for this study through KIIs

SN	Name	Position	Organization
1.	BAGWANEZA Viateur	Chilli producer	Individual, Rulindo District
2.	BARAHIRA Bertin	Start-up Development Officer	Local government, Rulindo
3.	Bayingana Ribert	Director of Agriculture and Natural Resources	Local government, Rubavu
4.	BIRORI Sineze	Director of Youth, Sport and Culture Unit	Local government, Rubavu
5.	Bisangwa Innocent	Coordinator	SAIP project, MINAGRI
6.	Bizaba Fabien	Operational assistant	Proxifresh Rwanda
7.	BIZIMANA Alexis	Senior manager agribusiness and Mobigrow project	Kenya Commercial Bank (KCB), Nyarugenge
8.	CHRISTENSEN Kennet	Country Director	VIAMO
9.	HAZITAYEZU Donathien	Entrepreneurship coordinator	Akazi Kanoze, Gasabo District
10.	DUSENGIMANA Augustin	Irrigation Officer	Local government, Rulindo
11.	GAHUNGU Jules	Tomato producer	Individual, Nyanza District
12.	GAHUTU Anastase	Director of Agriculture and animal resources	Local government, Rulindo
13.	GAKWERERE Isaie	Project officer	USAID-Hinga Weze project, Karongi
14.	GAKWERERE Jean	Commercial tomato farmer	Cooperative Kimuyanza, Rulindo District
15.	GASHAYIJA Andrew	Project manager	Kilimo Trust
16.	GATETE Aimable	Coordinator	HCoE
17.	GATETE Bosco	Aggregator (passion fruit, green beans and tomato)	Individual, Nyanza District
18.	HABIMANA Gerard	President	Jyamberemuhinzi cooperative, Nyanza
19.	HABINSHUTI Fiston	Veterinary practitioner; Agrodealer	Individual, Rwamagana District
20.	HABUMURYEMYI J. Pierre	Sodiaco Agrodealer	Individual, Nyarugenge District
21.	HAGUMAKUBAHO Germain	Passion fruit farmer	Individual, Karongi District
22.	HAKIZIMANA Claude	Veterinary practitioner; Agrodealer	Individual, Rwamagana District
23.	ISHIMWE Emmanuel	Co-founder, Chairman of the board and Project Executive Secretary	HoReCo

Annex 2: Key informants

SN	Name	Position	Organization
24.	KABALISA Jean Paul	Agronomist	Garden Fresh
25.	KAGIRANEZA Boniface	Head of horticulture department	RAB, Huye
26.	KAMUGISHA Thierry	Innovation products specialist	Tubura (One Acre Fund)
27.	KANYAMAHORO Fidele	President	Duhuzimbaraga Group (farmers and exporters to DRC), Rubavu
28.	KAYONGA Clinton, son of big farmer Zibera Modeste	Commercial farmer (green beans, chili and tomato)	Individual, Rwamagana District
29.	MANIRAKIZA Jean de Dieu	Business development and cash crop Officer	Local government, Rubavu
30.	MATERNE Mateso	Agronomist	Gashora company
31.	MBARUSHIMANA Pierre	Agrodealer	Individual, Rulindo District
32.	MBONIGABA Eric	Director, Chamber of Agriculture and Livestock	PSF
33.	MPORWEKI Emmanuel	Passion fruit producer	Coopedush, Karongi District
34.	MUGANINEZA Jimmy Franck	Kinyinya Sector Agronomist	Local government, Gasabo
35.	MUKAMANA Zainabu	Green beans retailer, Nyanza District	Twiheshagaciro Cooperative
36.	MUKAMURENZI Marie Jeanne	Start-up development officer	Local government, Karongi
37.	MUKARUBUGA Gentille	Cash Crop Officer	Local government, Rubavu
38.	MULINDWA Prospere	Vice Mayor Economic Affairs	Local government, Rulindo
39.	MUNYANEZA Jean Marie Vianey	Division Manager, Emerging Value chains	NAEB
40.	MUNYARANGABO Jonas	Director General, Planning, monitoring and evaluation	MINICOM
41.	MUSABYEMUNGU Jean d'Amour	Cash crop officer	Local government, Nyanza
42.	MUSABYIMANA Mustafa	President	Forum for cross-border traders of fruits, vegetables, maize farmers (IAIIIRU), Rubavu
43.	MUSAFIRI Emmanuel	CEO	Agriwin Company
44.	MUSANEZA Belise	Agribusiness Manager	Equity bank
45.	MUSANINYANGE Joselyne	Start-up business officer	BDI, Nyanza
46.	MUSERUKA Joseph	Project coordinator (crop insurance)	MINAGRI

Annex 2: Key informants

SN	Name	Position	Organization
47.	MUTANGANA Felix	Commercialization and Digitalization Specialist	IKOFI of Bank of Kigali
48.	MUTUYIMANA Jean Claude	President	Horticulture platform, Karongi District
49.	MUVADIMWE Olivier	CSAE programme manager	RYAF, Gasabo
50.	NDINDABAHIZI Damien	Tomato retailer	Individual, Karongi District
51.	NGABONZIZA Ange	Agrodealer	Individual, Karongi district
52.	NIKUZE Marcelline	SMEs and cooperatives officer	Local government, Karongi
53.	NIYIGENA Candide	Agronomist	SAIP, Rulindo district
54.	NIYOBUHUNGIRO Denyse	Veterinary practitioner; Agrodealer	Individual, Rwamagana District
55.	NIYODUSENGA Spridio	Agrodealer; veterinary doctor	Agrotech, Nyarugenge District
56.	NIYOMPANO Vedaste	Tomato producer	Individual, Karongi District
57.	NIYONSABA Jean Bosco	Green beans and chilli producer	Individual, Nyanza District
58.	NIYOYANKUNZE Innocent	Regional field coordinator	PASP, Rubavu
59.	NIZEYIMANA Francois Xavier	Veterinary practitioner; Agrodealer Megavet	Individual, Rubavu District
60.	NKUBITO James	Director of planning and capacity building	Rwanda Cooperative Agency
61.	NKUNDAYEZU Alexis	CEO	Urwibutso Enterprise, Rulindo
62.	NKURUNZIZA Enoch	District corporate and division manager	Local government, Nyanza
63.	NSHIMIYIMANA Eric	Veterinary practitioner; Agrodealer	Individual, Rubavu District
64.	NSHIMYIMANA Ernest	Youth	HoReCo
65.	NSHIMYUMUKIZA Juvenal	Youth; food processing technician	Karongi District; Agriterra
66.	NSHIRIKAHE Gaudence	Passion fruit producer	Individual, Karongi District
67.	NTAGANDA Peter	Advisor to the State Minister of MINAGRI	MINAGRI
68.	NTAKIRUTIMANA Jean Marie	Business Advisor	Agriterra
69.	NTIYAMIRA Faustin	Agronomist	Local government, Gasabo
70.	NTUKANYAGWE Aimable	CPO IFAD Rwanda	IFAD
71.	NYINAWABEZA Prisca	Veterinary practitioner; Agrodealer	Individual, Rubavu District
72.	NZANSABIMANA Oscar	Agrodealer	Individual, Nyanza District
73.	NZAYINAMBAHO Eulade	Coordinator of RYAF, horticulture farmer	RYAF, Karongi District
74.	NZEYIMANA Emmanuel	Deputy Director	DOT

Annex 2: Key informants

SN	Name	Position	Organization
75.	ROBWA Deborah	Youth; sales marketing manager	Gashora Farm
76.	RUGWIZA Telesphore	Specialist in charge of processing	MINICOM
77.	RUKEBESHA Albert	Agronomist	Holland Greentech
78.	RUKERAMIHIGO Jean Nepomuscene	SMEs and Cooperatives Development Officer	Local government, Rulindo
79.	RUKUNDO Emmanuel	President	Association of Horticulture Exporters
80.	RUKWAYA Colombe	Managing director	Ruco Farm Ltd
81.	RUSANGANWA Patrice	Green beans producer	Individual, Rulindo District
82.	RWAYITARE Jean Bosco	Specialist of youth employment promotion	MYCULTURE
83.	SAFARI Evariste	Agribusiness Manager at Balton Rwanda Ltd and Chair of Rwanda Agricultural Input Dealers Association	Balton Rwanda Ltd
84.	SEBAHIRE Felicien	In charge	Koabibika Cooperative, Karongi District
85.	SIBOMANA Donat	Youth, Sports and Culture Officer	Local government, Rulindo
86.	SIMPUNGA Gilbert	Cash Crops Officer	Local government, Rwamagana
87.	SUM Barirye	ICT	MINAGRI
	TURAMBANE J. Claude	Youth capacity development officer	MINAGRI
88.	TWAHIRWA Diego	Commercial producer of chilli	Gashora Farm, Gasabo
89.	UMUTONI Joelle	Head of Project and Insights	DMM HeHe
90.	UWAMWEZI Joseline	Business Deve	BDF Gasabo
91.	UWASE Solange	Agrodealer	Nyanza
92.	UWINEZA Jeannette	Youth; retailer	Karongi District
93.	UWIZEYIMANA Emmanuel	Director of Labour Research and Employment Promotion	MIFOTRA

Annex 3: List of focus group discussions

Overview of FGDs undertaken for this study.

SN	Date of FGD	District	Name of moderator	Number of participants	Value chain
1.	30/07/2020	Rwamagana	Addy	12	Chilli production
2.	07/08/2020	Nyanza	Addy	6	Green bean production
3.	30/07/2020	Rwamagana	Assinapol	13	Passion fruit production
4.	30/07/2020	Rwamagana	Addy	12	Tomato production
5.	03/08/2020	Gasabo	Addy	10	Tomato production
6.	03/08/2020	Gasabo	Assinapol	10	Tomato production
7.	07/08/2020	Nyanza	Addy	7	Tomato production
8.	30/07/2020	Rwamagana	Assinapol	11	Tomato production
9.	05/08/2020	Rubavu	Addy	8	Tomato production
10.	30/07/2020	Rubavu	Assinapol	13	Tomato production
11.	03/08/2020	Gasabo	Eric	10	Chilli production
12.	05/08/2020	Rubavu	Eric	6	Green bean production
13.	30/07/2020	Rwamagana	Eric	9	Green bean production
14.	03/08/2020	Gasabo	Eric	10	Green bean production
15.	13/08/2020	Rwamagana	Eric	10	Passion fruit production
16.	03/08/2020	Gasabo	Karekezi	11	Green bean production
17.	07/08/2020	Nyanza	Karekezi	9	Green bean production
18.	05/08/2020	Rubavu	Karekezi	7	Chilli production
19.	30/07/2020	Rubavu	Karekezi	9	Green bean production
20.	13/08/2020	Rwamagana	Karekezi	10	Green bean production
21.	04/08/2020	Nyarugenge	Addy	7	Tomato retailers
22.	06/08/2020	Rubavu	Addy	12	Tomato retailers
23.	13/08/2020	Rwamagana	Addy	8	Tomato retailers
24.	04/08/2020	Nyarugenge	Addy	6	Tomato wholesalers
25.	04/08/2020	Gasabo	Eric	9	Tomato retailers
26.	13/08/2020	Rwamagana	Eric	7	Chilli retailers
27.	04/08/2020	Nyarugenge	Eric	8	Chilli retailers
28.	06/08/2020	Rubavu	Eric	8	Chilli wholesalers
29.	04/08/2020	Nyarugenge	Eric	9	Chilli wholesalers
30.	04/08/2020	Gasabo	Karekezi	4	Green bean retailers
31.	04/08/2020	Nyarugenge	Karekezi	9	Green bean retailers
32.	30/07/2020	Rwamagana	Karekezi	10	Passion fruit retailers
33.	13/08/2020	Rwamagana	Karekezi	8	Green bean retailers
34.	03/08/2020	Gasabo	Karekezi	5	Youth
35.	04/08/2020	Gasabo	Karekezi	4	Youth, green beans production
36.	04/08/2020	Nyarugenge	Karekezi	6	Youth
37.	05/08/2020	Rubavu	Karekezi	6	Youth, chilli production
38.	30/07/2020	Rwamagana	Karekezi	9	Youth, tomato production
39.	13/08/2020	Rwamagana	Karekezi	8	Youth, tomato production

Annex 3: List of focus group discussions

SN	Date of FGD	District	Name of moderator	Number of participants	Value chain
40.	13/08/2020	Rwamagana	Karekezi	4	Youth, retailer
41.	30/07/2020	Rwamagana	Karekezi	3	Youth, tomato production
42.	03/08/2020	Gasabo	Eric	5	Youth, chilli production
43.	05/08/2020	Rubavu	Eric	7	Youth, green bean production
44.	03/08/2020	Gasabo	Eric	6	Youth, green bean production
45.	07/08/2020	Nyanza	Eric	4	Youth, chilli production
46.	04/08/2020	Gasabo	Eric	5	Youth, tomato retailers
47.	03/08/2020	Gasabo	Assinapol	4	Youth, tomato production
48.	30/07/2020	Rwamagana	Assinapol	5	Youth, passion fruit production
49.	04/08/2020	Gasabo	Addy	3	Youth, passion fruit sellers
50.	06/08/2020	Rubavu	Addy	8	Youth, passion fruit sellers
51.	13/08/2020	Rwamagana	Addy	8	Youth, passion fruit production
52.	07/08/2020	Nyanza	Addy	5	Youth, tomato and green bean production
53.	05/08/2020	Rubavu	Addy	3	Youth, tomato production
54.	05/08/2020	Nyamyumba	Addy	4	Youth, tomato production
55.	03/08/2020	Gasabo	Addy	5	Youth, tomato production
56.	04/08/2020	Nyarugenge	Addy	7	Youth, tomato sellers
57.	06/08/2020	Rubavu	Addy	10	Youth, tomato sellers
58.	30/07/2020	Rwamagana	Addy	9	Youth, tomato sellers
59.	13/08/2020	Rwamagana	Addy	4	Youth, tomato sellers
60.	13/08/2020	Rwamagana	Eric	4	Youth, chilli retailers
61.	04/08/2020	Nyarugenge	Eric	5	Youth, chilli retailers
62.	06/08/2020	Rubavu	Eric	5	Youth, chilli sellers
63.	13/08/2020	Rulindo	Yvonne	4	Green beans wholesalers and retailers
64.	06/08/2020	Karongi	Yvonne	6	Passion fruit production
65.	05/08/2020	Karongi	Yvonne	8	Chilli production
66.	13/08/2020	Rulindo	Yvonne	6	Passion fruit production
67.	07/08/2020	Nyanza	Raymond	10	Tomato production
68.	13/08/2020	Nyanza	Raymond	6	Chilli production
69.	13/08/2020	Rulindo	Raymond	5	Chilli production
70.	05/08/2020	Karongi	Munyana	10	Tomato wholesalers and retailers
71.	30/07/2020	Rulindo	Munyana	10	Youth, green bean production
72.	08/08/2020	Nyanza	Munyana	5	Youth, tomato and green bean sellers
73.	05/08/2020	Karongi	Munyana	9	Tomato production
74.	13/08/2020	Rulindo	Munyana	7	Green beans production
75.	08/08/2020	Nyanza	Munyana	6	Youth
76.	05/08/2020	Karongi	Aimable	5	Green beans wholesalers and retailers
77.	05/08/2020	Karongi	Aimable	4	Tomato production
78.	13/08/2020	Rulindo	Aimable	3	Youth, chilli production

Annex 4: Participants of the validation workshop

The validation workshop was held online on 22 January 2021, while the three smaller group discussions were held on 3 and 4 February 2021, also online.

No.	Name	Position	Institution	Participants			
				General Workshop	Group 1	Group 2	Group 3
	A. PUBLIC ORGANIZATIONS						
1.	UWIZEYIMANA Emmanuel	Act. Director of labour Research and Employment promotion	MIFOTRA	X			X
2.	KAGWERA Edith	Agriculture calue chain specialist	MINAGRI	X			X
3.	NTAGANDA Peter	Advisor to the state Minister Edith Kagwera	MINAGRI	X			
4.	TURAMBANE Jean Claude	Youth capacity development specialist	MINAGRI				X
5.	MUNYURANGABO Jonas	DG Planning	MINICOM	X			
6.	NTANKIRUTUMANA Frank HABIMANA Peter RWAYITARE Bosco	Youth POLICY Mainstreaming Employment promotion Youth entrepreneurship DVPT-specialist	MYC	X X			X
7.	MUNYANEZA Jean Marie Vianey	Emerging commodities Diversification Manager	NAEB	X	X		
8.	Dr NDEREYIMANA Assinepal	Researcher in Horticulture	RAB	X			
9.	NKUBITO James	cooperative promotion	RCA	X			X
10.	MUKARUKAKA Berna	PCPU	RCA	X			
	B. YOUTH ORGANIZATIONS						
11.	MUVADIMWE Olivier	Act. Corporate liaison manager	RYAF	X		X	
12.	MUSAFIRI Theophile	CEO	AGRIWIN	X		X	
13.	NIYIGABA Etienne NSHIMIYIMANA Arcade	CEO Chairperson	YEAN	X X		X X	
14.	NSHIMYIMANA Ernest	Senior Agronomist	HORECO	X		X	
	C. DEVELOPMENT PARTNERS						
15.	BISANGWA Innocent	SPIU Coordinator	SAIP/MINAGRI	X			X
16.	GASHAHIJA Andrew	Coordinator of Youth Employment business project	Kilimo Trust	X			X
17.	HABIMANA André	UNIDO Country Representative	UNIDO	X			
	D. FINANCIAL INSTITUTIONS / SERVICE PROVIDERS						
18.	MUSANEZA Belise	Agribusiness Manager	Equity Bank	X			

Annex 4: Participants of the validation workshop

19.	MUGWANEZE Carine MUGISHA Albert	Acting Fund Manager Corporate officer	BDF	X		X	
20.	BIZIMANA Alexis	Agribusiness Manager	KCB	X			
21.	NZEYIMANA Emmanuel	Country Program Manager	DOT Rwanda	X			
	E. FARMERS ORGANIZATIONS						
22.	GAFARANGE Joseph	Secretary General	IMBARAGA ORGANIZATION	X	X		
23.	MUKASERILE Devotha	President	Rwanda Federation of Horticulture Cooperatives	X	X		
	F. PRIVATE SECTOR PLAYERS & EXPORTERS						
24.	NKUNDAYEZU Alexis	CEO	Ese Urwibutso	X	X		
25.	TWAHIRA Dieudonne	CEO	Gashora Farm	X			
26.	KABALISA Jean Paul	Agronomist	Garden Fresh	X			
27.	RUKUNDO Robert	President	Horticulture Exporters association	X	X		
28.	SAFARI Evariste	President	Agrodealers association	X	X		
29.	IRAKOZE Christian	CEO	Eza Neza private company	X	X		
30.	RUGEMA Angels	Managing Director	Bahage Food Ltd	X	X		
31.	NDAYAMBJE Jean Claude	President	YPAD	X			
	FAO						
32.	BAMMANN Heiko	FAO, Rome office	FAO	X			
33.	HO Hitomi	FAO, Rome office	FAO	X			
34.	GRANDELIS Illeana	FAO, Rome office	FAO	X		X	
35.	KAIYLISA Caritas	FAO, Rwanda office	FAO	X			X
36.	SCURIATTI Claudia	FAO, Rome office	FAO	X			X
	BARWITZKI Sonja	FAO, Rome office	FAO	X			
	SNV						
37.	CHAVES Bernie F.	SNV country directory	SNV	X			
38.	BANJARA GB	HortInvest	SNV	X	X	X	X
39.	RUMENERA Philippe	FAO project/SEAD project	SNV	X	X	X	X
40.	UZAMUKUNDA Assumpta	HortInvest	WUR	X			X
41.	RUZIGAMANZI Eric	HortInvest	SNV	X			
42.	NSHIMIYIMANA Polycarpe	HortInvest	SNV				X
43.	AHISHAKIYE Janvier	HortInvest	SNV	X			
44.	RUKEBESHA Albert	HortInvest	Holland Greentech	X	X		
45.	KEULEN Rik van	HortInvest	SNV	X	X	X	X

Annex 5: Two case studies

Case study 1: Young woman succeeding in horticulture farming

Devotha Umuhoza is a confident farmer, with a strong entrepreneurial spirit. “My favourite crop is tomato,” she says, “as there is always demand for tomato and the price is good. But I don’t like cabbage, as the prices are low, so low that sometimes you can’t even make a profit.” She is also ambitious: “My target is to own one hectare of land, have irrigation and produce vegetables year-round. And when I get married and have children, I also want them to continue doing agriculture, but only after studying agriculture at university.”

Devotha, aged 25, only completed four years of primary school, and ever since has been helping her father on their farm in Karongi District. The wish to start farming came in 2019, after receiving training from the HortInvest project. “The training gave me confidence. What the lead farmer was doing on the demonstration plot, I knew I can also do this.” Soon after, she made an agreement with her father: she could use a plot of her parents’ land, just 700 m² (400 m² for vegetables and 300 m² for maize and beans, as the latter has no irrigation), and she would pay for the inputs herself, while her father would pay for the hired labour during the first season. She borrowed RWF 25 000 from the cooperative, but she still needed to borrow from her father to buy all of the inputs. Some of the work she could do herself, but she also hired workers for tasks such as land preparation, weeding, and fertilizer application. As she still lives with parents and other siblings, household duties are not an obstacle; there are always others who can take her task.

“With my questions, I go to the HortInvest agronomist (Horticulture District Coordinator). He even linked me to West Gate Motel and to the buyers at Rubengera market, at the Karongi District headquarters,” she says. The traders at Rubengera market participated in the Business-to-Business session organized by the agronomist, where farmers, buyers, SACCOs and input suppliers exchanged views and discussed possibilities to do business. “But he also told me where I can buy good seeds. And if I have problems with pests and diseases, he is my source for advice,” she says. “We also started a cooperative, without support of others; it was made by youth, for youth. We named the cooperative Dukorane Umurave, which means ‘working with zeal, with courage’. And we women are in the majority: 24 women and only 18 men. The vice-president is also a woman. We are all young, with less experience, but I can already see a difference when comparing to how things were before.” The main advantage of the cooperative is the credit and saving scheme they run: she saves RWF 500 per week and was able to loan RWF 25 000 at 4 percent interest for her vegetable production. They have not started selling together as a cooperative, neither have they done any production planning together.

And what impact has the COVID-19 pandemic had on her farming? “When the movement and transport was stopped at the beginning of the pandemic, the first lockdown, I could not get the quality fungicide. There had been a lot of rain, and the tomatoes were suffering. The local agroshop was soon out of stock, and it took time for new inputs to arrive. But now we are okay, agriculture is given priority and is allowed to move, to continue, even when offices have to close.”

What is her advice for other young women? “They should engage in horticulture. The benefits are good. From the income, I have now bought five goats and two pigs. And I don’t have to ask my

parents for money to buy shoes or clothes! And they should seek the practical trainings, right in the field. All those other classroom trainings, given by projects, they will not help you go forward," she concludes.

Figure 51: Ms Devotha in her field of tomatoes

Case study 2: Youth pushing for innovation in horticulture

Christian Irakoze

"Eza Neza signifies 'cultivate well' in Kinyarwanda," says Christian Irakoze, co-founder of Eza Neza. "A fitting name for this project because we will use 80 percent less water and 80 percent less land, and we will produce 30 percent more compared to conventional farming methods." With different hydroponic and vertical agricultural technologies in its green house, Eza Neza is pushing the boundaries of horticultural practices in Rwanda. As he eagerly shows the 900 m² greenhouse in Muhanga District, clearly Eza Neza wants to be ahead of the game. "We don't only want to be the most efficient producer of vegetables and fruits, like sweet pepper, strawberry, lettuce and tomatoes, but we want to be a centre of horticulture innovation in Rwanda, to show others what technologies can bring us."

Christian is not even trained in horticulture, neither is his brother, the other co-founder. After high school in Rwanda, he got a Bachelor's degree in Business Management from a U.S. university, after which he worked for a health insurance company in New York. "I realized I could do meaningful work in the U.S. but that my impact would be bigger in Rwanda," he says. "So instead of doing a Master's degree in the U.S., I returned to Rwanda four years ago." He first worked as an IT expert for an internet service provider, but after a few months back in Rwanda, his interest in agriculture was kindled during a family dinner, as they were discussing the challenges and opportunities in the agriculture space in Rwanda. While developments in the IT sector come one after the other, agriculture seemed to lack innovations. Gathering more information from the internet, his ideas about a modern horticulture greenhouse began to evolve.

“For two years, I was like a sponge, checking everything on YouTube related to greenhouse farming. I also learned a lot from Holland Greentech, as they allowed me to join on their visits to commercial farmers also operating greenhouses.” Eza Neza was registered in the third quarter of 2019, but it took a year before the first seeds could be planted. All equipment had to be imported from China. “The Chinese supplier was very helpful. For about six months, we were in discussions, trying to find out what we really needed. Luckily all of the items arrived before the COVID-19 lockdown, and only the installation was delayed during the three-month lockdown.”

The first seeds were planted in October 2020, and now in January 2021 the first harvest and sales have taken place. Eza Neza is supplying directly to supermarkets and to distributors that supply hotels. “Tomatoes from the greenhouse are bigger and juicier, so we have a niche there providing better prices,” Christian says. Demand has not declined due to the latest COVID-19-related movement restrictions. “Purchasing power of people might go down, but we might also be able to become the preferred supplier now. The impact could go either way, but being an essential business, we are allowed to travel.”

Christian adds: “I am now confident to say we have been able to establish a commercial farm, and I am expecting production to be worth RWF 50 million from sweet pepper, strawberry and tomatoes over the next year, and we are likely to break even within the next two years. We are not yet making a profit, but the revenues have started coming in the last three weeks.”

Initially, the main challenge was finding capital to invest and become operational. Funding largely came from family and friends. Christian did not take any bank loan, but the matching grant of EUR 32 000 from the HortInvest Innovation Fund was key. “We were doing small pilots,” Christian says, “and we were convinced it could work. But the matching grant of EUR 32 000 allowed us to buy the equipment for the full-scale greenhouse. Then we applied to lease government land, and we were also successful. We now lease one hectare at a symbolic price. This sounds as if it was all so easy, but actually, the process has been a tough one. But we persevered and in the end we succeeded.”

He further elaborates: “We have a vision to expand, further improve the infrastructure here, like with cold storage, cold trucks, and to start the trainings for others with interest in these technologies. And start with e-commerce for home delivery. But what probably is most important now is to improve our crop management; it requires substantial knowledge and skills. We still need to improve our yields.”

When asked, he thinks it is partly true that youth are not interested in agriculture because agriculture has not been marketed as a very attractive industry. Moreover, agriculture is an industry that requires patience and reaping benefits in the longer term compared to other industries, and this might be unattractive to some. However, he sees that the trend is slowly shifting, as youth are realizing the incredible opportunity that is there. The advantages of working with youth is clear to him: they learn faster and adapt well, which is especially useful if one is trying out new technologies as those to be seen in the Eza Neza greenhouse.

Any advice for his peers? “Whatever they want to do, they should start small and stay persistent. Focus on small wins. These small wins eventually lead to big milestones.”

Elias Nyaminani

Elias, aged 25, is one of the staff members of Eza Neza. After finishing high school, he was basically unemployed. “I wasn’t doing anything,” he says. Coming from a humble family, he stayed at home and helped his parents on their small farm. For the past nine months, he has been involved in the crop management activities of Eza Neza. He is enjoying this work, as he can learn a lot about the different horticulture technologies. What he needs to learn more about? He mentions crop science, as this is a challenge at the moment. But in the near future he would like to gain more experience in the logistics and transport side of the company.

Table 91: Staff at Eza Neza

Company Eza Neza	Total		Men		Women		Youth 16–17		Youth 18–30		Adults >30	
	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual	Full-time	Seasonal/ casual
Staff	4	7	4	4	0	3	0	0	2	3	2	4
	100%		100%				100%					

Figure 52: Modern cultivation practices at Eza Neza farm

Figure 53: Christian and Elias, Eza Neza
(Left: Christian Irakoze, the CEO of Eza Neza. Right: Elias Nyaminani, a youth employee)

Annex 6: Applying the OYE model for youth employment strategies

Every youth employment programme or intervention needs to make some initial strategic decisions which inform the further development of the strategy, for example, which value chain(s) and at which nodes of the VC one sees the best potential for youth employment generation. Other decisions need to be made, for example, if one has to limit oneself to certain geographical areas, or if one wants to limit oneself to a certain category of youth or not. Most important categories of youth are: out-of-school or educated, men or women or both, rural or urban areas, youth aged 16–18 or 19–30. Some programmes focus on boosting youth micro-enterprises to grow and employ more youth, while others might focus on self-employment or on employment by larger SMEs.

In this section, we make use of the Opportunities for Youth Employment (OYE) approach,[106] a proven model for designing interventions. This approach is very similar to the three pillars of the National Skills Development and Employment Promotion Strategy (NSDEPS) 2019–2024 (see Section 3.1, Figure 9), and therefore, it will also facilitate and complement policy level discussions without necessarily having to be limited to the programmes already existing under the NSDEPS.

OYE approach

OYE's market-based approach focuses on ecosystem development (enabling environment), collaborating with national governments, civil society organizations, local service providers and private sector companies to play a pivotal role of providing concrete employment opportunities, mentoring and coaching, market linkages and access to finance to marginalised youth. It highlights the key aspect of matchmaking between the labour market (demand side) and skilled youth (supply side) to deliver systemic change and sustainable results at scale, and to stimulate entrepreneurial activities in sectors with high-growth potential such as agriculture, energy and Water and Sanitation (WASH). Informed by outcomes of market scans, OYE's pathways of Push, Match, Pull, Enable has the following features:

- **Market scan**: Opportunity identification for decent employment and entrepreneurship for underprivileged youth.
- **PUSH:** Youth acquire market-oriented employability skills. OYE promotes peer-to-peer learning and role models for inspiration and strengthening positive networking, leadership and relationships among youth, especially female youth.
- **MATCH:** Technical skills and market exposure are acquired in practical (on-the-job) settings. Youth have acquired access to finance (banking/credit services as well as

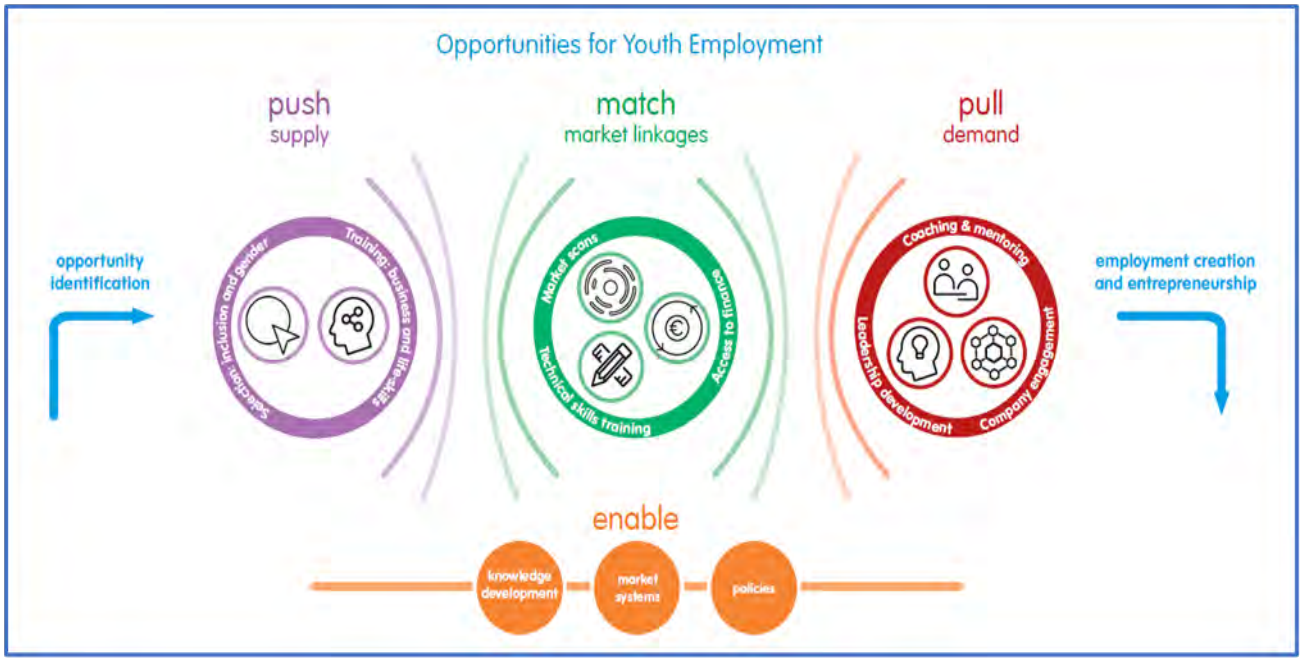
[106] SNV has been developing this OYE approach since 2016 in the sectors of agriculture, renewable energy and water, hygiene and sanitation. OYE has strengthened collaboration with national governments and private sector players to transform the lives of more than 50,000 male and female youth in developing countries, of which 40,000 have reached new self-employment (40 percent of whom have been female youth). It has been applied in Rwanda in the renewable energy sector under the OYE programme funded by MasterCard Foundation from 2016 to 2018. The approach has proven itself in the horticulture and energy sectors and is now live in several countries, including Mozambique, Zambia, Zimbabwe, Mali, Niger, Ghana and Ethiopia. In those countries, SNV has seen most youth finding employment and entrepreneurship opportunities in production (farming), and a smaller but still important number in employment by others. These projects also show that horticulture is an attractive sector for youth compared to other agricultural sub-sectors.

generating and managing their own financial resources, for example self-organized savings and lending groups.

- **PULL:** Supported by post-training coaching and mentoring, youth achieve access to profitable and safe (meaningful) opportunities for employment and entrepreneurship in private sector markets. OYE, in close synergy with other projects and programmes (e.g. inclusive VC development), is contributing to the private sector becoming more youth-inclusive.
- **Enable:** Concrete evidence is documented on lessons learned and outcomes that can influence better and focused policy dialogue, local ownership and ultimate adoption for scale and sustainability.

The model also provides the flexibility to prioritize specific groups of youth, for example female youth, uneducated and educated youth, and also does not limit itself to a specific (sub)sector. Figure 54 provides a graphic of the approach.

Figure 54: OYE approach



Push: employability

a) Selection, inclusion and gender

Selection is the most important stage in identifying and ensuring inclusion of youth that are looking to build employability skills in agribusiness, and in particular if an intervention selects a certain category of youth. By displaying identified opportunities in high-growth sectors, OYE targets passionate growth-oriented entrepreneurs and job seekers with a drive to succeed. Thus, selection is contextualised, structured, of high quality and collaborative, meaning that youth are allowed to self-select, mainly considering their aspirations and inclusiveness. This self-selection, based on ambitions, should tally with identified opportunities in growth sector markets. Box 38 provides examples of additional strategies and activities which support female youth employment.

b) Training (social and business skills)

The OYE pathway starts with skills training that covers topics on social skills, business skills and leadership development. This is key to providing youth with the social skills that motivate them, as well as increase their appeal in the eyes of market players, and to enable them to enter and start their agripreneurship as professional businesspeople. Youth are also introduced to concepts on savings and lending as part of financial literacy and are encouraged to either establish or join existing savings and lending groups as described in the financial access and inclusion section.

Box 37: Distinctive features of OYE

The OYE approach has been fine-tuned over the years, developing some distinctive aspects based on lessons learned:

- It emphasizes the sustainability and strengthening of local services providers; the latter are identified as part of the market scan analysis (TVETs or informal skills that train actors who understand market gaps and the evolving needs of youth). With additional capacity-strengthening if necessary, these service providers are then engaged to provide skills training to youth.
- The importance of soft skills training, which is contextualized to the identified opportunities for employment and entrepreneurship.
- Initial soft and business skills training is essentially followed by the next stages of "MATCH" and "PULL". Training youth only, in most cases, is insufficient.
- Peer-facilitated learning and role models are used to trigger further skills development and youth aspirations.

The importance of social skills should not be underestimated and should be adapted to what is directly required to make entrepreneurship or employment successful. Often included are communication skills, work ethic, curiosity, analytical skills, lifestyle choices, entrepreneurship, financial literacy and cultural barriers (particularly for female youth).

c) Match: market linkages

At this stage, OYE connects youth to concrete market opportunities and with private sector companies as identified during market scans for wage or self-employment opportunities. Private sector linkages offer access to market opportunities for youth-produced goods and services.

Because access to start-up capital remains a challenge for youth, they are linked with financial service providers including MFIs, cooperatives and youth savings and lending schemes, as earlier described.

d) Market scans

In order to ensure a focus on the MATCH components in the OYE pathway, a key point of departure for each intervention is the identification of OYEs and entrepreneurship in the selected sectors and VCs.

In order to be able to identify *true* opportunities, OYE considers:

- Gender-sensitive accessibility of (self-) employment opportunities (including reachability, safety and reasonable working conditions);

- Gender-sensitive insight in youth aspirations and ambitions;
- Identification of gaps and possible solutions, including market demand for employability skills that youth may not yet have acquired, and the potential "supply" (i.e. training and coaching providers);
- Public and private sector actors that (potentially) provide access for youth to essential services for employment and entrepreneurship, including skills training and coaching, finance and scope for (self-) employment; and
- Local government stakeholders and other contributors for the regulation and facilitation of matchmaking and networking.

Box 38: Specific support to ensure inclusion of female youth

The following activities have provided additional attention for female youth in OYE projects:

- Market scans (opportunity identification) undertaken with a solid gender lens, with particular attention to opportunities in VCs that are accessible, attractive and safe for female youth.
- (Self-) selection of female youth already has an explicit component of *encouragement*, considering women and young female role models.
- Include options that are traditionally female tasks or jobs with opportunities that are traditionally not for women. In the case of the four VCs, traditionally women do well in farming, retail, sorting and packaging in packhouses. Non-traditional would be work in greenhouses, marketing of inputs, etc. Cultural sensitivities should be discussed, but not to block interests or ambitions.
- Additional coaching and mentoring for female youth in self-employment and in leadership.
- Focus on female role models in training and coaching to reinforce the development of leadership skills. Provide leadership development and mentoring for a "select group" of female youth.
- Gender-sensitive implementation and service delivery, for example accessibility criteria for female youth in training delivery, including locality (close to homesteads), and appropriate time slots, allowing them to take their babies into training sessions, ensuring a safe and welcoming environment whereby female youth are not dominated by their male peers. The latter requires special responsibilities and competencies among trainers and coaches.
- Female-only WhatsApp groups, promoting peer-to-peer coaching and learning.
- Female-only savings and lending groups.
- Developing long-term solidarity among women through the creation of groups and networks.

Market scans is an approach similar to VC analysis to provide an overview of market gaps, including youth-specific constraints, youth profiles and ambitions, and to provide an opportunity to map out key stakeholders, actors, employment opportunities and entrepreneurship opportunities in selected VCs. Market scans can be undertaken at the project design phase, but as interventions develop and lessons are learned, further market scans during implementation and mid-term review can be advisable.

e) Technical employability skills

OYE embraces a "dual vocational training" approach. This entails a combination of classroom trainings on soft and business development skills (under PUSH), with on-the-job or other practical technical skills training that literally and metaphorically demonstrate how these technical skills will be applied in practice, with the perspective of both profitability/revenue and safe and reasonable working conditions (part of MATCH). Youth acquire tailored technical skills through on-the-job trainings/apprenticeships or internships at private sector companies (e.g. processing), at TVETs or at well-established commercial farms.

f) Access to finance

Other OYE projects confirm the critically important but challenging issue of access to appropriate finance and broad financial inclusion when it comes to enterprise development for (male and female) youth. OYE facilitates access to youth-appropriate financing by combining and matching a range of instruments to the specific needs of groups and individuals in different VCs, depending on the nature of the market and where opportunities are along the VC (see Box 39).

Box 39: Different forms of access to finance for youth

a) **Savings as a starting point**
Group savings and credit schemes stimulate financial discipline, help with individual investments, and can complement loans or start-up grants. Cumulatively, consistency in savings builds creditworthiness and provides a start-up asset base. As they evolve and mature, stand-alone youth savings and lending groups can eventually be integrated into existing savings and credit cooperatives. Youth projects show that youth can successfully undertake savings. It is advisable where possible to collaborate with existing organizations like Umurengo SACCOs and Inkunga Finance PLC.

b) Starter kits
Starter kits are complementary to technical, soft, and business skills training and individual youth savings and contributions. To enable the youth to get their businesses off the ground, particularly those requiring more investment capital, starter kits in the form of equipment, for instance, can provide an additional boost.

c) Blend instruments to spread risk and catalyze entrepreneurship in the early stages
This is especially true if youth-led enterprises require higher levels of capital for start-up or scale up. By combining personal youth contributions from savings, a small percentage of a grant (perhaps from a project or government grant), a percentage of a loan and part equity (where the lender owns, for example, a machine until it is paid for with interest), it is possible to help youth get a foot on the enterprise ladder and be supported until they can function fully as a commercial entity within the VC; this example has worked in other OYE countries such as Mozambique. The duration of the project enables monitoring and coaching, as further risk is managed. These options can be explored with institutions with mandates to support the development of youth enterprises.
A slightly different version, described earlier in this report, is the possibility for youth to pay for the share (membership) of a cooperative, essential to access, for example, export market channels, only after the first harvest.

d) Out-grower schemes

Chapter 4 provides an overview of exporters and commercial farms that are involved in each of the four selected crops, and some of them are also buying from smallholder farmers, while also advancing inputs and providing agronomic advice. This reduces the upfront investment to be borne by the youth farmer alone. It would be good to understand which different modalities are currently applied in out-grower schemes or contract farming. Clearly, this approach is also a potential way to access knowledge and skills.

Here are three examples of this approach in Rwanda: (1) Gashora Farm produces chilli for export. The company works with a youth farmer organization to supply inputs. It provides technical support and follow-up through its agronomists, and it buys from youth for export; (2) Garden Fresh, an exporter in French beans, works with youth organizations, cooperatives and individual farmers. It provides inputs on credit and advisory services to farmers by agronomists, and it buys all of the produce from them; and (3) Uzima Chicken, a non-horticulture example, is one of the leading companies in the poultry sector in Rwanda. It works with youth organizations who operate as agents for marketing and distributing chickens to smallholder farmers. It creates jobs for youth, contributing to self-employment and development.

e) Leasing government land

Section 4.2.4 explained how the GoR is leasing out rehabilitated land and drained marshlands to youth. Drained marshlands in the valleys are especially ideal, as they automatically ensure access to water for irrigation. Section 4.2.5 details two cooperatives with high-youth participation where the district supports cooperative formation and access to fertile marshlands. It also shows that lease fees for the government are very low.

Other rehabilitated government lands could be made suitable with low-cost irrigation, but this is still a lot of money for unemployed youth, so blended forms of finance should be developed for this. Government or projects should ensure that water is accessible in the vicinity. An alternative to leasing government land could be crop sharing, but this requires further research regarding why crop sharing happens with staples and not with horticulture crops.

Pull: realizing and maturing employment and entrepreneurship

a) Company/private sector engagement (employment)

As the OYE approach is developed on the basis of (potential) private sector engagement, the PULL stage also includes continuing interaction with private sector companies in order to sustain the prospect of developing profitable working relationships with youth. Maintaining communication with the employing company to ensure that the business interests of the private sector partners are also served (notably after they have invested in on-the-job training, input supply, for example in out-grower schemes, and the retail of their products). Linking with private sector engagement and inclusive VC development initiatives such as result-based financing schemes, and challenge funds are, therefore, recommended, as these usually have important complementary business investment resources that are beyond the scope of OYE projects.

b) Entrepreneurship (self-employment)

Many youth, often the more educated, are eager to start small enterprises. In the case of taking up farming, this requires a mix of support related to access to knowledge, land and inputs. Here, we can, for example, propose to partner with TM to ensure that local lead farmers also adopt GAPs as role models with the capacity to steer knowledge exchange between the youth and the more seasoned farmers as sources of knowledge.

In the case of off-farm entrepreneurship, the support needs be tailor-made, for example, whether this is starting retail or input marketing. It is important to promote linkages for matchmaking between private sector and youth-led businesses to build trust and market linkages. This positioning can assure markets for youth-produced goods and services, and can trigger higher productivity, new employment and business opportunities for youth, led by youth.

Box 40: Agri-green businesses

Projects in Ghana and the United Republic of Tanzania have galvanized the energy of relatively educated youth into establishing agri-green businesses, thereby creating employment but also supporting further development of the sector. These youth-led agri-enterprises apply or promote climate-smart agricultural practices (e.g. solar irrigation), services in transportation and/or logistics, improved storage, healthy food processing, and marketing and distribution (including last mile distribution to BoP consumers) to assure timely delivery of food to markets/consumers.

c) Mentoring and coaching for male and female youth

The main goal of mentoring and coaching is to encourage youth to optimize and diversify their operations, and to best utilize market opportunities and maximize outputs and incomes, whether as start-up entrepreneurs or as newly recruited employees.

The basic focus areas of coaching and mentoring are:

- Realizing the horizon of the pathway: making linkages to employment and entrepreneurship operational, competitive, profitable and sustainable;
- Managing personal assets, including time and finance;
- Supporting in the development of key leadership competencies, notably articulating a vision in line with aspirations and inspiring change and innovation at the company and community levels; and
- Strengthening the capacity and building the confidence of youth to enable them to develop self-clarity, make choices and develop the confidence needed to venture into new entrepreneurial territories.

In addition to selecting local (accessible and context-savvy) coaches and mentors, OYE promotes peer-to-peer mentoring (see Box 41), including engagement of female role models as mentors and coaches for female youth as earlier explained.

Box 41: Peer mentoring
Both male and female youth thrive more when there is consistent peer pressure, opportunities for peer learning and peer modelling, and mentoring and coaching as consistent accompaniments aimed at building confidence towards economic empowerment. Furthermore, more experienced and trained youth can be paired with newer cohorts for scale and sustainability.

Enable: promoting market systems and a conducive environment

Besides directly targeting unemployed youth, the changes brought about through these activities should also lead to changes in the "system" that currently keeps youth in poverty and without meaningful employment. Therefore, it is critical to engage with local and national actors and stakeholders.

a) Engaging stakeholders in system solutions

OYE does this by identifying systemic and youth-specific constraints (such as legal and governance frameworks that are barriers to youth employment), and by developing targeted activities with these actors and stakeholders to reduce the identified barriers, including building their capacity to promote and sustain youth-inclusive market systems. Key stakeholders include national and local government, TVETs and other employability skills training providers, private sector companies, financial service providers and youth representatives.

b) Knowledge development, networks and policy platforms

Improving youth-inclusive enabling environments results in knowledge development and validation. Systematically gathering and analysing experiences and lessons learned (OYE's collaborating learning and adapting [CLA] approach) aims at informing and equipping key stakeholders with evidence that feeds into regulatory frameworks and policies. In addition, OYE aims at contributing to youth' leadership and "voices" in relevant platforms and networks, thereby holding the "duty bearers" (notably national and local government authorities) accountable. Exemplified in this study are the results achieved, and the question of whether or not this can be scaled up, by availing marshlands to youth and the formation of youth-focused cooperatives.

c) Sustainability and scaling up the OYE youth employment strategies

Sustainability is optimized by involving implementing partners who are equipped with the skills and experience to continue youth training and coaching beyond the duration of the intervention. An example is strengthening TVETs to provide more practical or tailor-made training, and seeking formal accreditation to the practical skills training provided by TVETs. Another example is online enterprise development support and training services; theoretical training modules can be developed and made accessible through ICT-based platforms to maximise cost effectiveness and stimulate more interest among youth, particularly considering the implications of COVID-19 restrictions.

Scalability is achieved by collaborating with local service providers, youth as peer mentors, and initiating private-public partnerships that last beyond the intervention. Public and private sector partners should establish joint agendas around youth employment, in which interventions are

adapted, scaled up and replicated in other areas. To ensure buy-in and scalability, it is crucial to consistently (1) showcase successful business cases of private sector and youth engagement;[107] (2) prioritize VCs with a blend of high youth traction; and (3) engage in knowledge management and sharing of what works (and what does not work). The key is to use evidence to inform policy, to stimulate programming, to improve youth "voice" in policy processes and to help create alterations and adaptations within the enabling environment.

Sustainability of the programme outcomes also happen through pursuing linkages and awareness-raising with other poverty reduction and income-generating programmes of the government and of other donors, for increased understanding and adoption of inclusive market system development that provides win-win outcomes in local, regional and global economies.

[107] Such as Solange, an agroshop owner in Nyanza (see Box 5), or Alphonse Gatete (see Box 25), as highlighted in the study.

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