EMPLOYMENT AND SKILL NEEDS ANALYSIS IN THE AGRICULTURAL SECTOR IN RWANDA

Analysis of skills supply and demand in the broader agricultural sector

FOREWORD AND ACKNOWLEDGEMENTS

This study was conducted by the ETF upon the request of the Delegation of the European Union to Rwanda, to inform the development of a forthcoming EU action titled "*Strengthened access to and quality of TVET in the agricultural sector in Rwanda*". The objective of this new EU initiative is to bolster the efforts of the Rwanda TVET Board (RTB) in enhancing the quality of TVET in the agricultural sector, with an emphasis on increasing female participation. A primary strategy for achieving this is the transformation of some selected TVET schools into 'Centres of Vocational Excellence' (CoVEs), aiming at offering superior agricultural training to young people and adults. EU support may vary from infrastructure development or provision of teaching materials, to enhancing teaching capacities to ensure high-quality training in key areas of agriculture.

The study adopts a broader view of agriculture that extends from primary production to the processing and marketing of food and non-food products. While acknowledging the critical role of primary agricultural production, including subsistence farming, in safeguarding family livelihoods against poverty in Rwanda, the study adopts the value chain approach to agriculture, covering a wide spectrum of activities from farming and associated commercial activities such as input supplies, value addition, entrepreneurship, micro-financing and agricultural extension, as well as processing, marketing, distribution and trade of food products and by-products. Using the terms 'agrobusiness/agrifood' system, it searches for the ways of increased productivity, converting subsistence farmers into a skilled workforce across various agrobusiness value chains.

The focus of the study is to understand the main skills and occupational profiles needed to help transform agriculture into a broader agrobusiness system, as well as to understand how education institutions (TVET schools, polytechnics and universities) can help to meet these skills and occupational needs in Rwanda. The result is a broad review of system-level interactions across the different agriculture-related activities from an employment and skills perspective, revealing the part the various stakeholders have to play in this transformation process. Despite the broad scope, the study tries to capture diverse perspectives on skills requirements and explores how the country's human capital can contribute to the transformation through skills acquisition, enhancement and retraining. The skills needs identified go beyond simple agricultural or technical skills, encompassing a wide range of competencies necessary for the whole agribusiness system.

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EXECUTIVE SUMMARY

The Rwandan government set its long-term development plan in *Vision 2050.* Vision 5050 envisages an economic and social transformation of society through the guidance of the state and private sector-led growth. Agricultural transformation remains at the core of this broad objective, supported by several state policies and sector strategies. Other drivers of change in the sector are: population growth, poverty and food security; climate change and environmental sustainability; and technological advances and digitalisation. Population growth, with further fragmentation of land and urbanisation, comes with the risk of poverty and food insecurity, while the uptake of technology and digitalisation has remained slow so far. There is an increasing push for change due to a high level of competition for international exports, the need for higher quality and upgraded products, and changing consumer demands. As a result, business operations, workers and farmers in the sector are all affected, leading to changes in job tasks and skills needs in the labour markets.

With 13.2 million people, Rwandan society has a young and growing population. Two-thirds of the population is under 30 years old, and the majority of the young population lives in rural areas (72%). The country has achieved significant improvements in human development, poverty reduction, gender equality, education, and public health. Society has been changing, with economic development, urbanisation and increasing education levels. With the State's commitment to expand free and compulsory education to the age of 12, school attendance became mandatory for 6-17-year-olds, while the literacy rate of the population aged 15+ reached 79%. In 2022, 81% of children aged 6-17 years were at school. Several actions are being taken by the State to increase school attendance, such as expanding the number of schools from primary to secondary and TVET, creating boarding schools, and school feeding programmes.

The Rwandan economy has grown visibly in the last decade, with the services sector contributing the most (close to half of GDP), the agricultural sector contributing to one-quarter of GDP and industry to one-fifth of GDP. Growth was mainly boosted by the services sector (e.g. hospitality, transport, IT, trade, financial services), but also by manufacturing (textiles, chemicals, plastics, food and beverages). Nevertheless, the economy is dominated by sole proprietorships and micro enterprises, 77% of which were in trade, accommodation, and food services, and another 7% in manufacturing. The number of enterprises in agriculture was less than half a percent, providing a strong indication of the lack of forward-backward linkages with business. The overall picture is a 'low-skilled equilibrium' economy, with a shortage of medium-skilled workers and a small pool of highly skilled graduates, primarily employed in the public sector. The very low share of technicians, associate professionals, craftsmen, plant and machine operators and assemblers is striking. Despite the limited capacity of the private sector to absorb graduates with a medium skill level and highly skilled graduates, certain dynamic sub-sectors within the agrifood/agribusiness system show higher potential and growth.

In 2022, there were around 2.3 million agricultural households in the country. The sector is characterised by very small production units (three-quarters of farms own less than 0.5 hectares of land) that are almost exclusively rainfed, with very little use of irrigation. The most common challenges faced in production include limited access to seeds, fertilisers, pesticides, irrigation, and machines. The main food crops are maize, bean, potato, cassava, banana and sorghum, and there is a growing share of horticulture (vegetables, fruits, nuts, flowers). Coffee, tea, and pyrethrum are the traditional export crops, with new ones emerging (e.g. horticulture, livestock, cereals, essential oils, stevia). However, the country has experienced a continuous decrease in agricultural engagement at the expense of non-agricultural activities over many decades, a typical development trajectory of the declining importance of primary agriculture with a parallel increase of agrobusiness systems.

Key features of the Rwandan labour market

Labour market characterised by informality. In 2022, 56% of the working age population (16+ years old) was active in the labour market, with higher participation by men than women (64% versus 49%). The remaining population is classified as 'inactive', although a part of this population was

engaged in subsistence agriculture for their own consumption[1]. The total employment rate was 44% in 2022, with a similar gender imbalance (53% versus 37%). The employment rate has remained almost the same over the last five years, but the number of employed people has reached over 3.5 million – excluding those in subsistence agriculture. The most visible characteristic of employment in Rwanda is a high degree of informality, affecting 91% of all workers. Informality is much higher in agriculture and rural areas and among men, although slowly decreasing in non-agricultural activities. Decent work (working poverty), underemployment and unemployment are the major employment challenges.

Increasing total and youth unemployment. The total unemployment rate has increased since 2017, reaching 20% in 2022 – almost 917 000 people. This makes roughly one in five active people unemployed, more likely women than men (almost 24% versus 18%). The unemployment rate is similar in urban and rural areas, but the youth (aged 16-30) unemployment rate is higher than that for adults, almost 26% in 2022. Young women were more likely to be unemployed compared to young men, with an unemployment rate of 29% for women and 22% for men. Interestingly, the highest rate of unemployment is often found among young people with a secondary education, while secondary TVET graduates perform better than secondary general education graduates. In addition, one-third of Rwandan young people were not in employment, education or training in 2022, with more women than men (41% versus 31%) being in this situation.

Slowly increasing education levels of the labour force. The educational attainment of the labour force is a good indicator of the current skills demand in economy. In 2022, 44% of the Rwandan labour force had not completed any education, while 32% had completed only primary education. Together, these constituted over three-quarters of the active population. On the other side, the share of the labour force with a secondary education was almost 17% and the share of labour force with a tertiary education was 7%. Comparing these figures with those of 2017, a slow increase of education levels can be observed, especially in the number of those with a primary and lower secondary education. Moreover, by 2022, women had caught up with men in that they had similar education levels in primary education and even exceeded men in obtaining a lower and upper secondary education.

Changing occupational structure of employment. Occupational change is a good proxy for changing skill demands. In 2022, basic jobs involving simple and routine tasks constituted 61% of all occupations in Rwanda. This share has increased since 2017, and a higher share of women than men perform these simple jobs. The second highest occupation category is 'services and sales workers' (almost 14% in 2022), with a higher share of women than men. This was followed by 'craft and related trades workers' (8%), 'professionals' (6.5%) and 'skilled agricultural workers' (5.2%) in 2022. Plant and machine operators were less than 3% (all male), while 'technicians and associate professionals', 'legislators and managers', and 'clerical support workers' were around 1% each. Except for clerical workers with more women, the other occupations were heavily dominated by men.

Continuing dominance of agriculture in employment. Despite a continuous shrinkage of agricultural activities, the market-oriented agricultural sector still dominates employment in Rwanda – almost 47% of employment in 2022. This number reaches 63% of total employment if both market-oriented and subsistence agriculture workers are taken together. Overall, the sector employs more women than men. Employment in industry remained stable (17% in 2022), with more men than women (23% versus 10% in 2022); however, the sector's job creation capacity is relatively small. The services sector counted for almost 36% of total employment in 2022, with a more gender-balanced workforce. The most common form of employment after agriculture is in the wholesale/retail trade and in the construction sector (each with around 10% of employment). These are followed by transportation and storage (6%), manufacturing (5%), the education and training sector and the activities of households as employers (4% each). Trade is more gender-balanced, while construction and transport employ all men, and manufacturing more men than women.

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[1] Since 2013, the NISR applies the ILO employment definition, whereby only those working in 'market-oriented agriculture' are counted as 'employed' in its statistics. Those people working in 'subsistence agriculture' and producing only for their own consumption are no longer defined as 'employed', but rather 'inactive'.

Persistently lowest earnings in agriculture. Productivity and wages remain the main incentives that affect individual and employer behaviour. Providing the right incentives for efficiently allocating labour in the economy is as important as investing in education and training; these incentives include earnings, hiring practices, working conditions and social protection. A review of the average monthly earnings in the last 6 years indicates that the highest-paying jobs are in the services sector, followed by industry, and the lowest paying jobs are in the agricultural sector. The average monthly earnings in each respective sector were approximately RWF 122 000, RWF 75 000, and RWF 22 000 in 2022. Jobs in services pay over 5 times more than agricultural jobs and almost double industrial jobs, while industry jobs pay more than 3 times the pay of agricultural jobs. Earnings in agriculture remained stuck at the same level for many years and lagged behind industry and services in attracting talent.

A closer look at workers' skills in different agriculture-related sectors….

Based on the value chain approach, this report adopted a broader view of the agricultural sector, extending from primary production to the processing and marketing of food and non-food products, often called the 'agrobusiness/agrifood' system. Agriculture-related sectors are diverse, varying from primary production to agro-processing, food and beverage services, marketing and sales, transport and storage, and agricultural & scientific services. Based on the statistical analysis of LFS datasets, we show how workers' skills across these different agriculture-related sectors evolved from 2017 to 2022.

Primary agriculture sector. The biggest of these sectors is primary agriculture, which employs millions of people (in market-oriented and subsistence agriculture together) in very small production units with low productivity and earnings. Crops and livestock involved by far the largest number of the workforce, constituting 98% of workers in the sector in 2022. Employment in forestry and fishing remained very limited, without any visible increase (around 21 000 and 6 000 workers respectively). Almost 53% of all workers in the sector are women, but small forestry and fishing are dominated by men. Young people represented one-third of the workforce, albeit with a small decrease, while most of the remaining workers are slowly aging.

Low and decreasing levels of education in primary agriculture. A comparison of workers' education levels between 2017 and 2022 reveals increasing numbers with basic education but decreasing numbers with upper secondary or higher education in the sector. A decrease in the share of workers with no education and an increase in the share of primary school graduates are visible over the five years, due to increasing educational attendance both among men and women. However, educational improvement stops at upper secondary level, with a decrease even in the share of university graduates. This trend indicates *a self-selected exit from agriculture by more educated people.* As soon as people get an education at upper secondary and tertiary level, they tend to leave agriculture and move to other sectors. This happens more often to men.

Low skills base of occupations in agriculture. In 2022, almost 89% of all agriculture workers performed elementary jobs. The second biggest occupation was 'skilled agricultural workers' (11%), followed by 'service and sales workers' (0.2%) and 'professionals' (0.1%) – all have decreased their shares since 2017. In contrast, workers with other medium-skilled or highly skilled occupations (however small this number is) seem to have left the sector in the same period, indicating a deficiency of managers, professionals, technicians and other skilled roles. Women occupied most elementary jobs in agriculture, while men were in the majority in other occupations. This confirms once more the skills exodus from agriculture, with more specialised workers moving to carry out their occupations in other sectors.

Agro-processing sector. This is a very small sector in its nascent phase. It is part of the manufacturing sector, with ~5% of total employment in 2022. This report defines the agro-processing sector as six subsectors together: the manufacturing of foodstuffs, beverages, tobacco, leather, wood, and paper. All six together constituted over one-third of the total manufacturing employment, representing 1.9% of total employment in 2022. This amounts to around 68 000 workers, with over 40 000 workers employed in the first three sub-sectors. Almost three-quarters of workers in the sector are men, but the share of women is relatively higher in the sub-sectors of food and beverage

processing. Recently the sector has hired increasingly young workers with more balanced gender shares.

Moderate and increasing education levels in agro processing. Despite the small number of workers, education levels in agro processing have become higher and are continually increasing. The clear trends visible between 2017 and 2022 are the decreasing share of workers with no education or primary education and the increasing share of workers with a secondary and higher education. Both genders improved their education levels, but the steep increase in the educational level of women workers is astonishing, especially at upper secondary and tertiary education level. The sector is still dominated by more low-skilled and male workers, but the share of women workers with an upper secondary education or tertiary education exceeded the share of men in 2022. This confirms ***the increasing skills needs in the agro-processing sector, which is gradually attracting more educated workers***.

Medium-skills base of occupations in agro-processing. Between 2017 and 2022, there was a slight increase in the small shares of managers and professionals (3.7% and 2.8% respectively), as there was for "plant and machine operators and assemblers" and "clerical support workers*"*. But a sizeable decrease can be noticed in the shares of "technicians and associate professionals", "service and sales workers" and "craft and related trades workers". Still, 53% of all occupations were elementary jobs in 2022, followed by 'service and sales workers' (~19%), 'plant and machine operators and assemblers' (~11%), and 'craft and related trades workers' (8%). Almost all occupations are male dominated, but women are better represented among clerical workers, professionals, elementary jobs and service and sales workers. ***This confirms the strong potential of the sector to absorb more medium-skilled and highly skilled workers of both genders.***

Food and beverage services is another agriculture-related sector with increasing employment numbers. In 2022, the sector had 1.7% of total employment, with almost 60 000 workers and a better gender balance. ***Veterinary services*** are also an important sub-sector of agriculture and scientific services, in which employment is extremely small. It accounted for less than 3 000 people in total in 2022, around two-thirds of whom were male. Given how big a sector primary agriculture is, the number of veterinary professionals seems very low, with a potential to expand substantially. Other relevant sub-sectors are the *wholesale and retail trade of agricultural food and non-food products, land and air transportation of the same products, and warehousing for the storage of those products*. Estimating employment numbers in all these subsectors is more difficult but the numbers are expected to be significant and growing.

Skills demands in agriculture-related businesses…

Business in agriculture-related sectors has both opportunities and constraints. A cautious optimism was felt in the interviews with businesses and was also visible in their sizeable short-term hires. The majority of the newly recruited were young workers with an upper secondary and university education, and there were slightly more men than women. This suggests a growing demand for skilled workers in the sector, including more female workers. At the same time, the key constraints for business growth remained the same: *limited access to finance, inadequate infrastructure, skilled labour shortage, escalating input costs, import competition and climate change impact.* Supporting the growth of the businesses requires comprehensive policy measures to address those constraints.

Labour and skills shortages due to increasing skills demand. Companies reported high labour costs due to limited Rwandan specialists and imported expatriate experts. They also confirmed several challenges in attracting and retaining professional workers, listing several hard-to-fill occupations in medium-skilled and highly skilled positions. One key finding is the equal need for (i) higher quality technical skills in several agricultural areas, and (ii) other technical/business skills from non-agriculture areas. Business creation and expansion in the country will depend on the supply and deployment of a critical mass of those profiles. Overall, the most requested professions and expertise reported by companies can be classified under three groups.

- ***Agriculture-related technical skills,*** including agronomists, agricultural engineers/technicians, veterinary doctors, animal health technicians, farm managers/technicians, crop production

technicians, post-harvest treatment, processing, safe packaging and distribution, horticulturist, environmental engineers, agro-scientists, food engineers/technicians, microbiologists, laboratory workers, culinary experts, food safety/quality control inspectors, etc.

- ***Non-agricultural technical and business skills,*** including electric/electronic engineers and technicians, other engineers, machine operators and assemblers, maintenance/repair of machinery, craft designers, spatial analysts and technicians, energy experts, data analysts, managers for production, HR, procurement, marketing, and branding, financial experts, accountants, etc.

- ***Core competences and soft skills,*** including a good level of literacy and numeracy, foreign languages, ICT and digital skills, interpersonal/communication skills, teamwork, problem-solving, critical thinking, creativity, management and leadership skills, customer care, dependability, adaptability, resilience, etc.

In addition to the three groups above, national stakeholders and donors added to this list two other skill sets. ***Entrepreneurial skills*** are seen as the only way to support the creation of new businesses, often requiring a combination of technical, management and personal skills. ***Skills for sustainability*** are also raised as a combination of knowledge, values and attitudes for environmental protection and biodiversity, reducing energy, materials and water consumption, technical skills on green technologies, sewage treatment, waste management, and circular economy and recycling. Finally, ***missing practical skills and work-based learning*** is an issue that cuts across all the technical, business and core competences. Both companies and national stakeholders agree on the need for more practical skills at all education levels (secondary TVET, polytechnics, higher education).

Improving gender inclusion in the agrobusiness system. The agrobusiness system in Rwanda seems to be a significant employer for both men and women, especially considering recent recruitment. All interviewed employers accept the idea that women can perform as capably as their male counterparts, particularly in less physically demanding roles. This is reflected in the perception of gender-neutral occupations such as agronomy, animal science, farm management and business management, where companies had no gender preference in recruitment. However, gender stereotypes continue to influence occupational roles, with men dominating technical and managerial positions and women in positions that require attention to detail and relationship management.

Skills supply trends, particularly in agriculture-related sectors

An expanding education system. A review of education statistics reveals a school system that has still been expanding in terms of numbers of schools, classrooms, teachers and learners over the last decade in Rwanda. As a result, the country achieved full enrolment in primary education, while enrolment rates in lower and upper secondary education remain lower. In fact, the total number of students in lower and upper secondary education together constitutes only one-third of the total number of primary school students. This indicates ***significant dropouts (early school leavers) at the end of primary education and education losses*** (e.g. repetition, poor learning). This leakage at the end of primary education creates a continuous pressure on the training needs of low-educated adults, especially in rural areas.

Upper secondary education included 273 000 students in total in 2021, consisting of general upper secondary, professional upper secondary and TVET secondary schools – with the respective shares of students in each education stream being around 65%, 8% and 27%. The education losses in the primary and lower secondary education risk creating a compromised quality of upper secondary education, including TVET. A strong foundation of basic skills during a person's basic education is often seen as precondition for TVET's success. More efforts are needed to continue reducing dropouts and repetition rates, building school and teacher capacities, increasing enrolment and completion rates and ensuring better learning outcomes. Overall, ***girls are a majority in primary, lower and upper secondary education, while boys have higher enrolment rates in TVET and higher education institutions***.

Growing offer of technical and vocational training at three levels (short-term, upper secondary and polytechnics). With over 366 schools, secondary TVET has shown a promising increase over the

years: the number of students increased from around 70 000 in 2021 to 87 000 in 2023 (with around 40% females). The Government is aiming for 60% of lower secondary school students to enter TVET by 2024, but currently less than 30% of the 9th grade students choose TVET for their last three years of education. TVET secondary education and higher education are not free in Rwanda, though scholarships are available for paying the fees.

Training programmes exist for seven agriculture trades: Agriculture/ crop production, animal health, food processing, forestry, wood technology, water & irrigation, and leather technology. However, most students are registered in four trades: agriculture, animal health, food processing, and wood technology, all with more female students than male students except for wood technology. There are 43 secondary TVET schools that provide training in agriculture-related trades, 18 of which offer only specialised agriculture courses. Students in agriculture-related trades constitute around 10% of all secondary TVET students, with an equal share of women. In agriculture-related higher education (including polytechnics), however, only less than 5% of the 96 000 students are in the 'agriculture, forestry, fisheries and veterinary' fields – with women taking over 40% of the share.

Challenges of access, quality and gender equality in TVET. The findings indicate several physical, economic and socio-cultural barriers for access to TVET, especially for girls. The physical distance from home to school is the first deterrent, so having a safe boarding facility or safe transport is vital. School fees and living costs are barriers for families with a poor and rural background, while the low share of female teachers and staff in secondary TVET and polytechnics could be an impediment for a more gender-sensitive approach in schools. The shortage and/or low quality of school infrastructure such as workshops, laboratories, training materials, IT facilities or internet connectivity, boarding facilities, canteens, and toilets are often mentioned, as are water and power cuts. Schools which provide courses mostly preferred by girls (e.g. tailoring, hair dressing, culinary arts) are often private schools that are more expensive or offer only short courses in day-schools.

Varying training quality due to teachers and inadequate resources. The shortage of qualified and experienced teachers remains a challenge in some schools and there is a need for continuous professional development for teachers. The limited resources allocated to agriculture-related courses reduce the effectiveness of 'industrial attachment' programmes. A one-month internship period is not considered enough, while the lack of student grants is a core problem. Several companies charge students high fees for internships, while the same internship period implemented across the country makes it more difficult for students to find workplaces.

Difficult transition for young people from school to work. Several tracer studies show the lack of enough professional experience, lack of general and soft skills (e.g. languages, communication, ICT) and lack of entrepreneurial and business skills. However, there is a large variation in employability among graduates from different fields, which is also affected by gender and place of residence – women and rural residents have less opportunities. Although overall employment rates of graduates seem reasonable, they vary from one educational field to another. The lowest employment rates and highest unemployment rates were often found among (TVET) graduates in the agriculture, irrigation, forestry, fisheries and veterinary services sectors.

Complicated jobs market in agriculture-related fields. The findings show that over two-thirds of secondary TVET graduates continue studying at higher learning institutions, while a small share start working as self-employed, often in animal health and food processing. The main reason to continue studying is the fact that *'all better-paying agricultural jobs are in public institutions which in turn look for university graduates.'* This is borne out by the fact that over three-quarters of polytechnic graduates in veterinary technology and crop production found employment in public institutions as sector veterinarians or agronomists. ***This information confirms that young people do not accept low-paid agriculture jobs with difficult working conditions unless they have no other option.***

Wrapping up the final conclusions

The study gives an overall picture of ***shrinking primary agriculture with a marked skills exodus of educated people, against the dynamic and growing agriculture-related businesses, gradually absorbing more medium-skilled and highly skilled workers,*** however nascent those businesses

are. This is an expected development, but the businesses must grow faster as primary agriculture is predominantly composed of small farming households, with very little backward-forward linkages with business. However, accelerating the growth of agriculture-related businesses – varying from agro-processing, food and beverage services to marketing and sales, transport and storage, agricultural and scientific services – urges for several policy actions to address the main business constraints.

Moreover, *the skills ecosystem is wider than just education and business stakeholders, and policies cannot underestimate the power of 'individual agency'.* The importance of individual agency can be clearly observed in young people's lack of appetite to work in primary agriculture and the continual skills exodus from the sector. Everyone makes their own strategic decisions on which area of education/training to invest in, which sector to work in, and what kinds of jobs/occupations they do according to their own personal context, often following the opportunities and constraints faced in the labour market.

Any solution to increase agrobusiness would involve a mix of at least three policy areas: labour market policies, sector economic policies, and education & training policies. Coordination and coherence between these policy areas are crucial to ensure the contribution of human capital to economic growth. Skilling the population needs to be backed up by creating and increasing decent employment opportunities, which in return requires supporting SMEs in creating decent jobs. The huge number of informal workers facing low pay, poor working conditions and increasing unemployment calls for comprehensive and simultaneous policy measures on several fronts.

The recommendations are therefore divided into two parts. The first set of recommendations focuses on how to support the growth of agriculture-related businesses, through coordinated and coherent actions in three policy areas: *labour market policies, sector-related economic policies, education, and training policies*. Key action points are listed under each policy area for a consistent approach. The second set of recommendations aims to improve the delivery of agriculture related TVET provision. Besides increasing access to TVET, especially for vulnerable groups in rural areas, most recommendations are to improve the quality of training on offer for the different target groups.

Recommendations to support the growth of agriculture-related businesses

Labour market policies. In the context of large-scale informal economic activities in agriculture, several employment policy tools could be used to increase the attractiveness of jobs in agriculture-related sectors and improve job quality for educated people. The most important ones are labour legislation and its implementation, wage policies across sectors, including increasing the minimum wage to boost earnings in agriculture, and enlarging health and social protection coverage.

Standardising hiring practices and working conditions between the public and private sector, transparent labour market information, increasing the outreach of job intermediation, career guidance and counselling and active and passive labour market programmes are also very important. Incentives must be developed for companies to formalise existing informal jobs and adopt gender-neutral hiring practices.

Sector economic policies. Higher investment in agriculture-related sectors must be facilitated by increasing access to low-cost financing for micro and small enterprises, start-up capital for aspiring entrepreneurs, and in particular access to business advisory services. Exceptional schemes for SMEs could be launched for conditional access to public grants for investing in rural areas/regions, linking with farmers, prioritising certain sub-sectors, and creating formal jobs.

Priority sub-sectors must be balanced between the needs of domestic and international markets. Since each value chain has a different impact – some benefit business and others large masses – several priority areas could complement each other in the development of the country's goals. Tax and social security incentives must be aligned with those priority sub-sectors for investors, as must import costs of agricultural inputs and processed foods.

Finally, improving the country's infrastructure, especially in the regions and rural areas, seems to be imperative for business – e.g. road transport to connect producers to consumers at low cost, access to

stable electricity and water, irrigation and machinery to increase mechanised farming. The lives of farmers could dramatically improve with affordable modes of transport for agricultural products, while special processing zones could attract investment from international companies.

Education and training policies. The key policy objective is to increase enrolment and completion rates in lower and upper secondary education, while reducing dropouts and repetition rates and ensuring better learning outcomes in basic education. The content and delivery of basic education must be adapted to ensure that students have better digital skills, green skills, and other general and soft skills. Girls must be systematically encouraged to choose technical, managerial and ITC-related education fields. Implementation of above will contribute to improve the quality of TVET as well.

Another policy option could be to create more and more diverse tertiary education programmes as the 'polytechnic pole' of agricultural higher education and connect them with agricultural research centres. For example, creating and popularising specialised programmes for agro-food professions will attract more students to the relevant tertiary education with better job prospects. Agro-science or agro-technology, the pharmaceutical & beauty sector (production of pharmaceuticals, para-pharmaceuticals, and cosmetics), agro-forestry, including wood value chain and forestry products, could be other areas for specialised tertiary programmes.

Finally, developing a more accessible and affordable adult learning system for upgrading skills is needed for adults with little or no education, especially vulnerable women in rural areas. Due to the high number of school dropouts, the number of poorly educated adults who need training will not decrease anytime soon in rural areas. They need training both in core competences and TVET through more flexible short-term courses. This is elaborated on in the next section.

Recommendations to improve agriculture related TVET provision

Increasing access to TVET. Measures are needed to give vulnerable groups in rural areas access to TVET to overcome their poor socio-economic status, distance to schools, school fees and costs of living. Investment must continue in school dormitories (safe boarding) and student scholarships in both public and private schools. Special campaigns could be launched to promote the enrolment of girls in technical and mechanical fields that are traditionally considered for boys.

Improving implementation of work-based learning. The length, implementation period and format of internships and industrial attachments could be revisited thoroughly, and the standard checklist updated. Closer cooperation and clarification of grey areas between schools and companies are also necessary, while providing grants to students on internships seems imperative.

Improving the functions of production units and community outreach programmes. The functions of production units could be improved further, teaching not only the practical skills of primary production, but also the practical skills of business management functions (marketing, processing, and selling products). Given the current poor links of agriculture with business, it is essential to incorporate business management functions into the system.

Instilling entrepreneurial skills in all programmes. Besides training, students must experience business development and start-up processes at first hand in production units and incubation centres in schools. The implementation and funding of business support services could be improved through public-private partnerships, where companies are directly involved in these programmes as providers or mentors.

Improving school infrastructure for learning and living. Schools need to provide a decent and safe learning and living environment for students, which includes not only laboratories, workshops, training materials, IT rooms and full internet connectivity, but also decent accommodation and eating facilities, toilets, continuous water, and electric supply, etc.

Improving the quality of teachers. The shortage of experienced and qualified teachers means that urgent upskilling from pedagogical to technical areas is required. However, a comprehensive policy package is needed for the long-term sustainability of teachers, focusing on the attractiveness of teaching as a profession, the importance of an initial professional education, continuous professional development of teachers, career progression, etc.

Increasing female share of TVET teachers and headmasters. Women are less represented in TVET education/training and in agriculture extension services. A higher female share of staff could help provide more gender-sensitive services and a better understanding of the challenges faced by girls and women on training programmes and in workplaces.

More systematic career guidance and counselling. Students, parents and adults must have continuous access to fully transparent labour market information on jobs, occupations and sectors in order to make informed decisions on education and job choices (e.g. visits to companies, working conditions, job tasks, wages, hiring criteria/practices). This must start early, from lower secondary education, and continue until the end of university and in employment services for jobseekers.

Direct involvement of business in TVET in promising subsectors. Besides activating a fully functional body, 'SSC Agriculture', for representing the sector at national level, some subsectors could be used as an entry point for direct business involvement in TVET, possibly in the form of a public-private partnership. One such promising sector is food processing (from dairy and meat to horticultural products, including food preparation and services) and food safety. Other sub-sectors with specialised training programmes could be agro-science/agro-technology, the pharma & beauty sector, agro-forestry including the wood value chain, encompassing aspects of digital and green transitions in agriculture as well.

Providing extensive adult training in the informal sector. Subsidised training for vulnerable groups, particularly women farmers and NEETs in rural areas, is highly necessary. It must be a large-scale scheme delivered in their work context; e.g. mobile training units combined with extension services. Training must involve both foundational skills and vocational/technical skills, possibly in the form of short-term courses and certification/validation of informal skills.

Closer collaboration between TVET and agriculture extension services. Agricultural TVET institutions need closer collaboration at all levels with the agriculture extension services, given their mandate and large organisational network in rural areas. This is particularly important in the regions/rural areas and in adult training provision.

1. Introduction

This introductory chapter presents key background information regarding the country's socio-demographic, economic and policy developments linked to the sector. It starts with an analytical framework of the agricultural sector in line with the agricultural value chain approach and clarifies the broader scope of the sector beyond primary production activities (often called agro-business or the agri-food system) adopted in this study.

The next section continues to explain the research methodology used in the study, including the main stakeholders consulted.

The third and fourth sections provide a summary of the socio-demographic trends in Rwanda, followed by the economic developments and trends, with a specific focus on the main economic sectors. The last two sections give an overview of State policies and strategies in the agricultural sector and employment, followed by the main features of agricultural production and agricultural households in Rwanda.

1.1. Analytical framework of the analysis: agricultural value chains

This study adopts the agricultural value chain approach, recognising agriculture as a pivotal factor in the economic advancement of developing nations. Initially characterised by subsistence farming, the sector typically evolves as agricultural productivity escalates, leading farmers to contribute surplus products to the market. This spurs job creation within the on-farm and off-farm economies and drives a surge in market demand for a wider array of products, prompting an increase in processing, packaging, transportation, trading and other complementary non-farm activities. Over time, the trajectory of development shifts as urbanisation and non-agricultural income become predominant, with urban and rural non-farm consumers predominantly driving the demand for agricultural products via value chains linking rural areas to urban centres (Diao et.al., 2023).

The pace and the pattern of this transformation vary across nations, influenced by their unique structures and developmental paths. Global experiences suggest that transformative investments in irrigation, mechanisation, research, training, and inputs, coupled with enhancements in storage, transportation and marketing infrastructure, can reshape agriculture into a larger, more diversified and professional agribusiness/agrifood system. This transformation often results in a decline in the relative importance of primary agriculture, coinciding with a rise in other agribusiness components.

Commonly, the agricultural sector is perceived as encompassing crop and livestock production, aquaculture, fisheries, and forestry, as well as agricultural engineering, machinery production and sales, the provision of farming inputs like fertilisers, animal feed, extension, and financial services. The interconnectedness within value chains means that all phases, including the processing and sale of agricultural products, are increasingly integrated into the agricultural production and value chain continuum. The International Food Policy Research Institute (IFPRI) uses the concept of 'agrifood system' for this complex network comprising various actors engaged in the supply, consumption and governance of agrifood products. This system is characterised by five distinct components: primary agriculture, agro-processing, input supply, trade and transport services, and food services, each playing a crucial role in the overall agrifood ecosystem (Diao et.al., 2023).

As Figure 1 shows, ***Primary agriculture (A)*** is the first component and includes the supply, demand, and trade of all agricultural products (crops, livestock, fishing, and forestry). ***Agro-processing (B)*** is part of the broader manufacturing sector and includes only those manufacturing subsectors associated with processed foods and other agriculture-related non-food products. ***Input supply (E)*** is the portion of intermediate inputs used directly in agricultural and agro-processing production. ***Trade and transport services (C)*** consider only the portion of such services associated with the transport, wholesaling and retailing of agrifood products between farms, firms and final points of sale (domestic

or international markets). Finally, ***Food services (D)*** are services provided in both food production and consumption, plus a portion of the accommodation sector (Diao et.al., 2023).

Figure 1 – Components of an agrifood system

E. INPUT SUPPLY	A. PRIMARY AGRICULTURE	*Consumption of own-produced goods*
	C. TRADE AND TRANSPORT	*Purchase of primary agricultural goods*
	B. AGRO-PROCESSING	*Purchase of processed agrifood goods*
	C. TRADE AND TRANSPORT	*Purchase of ready-made foods outside home*
	D. FOOD SERVICES	
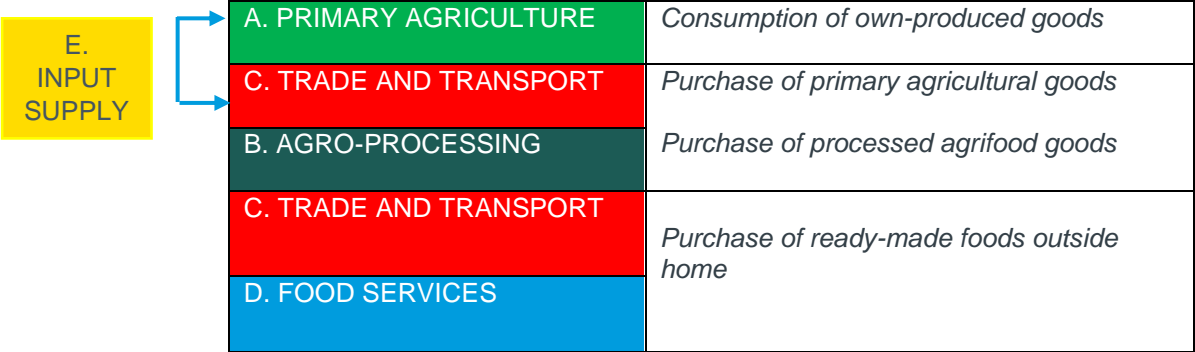
Source: Taken from Diao et.al., 2023.

Despite the foundational role of primary agricultural production in sustaining livelihoods, particularly in subsistence settings, this study deliberately adopts the terms 'agrifood/agrobusiness' to signify a broader, value-chain-oriented perspective. This approach encompasses the entire agricultural value chain, from primary production through to the processing and marketing of food and non-food products, thereby connecting the realms of production, purchasing and selling[2].

The agricultural value chain is a continuum, starting with producers (farmers) at one end and culminating with consumers at the other. In between lies a network of countless individuals, businesses, both small and large, each contributing a step in the chain and adding value through various activities such as growing, buying, selling, aggregating, processing, transporting, storing, inspecting and packaging. Supporting entities like banks, governments, educational and training institutions, as well as agricultural research, extension and business development organisations also plays a crucial role in bolstering the chain, providing financial resources, setting regulatory frameworks, nurturing the workforce with essential skills, and fostering productivity enhancements among farmers[3].

In essence, agrobusiness – defined as the large-scale production, processing, and marketing of food and non-food farm commodities and products – is a cornerstone for a nation's socioeconomic progress. Especially in many developing countries, the transition to commercialised, value-added, and welfare-enhancing agriculture is often achievable only through business involvement. This involvement is instrumental in stimulating, mobilising and organising large-scale primary production, and the processing, marketing and trade of agricultural products. Here, 'business' and 'large-scale' are operative terms, denoting the transformation required for agriculture to evolve into a sector capable of generating decent jobs and employing a skilled workforce. Figure 2 is another attempt to visualise the

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[2] The *agricultural value chain* is the integrated range of goods and services necessary for an agricultural product to move from the producer to the final consumer. The concept has been used particularly by those working in agricultural development in developing countries. It is about linkages between people and businesses who transfer or exchange products, money, knowledge and information.
[3] For example, one common format of the agricultural value chain involves sales to companies from independent farmers. Such arrangements frequently involve contract farming in which the farmer undertakes to supply agreed quantities of a crop or livestock product, based on the quality standards and delivery requirements of the purchaser, often at a price that is established in advance. Companies often also agree to support the farmer through input supply, land preparation, extension advice and transporting produce to their premises.

interaction within the agrobusiness system, based on the international classification of economic activities (ISIC) [4].

Figure 2 – Visualisation of the agricultural sector in interaction with all agrobusiness activities
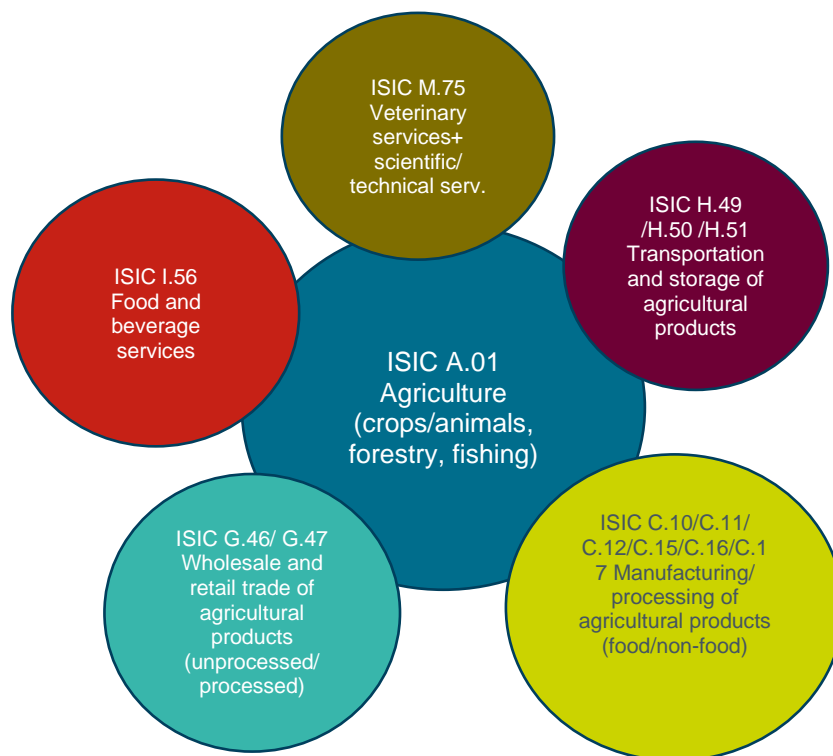
Source: Drawn up by the author based on the international classification of economic activities (ISIC).

However, the agrobusiness/agrifood system is not easily measurable with actual country data and statistics for assessing its performance and evolution. Quite often, economic, and employment-related statistics separate primary agricultural production from industrial manufacturing and wholesale/retail trade of food and non-food products. According to the ISIC system used for recording economic activities in national accounts and labour force statistics, primary agricultural production is classified in Section A 'Agriculture, forestry and fishing', while agro-processing is in Section C 'Manufacturing', trade and marketing in Section G 'Wholesale and retail trade', transport in Section H 'Transportation and storage', and food services in Section I 'Accommodation and food services'. Box 1 below brings together all the relevant ISIC sub-sectors to reflect the broader agrifood/agrobusiness system.

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[4] The International Standard Industrial Classification of all Economic Activities (ISIC) is a standard UN classification of economic activities arranged so that entities can be classified according to the activity they carry out. It has 4 levels (or digits) of classification. Level 1 already includes 21 economic activity groups. The classification is then organised into successively more detailed categories, which are numerically coded: two-digit divisions; three-digit groups; and, at the greatest level of detail, four-digit classes, seriesm_4rev4e.pdf (un.org).

Box 1 – Agriculture and other related sub-sectors (based on ISIC Rev.4)

(A). AGRICULTURE, FORESTRY AND FISHING

01 – Crop and animal production, hunting and related services

011-Growing of non-perennial crops

012-Growing of perennial crops

013-Plant propagation

014-Animal production

015-Mixed farming

016-Support to agriculture/post-harvest crop act.

017-Hunting, trapping, related services

02 – Forestry and logging

021-Silviculture and other forestry activities

022-Logging

023-Gathering of non-wood forest products

024-Support services to forestry

03 – Fishing and aquaculture

031-Fishing

032-Aquaculture

(C). MANUFACTURING

10 – Manufacture of food products

11 – Manufacture of beverages

12 – Manufacture of tobacco products

15 – Manufacture of leather and related products

16 – Manufacture of wood and wood products except furniture

17 – Manufacture of paper and paper products

(G). WHOLESALE AND RETAIL TRADE

462. Wholesale of agricultural raw materials and live animals

463. Wholesale of food, beverages, and tobacco

471. Retail sale in non-specialised stores

472. Retail sale of food, beverages, tobacco in specialised stores

(H). TRANSPORTATION AND STORAGE

49 – Land transport

50 – Water transport

52 – Warehousing and support activities

(I). ACCOMMODATION AND FOOD SERVICE

56 – Food and beverage service activities

(M). PROFESSIONAL, SCIENTIFIC, AND TECHNICAL ACTIVITIES

75 – Veterinary activities

Source: Drawn up by the author based on the international classification of economic activities (ISIC).

Typically, agricultural sector analysis uses economic and employment statistics coming from 'A-Agriculture, forestry and fishing' only (listed on the left of the box), which together contributed to 25% of Rwanda's GDP in 2022. The analysis often excludes the value added to primary products through processing, trade and transport, and food services (sub-groups C, G, H and I, listed on the right of the box). For example, the overall contribution of 'C-Manufacturing' to GDP was 10% in Rwanda in 2022, 60% of which came from food products, beverages and tobacco processing. The main problem in capturing agriculture-related contributions from other sectors is limited data availability broken down by each sub-sector. Hardly any economic or employment-related statistics are available and reliable at 2-digit, 3-digit or 4-digit levels, which means the contribution of each sub-sector linked to the agribusiness/agrifood system cannot be distinguished.

Some attempts have already been made to estimate the economy and employment within an agrifood system (see Diao et.al., 2023). They mainly relied on several data sources such as the population census, national accounts, household budget and labour force surveys that are available in Rwanda, but the number of observations by detailed sub-sector in household surveys is often not enough to get reliable results at national level. This study attempts to conduct a similar analysis of *skills demand and supply in the broader agricultural value chain,* as defined above. A clear definition of the sector with a list of its sub-sectors is vital in identifying and using the right economic and employment statistics and choosing the right analytical tools and relevant stakeholders for consultation. Because every sub-sector or sub-cluster has its own profile of workers, different skill supply and demand dynamics, they are not necessarily the same.

Within this context, the core aim of this study is to understand the main skills and occupational profiles needed (now and in the future) to help transform agriculture into a bigger 'agrobusiness/agrifood'

ETF Working together Learning for life
European Training Foundation

system, and how education institutions (TVET schools, polytechnics and universities) can help meet these skills and occupational needs in Rwanda. The study goes well beyond understanding the simple agricultural/technical skills of how to produce more and better vegetables, avocados, tea, coffee, etc. This makes the study framework rather large, but the objective is to get a glimpse of how different players see the realisation of this goal from a skills perspective and how the 'human capital' of the country can contribute to it through skilling, upskilling and reskilling.

1.2. Research methodology for the agrobusiness/agrifood system

A quick review of the literature on the agricultural sector in Rwanda reveals that there have been many studies, projects and programmes on the development of the sector, often with funding and implementation by donors and international partners. The existing sector studies indicate a wide use of the agricultural value-chain concept: for example, the Agriculture Sector Diagnostics study by the Mastercard Foundation focused on the following stakeholders: producers, traders, markets, processors, service providers, financers, educators and skills developers. Private sector representatives, including the recently pre-launched Agriculture Sector Skills Council (ASSC) in Rwanda, have the following sub-clusters in agriculture: crop production, livestock, agro-inputs/services, agro-processors, agro-business, traders/exporters. There are also studies done on some stand-alone value chains, e.g. coffee, tea, dairy, poultry, cassava, Irish potato and horticulture (MINAGRI 2021).

In line with previous practices, this study also adopted a broader definition of the sector to include all aspects of agricultural value chains. Within the context of discussions held with the EUD to Rwanda during the ETF mission in June 2023, the ETF agreed to use the VET Toolbox methodology in its sector skills analysis – given the fact that Rwanda Development Board (RDB) Skills Office had already received technical support in 2022 from the VET Toolbox for 'Standardising the methodology for sector skills and employment studies'[5]. As the RDB Skills Office needs to apply a standard methodology to all sector studies to support SSCs (finance, tourism, manufacturing, mining, agriculture), it is logical for the ETF to follow the same methodology.

The VET Toolbox methodology for a sector skills and employment study is a rapid assessment of a sector based on desk research, statistical analysis and consultations with relevant stakeholders. Besides desk review and statistical analysis from existing resources, the methodology employs one-to-one interviews with relevant stakeholders and/or an online survey with a representative sample of enterprises in the sector. Therefore, the research methodology must cover all relevant sub-sectors in the analysis as much as possible, from the first steps to the last of agricultural value chains, including crop production, livestock, agro-inputs/services, agro-processors, traders/exporters, etc. In all parts of this report, special attention is given to gender aspects, providing the gender baseline and key indicators in agriculture as identified by the Gender Monitoring Office (GoR, 2011).

Within this context, the research methodology of this study included the following steps in the analysis of '*skills demand and supply in the broader agricultural value chain*':

- ***Extensive desk research:*** A very large body of literature was found and reviewed on the broader agricultural sector in Rwanda, as well as on education, training and labour market developments in the country. As seen under 'References', the study attempted to capture, synthesise and present all the findings from the existing studies available, particularly those on the agriculture sector (CESB, 2017a; CESB, 2017b; Diao et. al. 2023; Dusingizimana et. al., 2022; FAO, 2020; FAO, 2017b; Mastercard, 2021; MIFOTRA, 2022b; MINAGRI, 2021; Neza et. al., 2021; PSF, 2021; Enabel, 2023; USAID/RTI, 2023).

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[5] As part of this technical support, the VET Toolbox team developed a template for the RDB, and a pilot 'labour market skills assessment for the mining sector' was carried out step by step as part of institutional capacity building, while SSC Mining was engaged in the dissemination and use of study results.

- *Statistical analysis of education, training and labour market-related datasets from the NISR:* The study made extensive use of all the education, training and employment statistics available through the NISR's different surveys and administrative statistics, such as: the fifth Rwanda Population and Housing Census in 2022 (RPHC5), Rwanda Agricultural Survey 2020 (RAS), Rwanda Establishment Census 2020 (REC), Comprehensive Food Security and Vulnerability Analysis and Nutrition Survey 2021 (CFSVA), the National Accounts from various years, and the 2017 and 2022 Labour Force Surveys (LFS). For a more nuanced analysis of employment evolution in the broader agricultural sector (and related subsectors), the microdata of the 2017 and 2022 annual labour force surveys was exported and analysed[6]. This was particularly for comparing and identifying change patterns in the several sub-sectors of the broader agricultural sector in terms of workforce characteristics (age, gender, education, occupation), trends in sectoral restructuring of employment, and the positioning of agriculture-related sub-sectors vis-à-vis other economic sectors. A similar statistical analysis was also done regarding the education statistics to highlight the main developments and trends in the country.

- *Qualitative interviews with key players in the sector:* Sometimes called in-depth interviews, these are designed to collect information on skills supply and demand in the broader agriculture value chain. Following the preparation of an interview guide and questionnaires by the ETF, Gisele Ntakirutimana conducted interviews focusing on the skills provision in the agriculture-related trades, while Désiré Mushumba and Brian Kiberu conducted interviews on the potential skills sets demanded in the broader sector enterprises. This interview technique is characterised by the researcher asking respondents usually open-ended questions or raising topics for a 'guided conversation'. Most of the questions were open-ended for respondents to present their view or 'tell their story'. This contrasts with online surveys, where researchers use mostly fixed-response questions. An online survey like that was avoided due to the high non-response rates and superficial nature of responses.

As a result, the sample of interviews was not large or representative of one or few specific value chains in agriculture. On the contrary, it aimed to reach to at least one interviewee representing various sub-sectors of agrobusiness, including primary agricultural producers, to gather their experiences and opinions on the most demanded skills and occupational profiles in each of their areas, and see how skills providers can meet their needs. Special attention was given to women's conditions in all sub-sectors of agrobusiness in Rwanda, even though they are currently present only in primary agricultural production, mostly in subsistence agriculture form.

The sample of interviews was a compromise between the 'minimum necessary' and 'availability of timing and resources' for this exercise. **To understand the skills demand in the sector,** we managed to reach 30 organisations/companies, to cover a diversity of stakeholders. In terms of the sample selection for collecting opinions on and experience in the most demanded skills and occupational profiles in various sub-sectors of agrobusiness, we interviewed one representative organisation from each of the economic activities listed below. This means that many of the selected interviewees were from the private sector, although some important public, PPP and/or NGO-type (expert) organisations active in these fields were included as well, covering different sizes (micro, small, medium, large).

The interviewees were selected from the following business areas:

- Crop production / Livestock production / Forestry and logging / Fishing and aquaculture
- Manufacture of food products / Manufacture of beverages / Manufacture of tobacco products
- Manufacture of leather products / wood products except furniture / paper and paper products
- Wholesale / retail sale of agricultural inputs (fertilisers, seeds, animal feeds, pesticides, etc.)
- Design, packaging and marketing for processed and fresh food products
- Wholesale / retail sale of agricultural raw materials / live animals
- Wholesale / retail sale of food, beverages, and tobacco

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[6] The time span between the two datasets was 5 years, due to the fact that the year 2017 was the earliest year with a comparable LFS dataset, and the year 2022 was the latest year with a comparable annual dataset.

- Warehousing (storage / cold chain) and support activities
- Imports / Exports of unprocessed/processed food products
- Agricultural extension services, including agronomy and veterinary activities
- Farmers in production areas above: individuals, farming cooperatives, and Farmers Union
- Provision of services to agriculture actors: business services, digital services, use of agriculture-related machinery
- Environmental and soil protection, efficient use of water / other resources
- Accreditation and certification services such as HACCP, FSMS, or ISO 22000, etc.

To understand the skills supply in the sector, some of the training institutions and students attending courses in agriculture-related trades were targeted. To understand the skills provision, the process was planned slightly differently; it was decided that five TVET schools, one polytechnic college and one university would be selected for interviews with two of the staff in each (the school manager and the deputy responsible for agriculture-related trades), and for two focus group discussions with students in each school. Thus, the national expert visited and observed the school environment and infrastructure in the seven selected education institutions that provide courses in agriculture-related trades, interviewed the management staff in charge of those courses, and conducted two focus group discussions with students in each school who studied in agriculture-related trades.

The questions in this part focused more on the content and quality of skills provision in agriculture-related trades. The criteria for selecting the seven education institutions were: having long experience in offering training in more than one agriculture-related trade; covering different levels of TVET and different school statuses (public, government-aided, private), including general education that provides agriculture-related courses as a TVET wing; and offering training on both agriculture-related and non-related trades.

The list of all consultations (including bilateral meetings with national institutions and donors, semi-structured interviews with 30 companies, and semi-structured interviews and focus groups in seven education institutions) is provided in **Annex 1,** but the names of the interviewees are not disclosed for confidentiality reasons.

1.3   Key socio-demographic trends in the country

Rwanda is a small landlocked and mountainous country with a total surface area of 26 338 square kilometres, located in the Great Lakes region of East-Central Africa. The country shares borders with Uganda to the north, Burundi to the south, Tanzania to the east and Congo to the west. Known as *'the land of a thousand hills',* Rwanda has a steep landscape, lying at an altitude ranging between 915 and 4 486 metres. Approximately 60% of the total land area is used for agriculture. With a tropical temperate climate, the average annual temperature ranges between 16°C and 20°C, and the average rainfall is 1 156 mm per year. The diversified agro-climatic conditions at high, medium and low altitudes are complemented by fertile soils, abundant water resources and affordable human resources to produce high quality agricultural products.

The country is divided administratively into four provinces (North, South, East, West) and Kigali City; all divided into 30 districts. According to the *fifth Rwanda Population and Housing Census (RPHC5)* conducted by the NISR in 2022*,* the population of Rwanda was 13.2 million, 72% of which resides in rural areas and 28% in urban areas. The majority of urban residents are mainly found in Kigali City, where 13% of the population live. Besides Kigali, 27% of the population lives in the Eastern Province, 23% in the Southern Province, 22% in the Western Province, and 15% in the Northern Province (RPHC5).

Based on the RPHC5, the country's population is very young, with a median age of 19 years and a mean age of 22.7 years. The annual population growth rate was 2.3% between 2012 and 2022, down 2.6% from the previous decade. The average number of children per woman was 3.6 in 2022, with a slow decrease over decades. Out of the total 13.2 million, the working-age population (16-64 years

old) comprised 56% (around 7.4 million) of the total, while only 4.2% of population was above 65+ years old. The share of those under the age of 20 was almost half of the population (49%), while this figure became 65.3% for those under 30 years of age.

During the last three decades Rwanda has recorded significant achievements in human development, poverty reduction, gender equality, environment sustainability, education and public health, in line with the Sustainable Development Goals. Rwanda's human development index (HDI) was 0.534 in 2022, putting the country in the 'low development' category and positioning it at 165 out of 191 countries. Nevertheless, Rwanda's HDI value increased by 87% between 1995 and 2022, reaching 66.1 years of life expectancy at birth, 4.4 years of mean years of schooling and 11.1 years of expected years of schooling. The country was ranked 12th in the Global Gender Gap Index 2023, scoring particularly highly in the dimensions of political empowerment, health and survival (WEF, 2023).

One of the reasons for the improving gender equality was the affirmative action taken by the government, including the adoption of certain laws (AfDB, 2014). The Law on Matrimonial Regimes, Donations, Succession and Liberalities (1999) guaranteed the land rights of legally married women, ensured equal inheritance rights for boys and girls, and required the spouse's consent in any land transfer. The 2003 Constitution earmarked at least 30% of posts in the public sector for women. The Organic Land Law (2005) ensured equality among men and women in land ownership, and its implementation through the land tenure regularisation programme showed increased land ownership among married women (AfDB, 2014). However, these strong central gender policies have yet to be fully translated at local levels and in agricultural practice. Despite the political will of Rwanda's leadership towards gender equality, social behaviours and attitudes towards women remain patriarchal (FAO, 2017).

Young people in Rwanda are defined as those aged 16-30 years. In 2022, this group constituted 27% of the population (almost 3.6 million), two-thirds of which resided in rural areas (2.4 million). This age group is also used by the NISR to calculate youth-related labour market indicators. As many young people graduate in their mid-twenties and enter the labour market before reaching their thirties, here we selected the 15-24 age group of young people to understand where they are and what they are doing. Both Table 1 and Figure 3 below attempt to demonstrate the share of young people according to their specific situation in 2017 and 2022 in a comparative manner.

As illustrated in Table 1, the share of young people aged 15-24 in education and training was around 36% of the total youth population in 2017, with many more boys than girls. This had increased to almost 43% by 2022, mainly due to the increase in schooling among all young people, which is particularly visible with young females. However, almost one-quarter of the young people group was inactive (not in education, nor in employment) in 2017, with almost two-thirds of those being girls. Possibly being linked to increasing schooling among females, the inactivity rate had decreased by 2 percentage points by 2022 and had become similar between boys and girls – although still higher among girls.

Table 1 - Where are young people (aged 15-24) by gender, 2017 and 2022

Young people aged 15-24	Year 2017			Year 2022		
	Total	Male	Female	Total	Male	Female
Youth population in millions	**2 045 058**	991 229	1 053 838	**2 819 577**	1 401 692	1 417 885
% of total young people who are in education and training	**36.1**	39.3	33.2	**42.5**	41.5	43.5
% of total young people who are employed	**30.9**	34.1	27.8	**25.5**	28.5	22.5
% of total young people who are unemployed	**8.8**	8.5	9.0	**9.4**	9.3	9.5
% of total young people who are inactive	**24.2**	18.1	30.0	**22.6**	20.7	24.5
Total	100%	100%	100%	100%	100%	100%

Source: Author's calculation from the annual datasets of Labour Force Surveys 2017 and 2022, NISR.

On the other hand, the share of employed young people in this age group was 31% in 2017, with more men than women (Table 1). This had decreased to 26% by 2022, with a similar decrease among young males and females. Finally, the share of unemployed young people represented almost 9% of the total youth population in 2017, with slightly more women. This had increased to 9.4% by 2022, similar among males and females.

The literacy rate of the population aged 15+ was 79% in 2022, up from 68% in 2012[7]. However, 22% of the population has still never attended school (NISR, RPHC5 2022). More than half the population has a primary education level (54%), 15% has a secondary education, and only 3% reached a university education. The level of educational attendance varies both by sex and area of residence: urban residents have a higher level of education compared to rural residents; 18% of people in urban areas never attended school compared to 24% in Rwanda's rural areas. The proportion of females that never attended school is greater than for males: 23% compared to 21%. Moreover, the proportion of males with a university education is higher than the that of females (3.8% vs 2.8%).

School attendance is mandatory in Rwanda for the 6-17-years age group. However, 81% of children aged 6-17 years were attending school in 2022; 13% were out of school and 6% had never attended school (NISR, RPHC5 2022). School attendance varies according to the children's age, reaching its peak between the age 7-11 age group and being minimal outside this range. The proportion of children attending school varies slightly across the provinces (North highest, East lowest) and is lower in rural areas even for these ages, while majority is already out of school after age 15 years.

Current school attendance among children aged 13-18 years is 65%, and it is more common in urban areas than in rural areas. The net attendance rates for secondary education are less than 50%, meaning that less than half of the Rwandan children who are supposed to attend secondary school do attend that level (NISR, RPHC5 2022). There are minor differences in attendance rates by gender, with significant variations by area of residence (urban higher than rural).

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[7] Overall, 77% of the population are literate in at least one of the four official languages of the country: Kinyarwanda, English, French and Swahili (NISR, RPHC5).

1.4   Economic trends and developments in the sector

Being a low-income economy[8], Rwanda has seen strong and sustainable economic growth during the last three decades. This growth was mainly a result of several transformative factors such as visionary leadership, sustainable development strategies, good economic governance and policy coherence, low corruption, and investment in natural and human resources. The World Bank put Rwanda among the world's fastest growing economies, surpassed in Africa only by Ethiopia (WB and GoR, 2020). The country was ranked 38 among 190 economies for 'ease of doing business', and second in Africa after Mauritius according to the 2020 World Bank annual ratings. Its attractiveness was high in terms of getting credit and registering property, which put it among the top 10 global reformers.

As seen in Table 2, the economic growth rate in 2022 was over 8% and is estimated to be 7.6% in 2023. The only year with negative growth was 2020 due to the Covid pandemic, when the lockdowns and social distancing measures sharply halted many economic activities, while exports and tourism took a strong hit. Despite continuous population growth, the GDP per capita has kept rising, reaching USD 1 004 in 2022 (GDP per capita PPP USD 2792). GDP at 2022 market prices was estimated at USD 13.3 billion. The **services sector** contributed to 47% of this GDP, the **agricultural sector** contributed to 25%, and **industry** to 21%, while 7% was attributed to adjustment for taxes and subsidies on products. Forecasts indicate continually growing GDP in the coming years, thanks to the stable government and good investment conditions.

Table 2 - Evolution of economic indicators in Rwanda

GDP growth	2010	2012	2014	2016	2018	2020	2021	2022
	7.3	8.6	6.2	6.0	8.5	-3.4	10.9	8.2
GDP per capita (USD)	594.1	706.1	724.7	754	797	803	853	1004

Source: NISR, 2023; World Bank, GDP growth (annual %) - Rwanda | Data (worldbank.org), https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?locations=RW

According to the *NISR GDP National Accounts 2022*, the Rwandan economy has continued to expand for more than a decade now and at an accelerated pace, mainly boosted by the services sector with 12% growth in 2022: compared to the previous year, notably hotels & restaurants grew by 87%, transport by 22%, information & communication by 20%, the wholesale and retail trade by 14, financial services by 10%, public administration services by 10% and education services by 17%.

The industrial sector also grew further (5%), largely driven by the 16% growth in manufacturing activities and the 15% growth in mining & quarrying activities, while construction decreased by 6%. The most dynamic sub-sectors in the manufacturing sector are textiles, clothing & leather goods (+21%), chemicals, rubber & plastic products (+14%), food processing (+13%), beverages & tobacco (+9%), and metal products, machinery & equipment (+7%). Meanwhile, growth in agricultural activity slowed (+2%) as drought conditions weighed in on food crops (-1%) but export crops grew by 4%, in particular new emerging crops such as horticulture, livestock, cereals and other export crops.

The economic picture is completed by the analysis of the business structure in Rwanda. According to the latest *Rwanda Establishment Census (REC),* the total number of enterprises increased from 152 200 in 2014 to 186 800 in 2017 (+23%), and then to over 226 400 in 2020 (+21%). Most enterprises were single unit establishments (99.3%). As seen in Table 3, the total number of establishments in 2020 was well above 232 200. Among them, wholesale and retail trade (57%) and accommodation and food services (20%) are the most predominant economic activities in Rwanda, representing together 77% of all establishments. After that comes other establishments for other service activities

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[8] According to the WB classification: https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups.

and manufacturing. The remaining establishments were scattered over the remaining economic activities (NISR, REC 2020).

Table 3: Distribution of establishments (number and %) by economic activity, 2020

Economic activity (ISIC 1-digit level)	Number	Percentage
Wholesale and retail trade; repair of motor vehicles and motorcycles	133 272	57.4
Accommodation and food services	46 107	19.8
Other service activities	19 914	8.6
Manufacturing	16 617	7.2
Education and training	4 186	1.8
Financial and insurance services	2 372	1.0
Professional, scientific and technical activities	1 944	0.8
Human health and social work activities	1 911	0.8
Water supply, sewage, waste management and remediation activity	1 319	0.6
Administrative and support service activities	1 203	0.5
Information and communication	1 147	0.5
Transportation and storage activities	676	0.3
Arts, entertainment and recreation activities	415	0.2
Agriculture, forestry and fishing	405	0.2
Mining and quarrying activities	284	0.1
Construction activities	170	0.1
Real estate activities	143	0.1
Public administration, defence, compulsory social security	127	0.1
Electricity, gas, steam and air conditioning supply	70	0
TOTAL IN ALL SECTORS	**232 283**	**100**

Source: NISR, Rwanda Establishment Census (REC) 2020.

While the number of establishments in the 'manufacturing' sector (which includes agro-processing) was 16.6 thousand (representing 7.2%), the corresponding number for the 'agriculture, forestry and fishing' sector was extremely low: only 405 establishments, accounting for 0.2% of the total. This is despite the fact that agriculture is the major employer and source of livelihood for the population, and that it has a subsistence nature and low wages, for which the government set the target of creating 200 000 off-farm jobs annually. In terms of regional/district breakdown, the three districts of Kigali City have the highest concentration of establishments: almost 9% for each of Nyarugenge and Gasabo and more than 6% for Kicukiro. Besides the one-quarter of all establishments registered in Kigali City, Rubavu (5%), Musanze (5%), Bugesera (4%), Nyagatare (4%), Rwamagana (4%), Gicumbi, Muhanga and Rusizi (each around 3%) have the highest number of establishments.

The overwhelming majority of enterprises belonged to the private sector (95.6%), while the rest include cooperatives (1.4%), public sector enterprises (1%), public private partnerships (0.9%) and NGOs (1.1%). In terms of legal status, over 91% of establishments were sole proprietorships. Most enterprises in Rwanda were micro-size, with 1-3 workers (92.6%), while small enterprises accounted for only 6.3%[9]. The total number of workers in all establishments was over 706 000, 61% of which were male (NISR, REC 2020).

Another important feature was the very high informality, based on the loose criteria of maintaining operational accounts and registering income. Overall, 92.6% of business-oriented enterprises were in the informal sector in 2020. Formal enterprises amounted to 7.4% of all eligible enterprises operating in Rwanda. While public and public private partnership (PPP) enterprises were classified as formal, informal enterprises were predominant among the private sector (93.3%) and among cooperatives (52.4%).

Rwanda's top five export destinations were the United Arab Emirates, India, the Democratic Republic of Congo, China and the UK in 2022. On the other side, China, Tanzania, India, Kenya and the United Arab Emirates were the top five countries of origin of imports to Rwanda (NISR, 2022). Agriculture is an important part of Rwanda's exports, making up 37% of the total value in the 2021-2022 tax year (MINAGRI). It is an exporter of primary and processed agricultural products. When a breakdown was made between primary agriculture and processing agriculture exports in 2019, only 14% of the total Rwandan agricultural exports were processed and 86% belonged to primary agriculture. Among the total agricultural imports, the picture was reversed: only 13% belonged to primary agriculture, while 87% were processed goods (IFPRI, 2022). So, Rwanda is a net exporter of primary agriculture and a net importer of processing agriculture.

1.5 State policies and strategies on agricultural development and employment

Rwanda has developed its long-term development vision, *Vision 2050,* for the transformation of the entire economy and society through the guidance of the state and private sector-led growth. Under Vision 2050, it planned to make long-term investments in future endowments to become a middle-income country by 2035 and a high-income country by 2050: enhanced human capabilities, strong innovation and technological capacity capabilities, socio-economic inclusion and governance. It plans to achieve this through a series of 7-year *National Strategies for Transformation (NST1*, GoR 2018), reinforced by sector strategies together with the UN's Sustainable Development Goals (SDGs). NST1 provides the foundation for and vehicle towards Vision 2050.

The Rwanda Development Board (RDB) is the public institution mandated to accelerate Rwanda's economic development by enabling private-sector growth. Under the Office of the President, the RDB is governed by the Board of Directors made up of global entrepreneurs and experts. Established in 2008 out of a merger of many institutions, it was created as one-stop-shop for business and investments. The RDB's services are: one-stop-centre services, investment promotion, investment deals negotiation, export & SEZ development, tourism and conservation, and private sector skills development. The RDB has five specialised offices: the Chief Business Strategy/Compliance Office, Chief Tourism Office, Chief Investment Office, Chief Skills Office[10] and Chief Financial Office.

Being the backbone of the Rwandan economy, agricultural transformation is considered one of the central drivers of economic growth in Rwanda, mainly by attracting more private investments in agriculture to unlock the sector's potential (RDB, 2019a). Recognising regional economic integration

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[9] For enterprise size, the following four categories were used based on the number of workers: micro (1-3 workers), small (4-30 workers), medium (31-100 workers) and large (100 plus workers). There were only 402 enterprises which employed over 100 workers in Rwanda in 2020.
[10] The Chief Skills Office (CSO) was recently moved from RDB to the Ministry of Public Service and Labour (MIFOTRA). Its mandate is to align skills development with labour market demands, effective oversight and coordination in the skills development and employment promotion ecosystem.

as a significant economic driver, Rwanda became a member of the *East African Community (EAC)* in 2009, with the purpose of increasing its market share of both agricultural and manufactured products on the EAC market. It subscribed to the EAC's Vision 2050 which aims to enhance agricultural productivity for food security and a transformed rural economy under its pillar on agriculture, food security and rural development. It is also party to *the Comprehensive African Agriculture Development Programme (CAADP)* as reinforced in the **2014 Malabo Declaration** to improve food security, private sector involvement and public-private partnerships.

The focus on higher productivity is also balanced by social aims such as food security and nutrition. Despite the growth in agricultural production, food security and nutrition remain concerns, especially when looking at households' vulnerability to shocks. Strong demographic and natural forces undermine the national objectives of improved livelihoods and food security. Rapid population growth brings with it a constant need to increase food production, while leading to land fragmentation in every generation. While the pressure on the already scarce land resources is mounting, the adverse effects of climate change and soil erosion are deteriorating the quality of agricultural land.

To transform agriculture, the government developed several strategic documents. The **National Agricultural Policy (NAP) 2018** aims to ensure food and nutrition security, and modern agribusiness technologies professionalising farmers in terms of production, commercialisation of the outputs and the creation of a competitive agricultural sector. The policy objectives are formulated according to the Malabo Declaration, and include increasing wealth, bringing economic opportunities, food security and nutrition, and resilience and sustainability. The NAP is implemented primarily through projects formulated under the **Fourth Strategic Plan for Agriculture (PSTA4) 2018-2024**[11]. PSTA4 guides public investments in agriculture and sets out the estimated resources required for the agricultural sector from 2018 to 2024. As value chain development plays a central role in transforming the sector, it is necessary to bring together the private sector for more market-oriented production systems, research and innovation (e.g. new crop varieties, disease mitigation), and farmers' knowledge and skills to support specialisation, intensification, diversification and value addition.

PSTA4 was articulated around four priority areas: Innovation and Extension; Productivity and Resilience; Inclusive Markets and Value Addition; and Enabling Environment and Responsive Institutions. Several actions were included to increase irrigated areas, improve agronomic knowledge and technology (especially improved varieties and breeds), bring in biological soil control measures, increase fertiliser usage, enhance access to veterinary services and vaccinations, and improve markets and linkages between production and processing[12]. In practice, this means strengthening key input markets such as fertilisers, insurance and finance, as well as upstream activities such as aggregation, promotion of value addition, market infrastructure and export readiness, increasing (cold) storage facilities and collection centres and access to standards and the sanitary and phytosanitary (SPS) certification.[13]

Together with the Ministry of Agriculture (MINAGRI), the Rwanda Agriculture and Animal Resources Board (RAB) and the National Export Development Board (NAEB) are key public actors responsible for the implementation of these plans. In 2019, NAEB also developed the **NAEB Strategic Plan 2019-2024 for increasing agro-exports**. It aims to increase international exports by horticultural high-value fresh products (French beans, snow peas, passion fruits, chilies and cut flowers) mainly going to the European market, followed by the Middle East, USA and the rest of Africa. It also encourages the increase of export volumes of tea, coffee and pyrethrum with more diversification and specialty. Beyond traditional and emerging export crops, support is also given to some new products (essential

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[11] The Fourth Strategic Plan for Agriculture (PSTA4) was the continuation of the first, second and third Strategic Plans for Agriculture (commonly abbreviated as PSTA1, PSTA2, and PSTA3), and builds on their results.

[12] There were also several social assistance programmes, such as the extension of the Girinka programme (One Cow per Poor Family) which would continue and include small-stock animals of chickens and pigs.

[13] The World Trade Organization (WTO) established the Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement) in 1995. The Agreement aims to protect human, animal and plant life and health, while simultaneously tackling unnecessary barriers to trade. SPS measures are applied to both domestically produced and imported goods to protect human and animal health (sanitary measures) and plant health (phytosanitary measures).

oils, stevia and sericulture). The main support activities include branding, market linkage, global operator attraction, business incubation, quality production and productivity management, logistics and infrastructure coordination, as well as financing, policy and regulation, and strategic analytics as cross-cutting areas.

It is worth mentioning here the '*Twigire Muhinzi Extension System'*, a homegrown decentralised farmer-oriented national system managed by MINAGRI and the RAB for delivering agricultural extension and advisory services. Twigire Muhinzi (which means 'self-reliance in farming') is considered one of the promising agricultural human capital investment initiatives (Neza et.al. 2021), based on two complementary types of farmer-to-farmer extension approaches: *Farmer Promotors (FP)* and *Farmer Field Schools (FFS).* FFS is a form of non-formal education with experimental plots and a trained 'farmer facilitator', while FP works with groups of 15-20 farmers (Twigire groups) and has a demonstration plot and a farmer promoter.[14] Nevertheless, the *Gender and Youth Mainstreaming Strategy* mentions the limited access of women to extension support services leading to gender inequality (MINAGRI, 2019).

Several systems have been put in place for the digitalisation of the agricultural sector as per *the ICT strategy* (MINAGRI, 2016). Satellite Crop Monitoring is one example, providing an assessment of crop growth status (and early warnings) in the country through satellite images. The *SMART Nkunganire System (SNS)* was developed in 2017 as an application that enables farmers to register and access subsidised agriculture inputs. It is accessible both offline and online. Over 1.1 million farmers and 1 502 agro-dealers are registered and use the platform (MINAGRI, 2022). The *National Agricultural Insurance Scheme (NAIS)* was launched in 2019 to enable farmers to access financial services and ensure the flow of credit to the agricultural sector by de-risking agriculture activities through insurance. The SMART Kungahara System was developed in 2019 to digitalise the cash crop sector in Rwanda. So far, more than 340 000 farmers and 313 coffee washing stations are registered. Finally, *E-Soko* was launched in 2009, an agricultural market price information system providing citizens with the latest commodity prices at major markets in Rwanda.

Rwanda has also developed its *National Skills Development and Employment Promotion Strategy (NSDEPS) 2019-2024,* which was drafted by the RDB Chief Skills Office (CSO) in collaboration with key stakeholders (RDB, 2019b). The strategy aims to provide skills for employment, match skills supply and demand and promote employment through targeted interventions. It was built on three pillars, covering *skills development* (through TVET and university education and work experience), *employment promotion* (through support to micro and SMEs) and *matching* (through LMIS, job portal, employment services). The CSO manages actions to respond to private and public sector skill needs through the *Capacity Building Fund (CBF)*, coordinates the implementation of employment support programmes such as skills development, business development and access to finance interventions, and organises coordination forums, mainly through the *Skills Development Fund (SDF)*[15]. It mobilises companies to partner in the professional internship programmes, for which over 3 500 fresh graduates apply online every year and around 1 500 interns are placed.

The CSO also conducts employment and sector studies and manages the Labour Market Information System and the Kora Job Portal (RDB 2022, RDB 2023). It launched a *LMIS portal* in July 2023 (https://lmis.rdb.rw/). It has established and strengthened employment service centres in Kigali, Musanze and Huye, and promoted outreach programmes to help job matching (e.g. mobile buses, Job

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[14] In 2008, the government first introduced the FFS approach as a separate project to promote integrated pest management. In 2014, it adopted Twigire Muhinzi as a decentralised farmer-to-farmer extension system and integrated FFS inside the system. In 2016, it also integrated the FP approach in the system with the target of reaching all farmers in Rwanda. As of 2021, there are 14 200 farmer promoters and 2 500 FFS facilitators who train farmers groups (FG) through demonstration plots, field days and village meetings. Through Twigire Muhinzi, 59 453 farmer groups, composed of 1 013 782 farmers countrywide, have been established, with two-thirds of Rwandan farmers accessing extension and advisory services through Twigire Muhinzi (Neza et.al.2021).
[15] This includes short-term training of up to 6-months – Rapid Response Training (RRT), Massive Vocational Training (MVT), out-of-school youth, recognition of prior learning, informal sector training, internships and apprenticeships. RRT is both for public and private sector projects (up to 6 months of training), while MVT is up to 3 months for young people and women in districts for selected trades and courses.

Portal-KORA). **Employment Service Centres** connect jobseekers with employment opportunities, provide career guidance and counselling, offer training and skills development programmes, and assist with job search strategies. The **Kora job portal** (Kora - Job Portal) is a matching platform for linking jobseekers with potential employers. The portal includes job vacancies, internships and training programmes, as well as the client management tool of the employment services. Besides the RDB, the Ministry of Public Service and Labour (MIFOTRA) is another public institution that supports the employment ecosystem by coordinating workplace learning and work readiness support.

In line with five priority sectors selected by the government (agriculture, ICT, mining, construction, hospitality), the RDB is working to revamp **Sector Skills Councils (SSC)** in five sectors: finance, tourism, manufacturing, mining, and agriculture. **SSC Agriculture** was only recently pre-launched for the first consultation with the support of RTT (USAID) and the World Bank, and its members come from academia, the private sector and government institutions dealing with agriculture. A discussion was held to create **five sub-sector clusters in agriculture** (Crop farming, Livestock farming, Inputs farming, Trades farming, and Food processing). Agro-processing is one of the sectors identified for attracting foreign investors (RDB, 2019a).

1.6   Main features of agricultural production and agricultural households[16]

As the main land mass of Rwanda is hilly terrain (85%), most of the agricultural land is located on slopes. There are two agricultural seasons: season A (September to February) and season B (March to July). A few crops, mainly planted in the marshlands (e.g. vegetables), may have season C (July to September). Despite the existing water resources, Rwandan agriculture is characterised by small production units and is almost exclusively rainfed, with only 9.2% of households using some form of irrigation and/or greenhouses. Around 71% of the cultivated area is a mixed cropping system.

The main food crops planted are maize, bean, sweet potato, cassava, banana, sorghum and potato, of which the first five are present in 90% of farmlands and constitute the common basis for all the regions of Rwanda. Some crops, such as bananas, potatoes, different varieties of wheat, sorghum and beans, are subject to a very large-scale trading[17]. The country has four key categories of horticultural products: vegetables, fruits, nuts and flowers. Coffee, tea and pyrethrum are the main cash crops which are exported to international markets, but new high potential export crops have emerged, including horticultural products, livestock, cereals and other crops (essential oils, stevia, fish, etc.).

According to the results of the *Rwanda Population and Housing Census in 2022 (RPHC5),* there were around 2.3 million agricultural households (70%) out of 3.3 million total households in the country[18]. Agricultural households were more common in rural areas (83%) than urban areas (34%). The Northern and Southern Provinces had the highest share of agricultural households (more than 80%). Three households out of 10 (29%) are headed by women (more common in rural areas, with 65% of female heads as widows) (NISR, RPHC5 2022). Two-thirds of private households were engaged in

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[16] This section aims to portray the main features of agricultural production and the characteristics of agricultural households in Rwanda. To do so, it uses information and data coming from different surveys implemented by the NISR, such as the fifth Rwanda Population and Housing Census in 2022 (RPHC5), the Rwanda Agricultural Survey 2020 (RAS) and the Comprehensive Food Security and Vulnerability Analysis and Nutrition Survey 2021 (CFSVA). Employment in the agricultural sector will be analysed later in Chapter 3, mainly using the Labour Force Surveys (LFS) from different years. Due to the differences in the methodologies and definitions of these surveys mentioned above, there might be some differences in the statistics, which come from different resources. The numbers must therefore be taken as indication of trends rather than absolute truths.

[17] According to the Comprehensive Food Security and Vulnerability Analysis and Nutrition Survey 2021, 81% of households cultivated beans, 58% maize, 31% white-fleshed sweet potato, and 22% Irish potato or other tubers as one of their main crops in 2021 (NISR, CFSVA 2021).

[18] Agricultural households refer to households that have at least one person engaged in agricultural activities; that is, either in crop or animal husbandry (NISR, RPHC5, 2022).

crop farming, while half of them were in livestock rearing (husbandry). Only a small proportion of Rwandan private households (about 0.5%) engage in beekeeping.

Figure 3 below is a good illustration of the continuous evolution (and decrease) of agricultural engagement in Rwandan society, based on population censuses since 1978. The population census counted both market and non-market agricultural occupations carried out by any member of the household aged 16 years or above during the 7 days preceding the survey. The results show a consistent decrease of agricultural occupations between 1978 and 2022 and a continuous increase in the share of non-agricultural occupations in the same period. The agricultural decrease was at a slower pace between 2012 and 2022 (5 percentage points) compared to the decrease between 2002 and 2012 (15 percentage points).

Figure 3: Evolution of agricultural and non-agricultural occupations, 16+ population
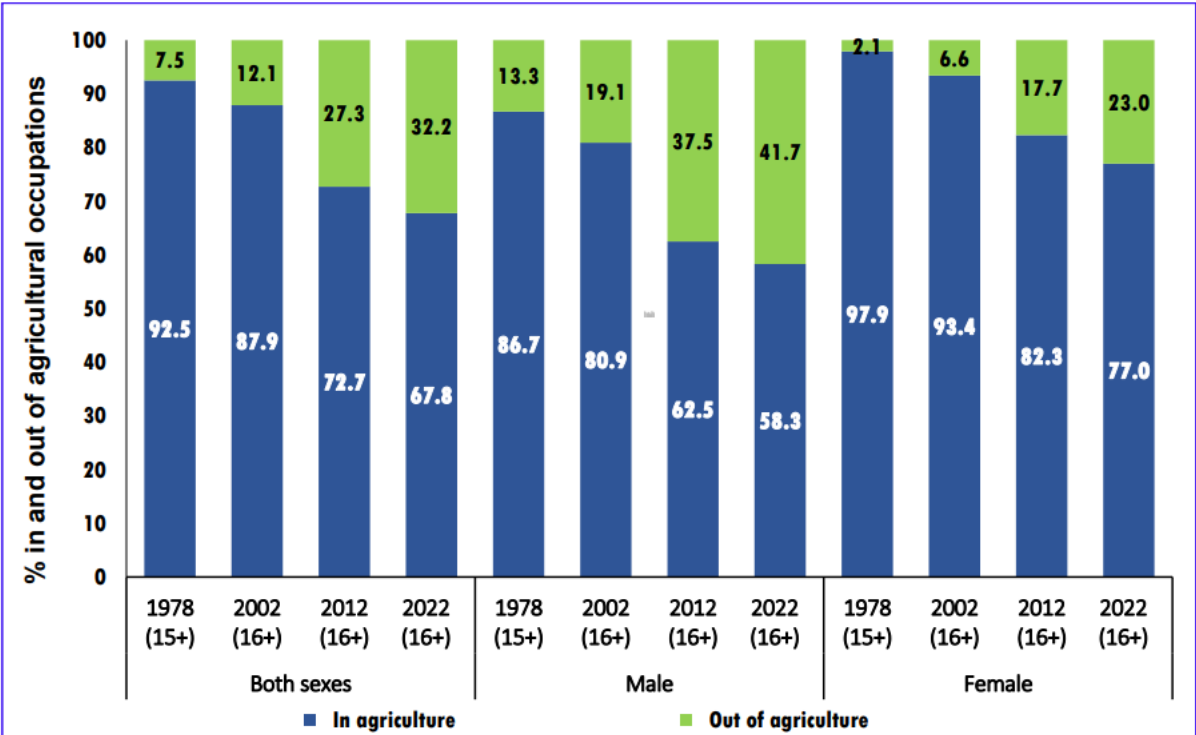
Source: 1978, 2002, 2012, 2022, Rwanda population and Housing Census (NISR)

The results in Figure 3 also show the higher share of agricultural occupations among women than men (77% against 58% in 2022). On the other hand, males had a higher share of non-agricultural occupations than females (almost 42% against 23% in 2022). This again confirms that women have more limitations in accessing non-agricultural occupations compared to men. It is also important to point out, from the findings of other surveys, that those working in subsistence agriculture were virtually all living in rural areas and generally older (median age almost 40 years old) and the majority of them were women (NISR, RPHC5, 2022). Moreover, male-headed agricultural households are more likely to be market-oriented rather than subsistence-oriented than female-headed households (approximately 60% versus 51%) (DfID, 2020).

Five areas of inequality were identified for women and young people in the *Gender and Youth Mainstreaming Strategy* (MINAGRI, 2019): low level of financial inclusion, low participation in lucrative parts of agro-value chains, limited access to extension support, weak institutions with no gender-sensitivity, limited control over resources and decision-making. Specific actions are planned to be implemented by MINAGRI between 2019 and 2025 to provide better access for women and young people to financial services, markets and value chain representation, extension support, institutional mainstreaming, and empowerment and decision-making (MINAGRI, 2019). Reducing gender inequalities in livelihoods, access to resources and resilience in agrifood systems is a critical pathway

towards gender equality and women's empowerment and towards more just and sustainable agrifood systems (FAO, 2023).

Based on the *NISR Agricultural Survey 2020*, almost 88% of agricultural households own a small plot of cultivation land, although renting land is not rare. On average, 77% of agricultural households operate on a farm less than 0.5 hectares in size, almost 14% on a farm ranging from 0.5 to 1 hectare in size, 9% on a farm ranging from 1 to 5 hectares in size, while only 0.4% operate on a farm with a size equivalent to 5 hectares and above (NISR, RAS 2020). About 63% of households reported cultivating a vegetable garden. Moreover, less than 15% of agricultural households practiced irrigation, while mechanical equipment was used only by 0.1% of agricultural households. Thus, the most common challenges faced during agricultural production include lack of access to seeds and fertilisers, limited irrigation and machines, and problem of pests.

The results of the CFSVA[19] showed that only 37% of farmers used fertilisers and 13% pesticides in 2021. Fertilisers and pesticides were mainly purchased by farmers (43% and 74%) or with a government subsidy (43% and 22%). Regarding land use, 13% of farmers practiced share cropping and 14% land consolidation. Irrigation was applied by 7% and soil conservation by 61% of farmers. The soil conservation mentioned here includes terraces, agroforestry and other soil and water conservation practices (NISR, CFSVA 2021).

The same CFSVA survey also revealed that 76% of households (ranging from 68% in the East to 95% in Kigali) had access to drinking water. In the Eastern Province, a high number of households (26%) still reported that they fetched drinking water from the lake, pond or river. Most household members walk to get their water, which takes on average 20 minutes – for some in the East it takes more than an hour. Access to electricity also seemed to be a problem for 39% of private households. Urban areas had more access to electricity (85%) than rural households (51%). Male-headed households were 10% higher in terms of access to electricity compared to female-headed households (64% vs 54%).

The agricultural survey also confirmed that most farmers were older, less educated, and lived in rural areas (NISR, RAS 2020). In terms of age groups, 64% of them belonged to the 31-64 age group, 26.6% were in the 16-30 age group, while 9.4% were 65+ years old. Overall, 65% of farmers have finished primary school, followed by 20% with no education, 14% with a secondary-school level of education and 1.6% with a university level of education (ibid). Consequently, access to finance is very limited in the agricultural sector: only 7% of total formal loans from financial institutions went to agriculture.

Data from the NISR, CFSVA 2021 revealed that most Rwandans prefer to use informal credit sources to borrow money, such as the tontine/cooperative system (54%), followed by banks (15%) or micro-finance institutions (14%). Poorer households more often rely on informal sources of credit. Furthermore, across all sources of credit, rural men have better access than rural women, according to a study of women's empowerment in agriculture (DfID, 2020). Rural women in female-only households have even less access than respondents in dual households, particularly from group-based microfinance, informal credit/savings groups and banks (ibid).

Another aspect is access to agricultural extension services, which was included in the agricultural survey 2020. Accordingly, around 65% of agricultural households received extension services, mainly for good agriculture practices and erosion control measures, while a small share (10-15%) gained skills on horticulture and pest management, how to use the Smart Nkunganire System[20], or weather and climate information. Regarding community membership, almost 13% of households belonged to agricultural cooperatives, 21% of agricultural households had at least one member belonging to

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[19] CFSVA is the Comprehensive Food Security and Vulnerability Analysis and Nutrition Survey, which was conducted last in 2021 by NISR.
[20] The Smart Nkunganire System is a supply chain management system that has digitalised Rwanda's agri-input subsidy programme, developed through a public-private partnership between BK Techouse and RAB.

Twigire Muhinzi groups[21], whereas less than 12% of agricultural households had at least one member belong to Farmer Field School (FFS).

On the other hand, the study of women's empowerment in agriculture found that 52% of men and 39% of women benefit from government extension services (DfID, 2020). Men are more likely than women to receive extension services from nearly every source, including from government, cooperatives, farmers' associations, neighbours, publications, and radio and TV. Cooperatives and NGOs have limited outreach and are unable make up for the government extension services' gap in coverage. However, radio and TV are progressively becoming popular means of learning, with 36% of rural men and 23% of rural women receiving agricultural advice (DfID, 2020). Only approximately half of farmers who face problems receive government extension services, with more men (56%) than women (42%) receiving the extension support, suggesting that government extension services are not sufficiently reaching women facing production problems (DfID, 2020).

Although women and men often share decisions about food crop production activities, more men in dual households make decisions about cash crop farming (DfID, 2020). Rural women are less likely than rural men to own poultry (chickens, ducks, turkeys), non-farm business equipment, small consumer durables, mobile phones and means of transportation. Gender inequality in decision-making powers over these income-generating activities and inequality in control over income may lead to unequal power relations within households. Women in female-only households have more say over decision-making and control over income in crop farming and rearing livestock than women in dual households, though the difference is small (DfID, 2020).

The CFSVA 2021 survey also enquired the involvement of households in agriculture as their second or third activity. It found that almost 90% of households were involved in farming and 83% raised livestock when including any agricultural activity as their first, second or third job. The situation was the same throughout the provinces except for in Kigali City. Based on the nature of their activities, the survey report classified 60% of these households as agriculturalists, 25% as daily labourers (agricultural or unskilled) and 15% as traders, salaried workers, skilled or artisanal workers (Figure 4).

Figure 4: Percentage of households involved in three main income-generating activities
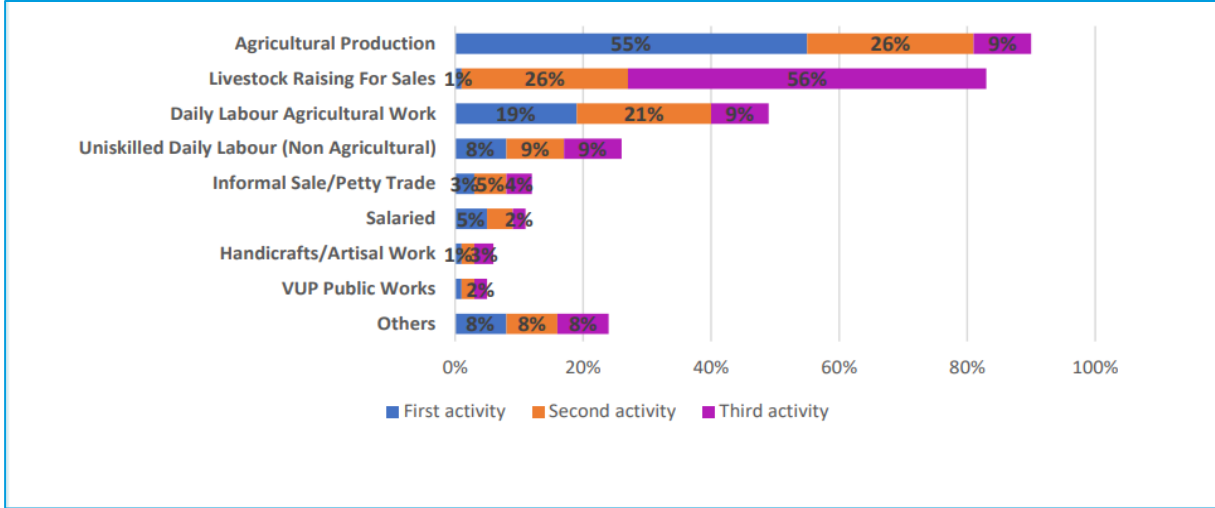
Source: NISR, CFSVA 2022.

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[21] The Twigire Muhinzi National Extension System is a homegrown, decentralised and farmer-oriented national system based on two complementary types of farmer-to-farmer extension approaches: farmer promotors and farmer field schools.

2. MAIN DRIVERS OF CHANGE IN THE RWANDAN AGRICULTURAL SECTOR

Global trends including climate change, technological change, digitalisation, renewed globalisation, demographic shifts, or migration are all affecting the world of work by displacing, replacing and reshaping existing jobs. They inevitably affect economic sectors, jobs and skills in all countries, as countries need people equipped with new skills, able to adapt and work in both domestic and international labour markets. Rwanda is no exception to these trends that create opportunities and risks for individuals and communities. To manage the transition towards the future, countries need the capacity to make a realistic analysis of where they stand and where they want to go. Analysing the main drivers of change in countries can help them decide and implement the right actions to mitigate challenges and grasp opportunities. There is no one future but different futures, a saying that is often said, depending on how countries react to changes.

This chapter discusses the main drivers of change in the Rwandan agricultural sector, for which several strategic sector plans were developed and implemented by the Government. These drivers of change were extracted from several policy and strategy documents, expert studies, analysis of patents in agriculture, reports by international development partners, action plans and statistics. They are classified/presented under six sections, namely: population growth, poverty and food security; climate change and environmental sustainability; technological advances and digitalisation; international trade and high competition for exports; the need for high quality and upgraded products along the global value chains; and consumer demands for healthy and organic food. Together they create a strong influence on business operations, workers and farmers in the sector, changing the nature of jobs and the skills required to succeed in the new economic environment.

2.1 Population growth, poverty and food insecurity

One of the main development challenges Rwanda faces is population growth and population density. Although population growth rate has decreased (2002-2012) from 2.6% annual growth to 2.3% (between 2012-2022), Rwanda's population is still set to grow in the coming years. Based on medium-range estimates, Rwanda's population will reach 14.1 million by 2025, 15.7 million by 2030, 19.4 million by 2040, and 23 million by 2050 (NISR, RPHC5). Moreover, the current high density of the Rwandan population will continue to increase, rising from 501 inhabitants per square kilometre in 2022 to about 868 in 2050. By 2030, almost 40% of the population will reside in urban areas, further increasing to 66.4% by 2050.

The good news is that demand for agro-food products is expected to increase significantly in the coming decades due to the increase both in the population and in per-capita incomes. As in other developing countries, rising incomes are also likely to alter diets (OECD, 2023). Urbanisation, in turn, would increase demand for processed and prepared convenience foods, as well as for foods served through restaurants and catering. Such trends are also changing food purchasing habits, through the growing role of supermarkets. Yet, under the effect of multiple factors linked to land fragmentation in agriculture and crises affecting international trade flows, a growing number of individuals in the country may actually face food insecurity.

Population growth accelerates land fragmentation in rural areas, as there will be an additional 1.3 million new households by 2032. For many of these, agriculture will remain the primary source of income. While agriculture's share of total employment will continue to fall with the ongoing structural transformation, the projected labour entrants each year to the sector are projected to be 80 000 people. This will aggravate the issues smallholder farmers are already facing today. The small size of the plots, low use of irrigation and agricultural machines, and low inputs of fertilisers and pesticides are the main agricultural constraints that prevent them from reaching a sufficient agricultural production.

The country still has a high poverty level: in 2016, 38% of the population was living below the national poverty line (4.6 million people), although that was a decrease from 45% in 2011. The International Poverty Line provided by the World Bank gave 52% (6.2 million) poor for the same year, with almost one-fifth of the population being food insecure[22]. This was despite the rapid economic growth experienced in the last decade, which was broad-based, positively affecting most sectors of the economy and all regions. Poverty is essentially a rural phenomenon, exceeding over 40% in such areas as opposed to rates as low as 15% in urban areas. Kigali has a much lower rate than the other provinces, at under 20%. Poor individuals are over-represented among female-headed households, households whose head was aged 40+, and households with 6 members or more. In terms of occupation, households whose head worked as a farm labourer exhibited the highest likelihood of staying in poverty.

Based on the *Comprehensive Food Security and Vulnerability Analysis and Nutrition Survey 2021,* 21% of the population in Rwanda was food insecure (NISR, CFSVA 2021). Agricultural daily labourers are typically the more food insecure (40%) followed by low-income agriculturalists (22%) and unskilled daily labourers (22%). The Western Province of Rwanda has the highest prevalence of food insecure households (35%), followed by the South, North and East (15%). Food-insecure households are more often headed by a woman, or by a single or less educated person. Levels of stunting among young children remained very high, although they have decreased from 35% in 2018 to 32% in 2021. Food insecurity and malnutrition are mainly caused by limited consumption of nutritionally diverse foods.

Economic vulnerability plays a major role in food insecurity as 30% of households were spending more than 65% of their total expenditure on food. According to the 2021 CFSVA findings, 44% of households reported having experienced a shock or unusual situation during the last 12 months that affected their ability to provide food for household members or eat in their usual manner. Land ownership and land size contribute to the reduction of food insecurity, while owning a cow reduces the proportion of being food insecure. The improvement and diversification of food production, among others, is a key policy action to address the problem.

2.2   Technological advances and digitalisation

Technological developments and digitalisation affect all parts of life as well as the economy, and agriculture is no exception. The introduction of new technologies has already made inroads in the economy, which is calling for a rapid transformation of the agricultural sector to higher-value commercial farming to the benefit of farmers. A trend that is facilitating this transition is the emergence of new farming technologies on the African continent, including mobile money transactions, increased smartphone uptake, hydroponics, vertical farming, remote sensing, social media, and many others. More widespread use of scale-neutral digital technologies such as ICT allows firms in emerging economies to access wider markets by cutting entry costs, giving access to finance and reducing the impact of distance.

New technologies can improve competitiveness and productivity at all stages of the value chain (e.g. yield, durability, system irrigation, fertilisation processes and soil conservation). An overview of agriculture-related patents indicates several innovations in irrigation systems, water treatment technology, energy harvesting systems, biochemistry, bioinformatics, genetics, microbiology, pesticides and fertilisers, solar technology, nanotechnology, harvesting robots and agribots, drones and control systems, sensors and detectors (e.g. in-soil and in-tree sensors, biosensors, remote sensors), image capturing devices and image analysis, data acquisition and analysis, wireless technologies. Similar innovations in agricultural machinery and equipment (e.g. tractors, rollers, shredders, belts and mowers), greenhouse technology (e.g. heat delivery, energy efficiency), and biomass production (i.e. the use of agricultural products or waste to produce fuels) are likely to bring several changes in the agri-food sector (ETF 2020, ETF 2021). These trends indicate the development

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[22] World Bank, Global_POVEQ_RWA.pdf (worldbank.org). Inequality in Rwanda measured by the Gini index is the second highest among low-income countries at 43.7 in 2016-2017.

of multiple new technologies, alongside with more conventional technologies (e.g. tractors and irrigation systems).

By using digital techniques to monitor and optimise agricultural production processes, a new 'smart' farming system has been developing in agriculture, sometimes called '***precision agriculture***'[23]. Precision agriculture has two key features: (i) using digital techniques for modern farming (e.g. satellite navigation and positioning systems; automated steering systems; geo-mapping, sensors and remote sensing; and agricultural robots), and (ii) environmental sustainability of farming (e.g. less and smarter use of herbicides, pesticides, fertilisers; reducing erosion risks; and increasing animal welfare). For example, rather than applying the same amount of fertilisers over an entire agricultural field, or feeding a large animal population with equal amounts of feed, precision agriculture would measure variations in conditions within a field and adapt its fertilising or harvesting strategy accordingly. There are several climate-smart technologies which are about to change the ways of traditional agriculture[24].

Further along the chain, technology offers considerable possibilities to improve quality enhancement of production (for example with solar dryers for fruits, pasteurisation machines for milk, or selection of input seeds for cereals) and to enhance traceability, which is particularly relevant as certification and quality control measures grow in importance. Technologies can be used to test, diagnose and profile products at all steps along the value chain, to ensure the traceability and quality of food up to the final distribution stage. Certifications and labels that recognise/confirm the product's identity would also help sales and increase consumer loyalty. Where necessary, many exporters can now trace consignments back to individual farmers and take the necessary measures to address any problems that arise. It is also possible to reuse production waste within the production cycle, improving revenue for farmers and reducing environmental impact (e.g. reuse of agricultural waste for heating). Digital sales with e-commerce of agricultural and agri-food products are also increasing, alongside social media activity for marketing.

ICTs have become an important tool in promoting agricultural value chain efficiency. There has been a rapid expansion in the use of mobile technology, as the price of ICT services is falling, and the technology is becoming more affordable to many in developing countries. There are now many applications that can support farmers directly through SMS messages. Examples include iCow, developed in Kenya, which provides information on the gestation period, on artificial insemination of the cows, and on how to look after them. Applications such as M-Pesa can support access to mobile payment services for a large percentage of those without banks, thereby facilitating transactions in the value chain. Other applications have been developed to promote the provision of crop insurance through input dealers.

ICT is also being used to strengthen the capacity of agricultural extension officers and NGO field staff to reach farmers with timely and accurate information and, at the same time, help capture data from the field. Since the adoption of an ICT strategy for agriculture by the Rwandan government (MINAGRI, 2016), several actions were taken to launch the Smart Nkunganire system, E-Isoko, and other digital extension and financial services. Farmer representatives are trained to use ICT applications on a smartphone to provide agricultural information and extension support. Most market price information is now delivered to farmers via SMS. Other small-scale examples are the Grameen Foundation's Community Knowledge Worker programme, Lutheran World Relief's Mobile Farmer, and various efforts funded by the Bill and Melinda Gates Foundation in Africa. However, several barriers have prevented the large-scale adoption of ICT in rural areas, especially among women and young people, such as the affordability of devices and services, a shortage of digital skills, and largely the lack of locally relevant content (FAO, 2020).

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[23] Precision agriculture is a farming management concept based on the use of technology such as satellite imaging and sensors that observe and measure the situation of fields and crops, and then operate with targeted interventions with the goal of optimising returns on inputs while preserving resources.

[24] See, for example, 12 climate-smart technologies that could transform farmers lives | World Economic Forum (weforum.org)

Technological potential includes everything from delivering farming advice via text messaging to interactive voice response, including smart phone applications that link farmers to multimedia advisory content, farm inputs and buyers. Digital solutions could help Rwanda in a pandemic situation such as Covid-19 or in natural disasters by improving resilience and economic opportunities for micro and small companies. Optimal crop calendars based on historical climate data and seasonal forecasts are crucial in decision-making and for avoiding extreme weather conditions at a crop's sensitive phonological phase. Emerging digital information services in the agricultural sector are generally provided by Meto Rwanda and a few other digital service providers, which are financially supported by development actors like USAID / CNFA Hinga Weze. Some Fin tech solutions like BK Techouse also provide agro-information services to various agro-value chains actors. These service providers mainly use USSD or digital information platforms for smartphone users.

Numerous ICT SMEs and start-ups have emerged in Rwanda in response to the business opportunities offered by digitalisation, and a few (e.g. Agrico and Esoko) have been able to scale up to medium-sized or large companies. Incumbent firms, notably regional mobile network providers (e.g. MTN) and international IT firms have provided physical infrastructures (e.g. MTN and Airtel), platform technologies (e.g. WhatsApp groups) or engaged directly in service provision. Established banks and insurance companies have been central for the integration of ICT into financial services (mobile payment services, micro-credits, crop and weather insurance). Agribusinesses such as product aggregators, commodity exporters and contract-farming scheme operators are emerging as an important source of demand for ICT solutions within agro-supply chain management and digital payments. In addition, government agencies and institutions have developed policies, regulations, innovation labs, R&D activities, etc. to create an enabling environment for digitalisation, often assisted by technical and financial donor support, e.g. from USAID, GIZ and the World Bank.

Regarding access to agro-input information, the current Smart Nkunganire System (SNS) developed a digital platform that allows farmers to make electronic purchases together with BK Techouse, a technology solutions company under the Bank of Kigali and the Bill & Melinda Gates Foundation. However, a few farmers in Rwanda can access digital information on the products available, their prices, suppliers and their location, and make orders remotely by using their mobile phone applications. Farmers use USSD to apply for agro-inputs and receive the necessary information through text messages regarding the quality and volume of agro-inputs needed and the amount to pay, as well as the mode of payment.

2.3 Climate change and environmental sustainability

Climate change is a strong driver with many facets, ranging from energy production to the modification of ecosystems, from weather shocks to the spread of pathogens. Given its wide-ranging impact on agriculture, it forces states to develop mitigation policies, with implications for new skills related to issues such as soil management, irrigation technologies for efficient use of water, weather forecasting, renewable energy and pest control. Rwanda is no exception to this and is also part of the 2015 Paris Climate Change Declaration.

Rwanda is already warming, with observational data showing that average temperatures have increased over recent decades at higher levels than the global average. Its rainfall patterns are becoming more irregular and unpredictable, with shorter rainy seasons, which has had a major impact on food production. Medium-term climate projections for Rwanda indicate further increases in temperature – between 1 and 2.5° C – by the middle of this century. Future climate change could exacerbate the impact of climate variability in the country and lead to new risks. These changes could have potentially large impacts on agriculture, from the combination of rising temperatures and changing rainfall, shifting agroclimatic zones, increased variability and extremes (shocks), as well as the indirect effects of changing pests and diseases.

As mentioned earlier, rainfall exhibits a large temporal and spatial variation in Rwanda due to the country's steep topography and the existence of large water bodies nearby. This leads to weather variability with a significant effect on agricultural production and livelihoods, causing droughts and shocks to food security. Apart from the significant impact of droughts on smallholder crop farmers, the livestock sector is also affected by drought, especially in the Eastern Province; it limits the availability of water and feed, and increases vulnerability to diseases. Hence, while subsistence farmers are most affected, climate variability affects all agricultural sectors and lowers annual production of different crops or livestock, value addition and exports.

The country's topography and its natural environment to a large extent shape natural hazards, including floods, landslides, droughts, windstorms, rainstorms, lightning and sometimes earthquakes. Over the last decade, the frequency and intensity of natural hazard-induced disasters have significantly increased, raising the toll of human casualties as well as economic and environmental losses. Irregular rainfall, drought, floods, landslides, and the limited amount of land that is suitable for agriculture, alongside pests and diseases, continue to pose risks to food security.

Rwanda is also among the countries most susceptible to water erosion. Topography and rainfall correlated to high demography, changes in land use and unsustainable human activities, such as water diversion onto lowlands and water pollution are the major causal factors of soil erosion and environment degradation. The loss of soil due to water erosion degrades the arable land and eventually renders it unproductive, consequently resulting in a drop in potential agricultural productivity and giving rise to concerns about food security. Rapid land conversion to agricultural use acts as a catalyst for accelerated soil erosion.

Finally, agriculture is both affected by other sectors' waste and is a net producer of waste itself. Waste management, recycling and possible reuse are becoming an increasingly important part of economies. Upcycling of agricultural waste as an input into other value chains can be a source of new business and jobs. In general, there is increased awareness of the need to reduce waste from the agricultural production processes, but the reuse of waste materials that are generated along the chain is not yet widespread in primary agriculture or agro-processing agriculture.

Rwanda is considered well placed to become the regional circular economy hub for Africa. For over a decade, it has taken a proactive approach and put the environment and climate change at the heart of all the country's policies, programmes and plans – as seen by its environmental protection initiative which aims to integrate green growth and climate resilience interventions. It can boast the largest Green Fund (FONERWA) in Africa, and is widely seen to have a pioneering, innovative and nimble policy environment. Rwanda had a pioneering role in the co-founding of the African Circular Economy Alliance first launched at the World Economic Forum in Kigali in 2016. Some of the climate-smart technologies focus on processing agricultural waste that could be promising for Rwanda[25].

According to the International Trade Centre (2008), organic agriculture in Rwanda has been developed and promoted along two parallel tracks, an NGO track and a commercial track, driven by companies. Quite uniquely for Rwanda, the government is already involved in the early stages. Having promoted the use of subsidised agro-chemicals in its agricultural transformation strategies, the government is now embracing the use of fertiliser-enriched compost. According to the REMA Climate Change Portal, Rwanda will switch from inorganic fertilisers to fertiliser-enriched compost by 2030 (GoR 2015) through the promotion, recovery and reuse of organic waste to restore soil fertility. Organic waste is, however, said to be hard to come by.

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[25] See, for example, 12 climate-smart technologies that could transform farmers lives | World Economic Forum (weforum.org)

2.4 International trade and high competition for exports

According to the World Bank, Rwanda's future growth must be powered by trade and regional integration. As a small, landlocked economy, it does not have the scale economies to sustain high growth on its own (WB and GoR, 2020). There are major shifts in the patterns of global trade and production, such as maturing global value chains and less possibility of unbundling production. At the same time, production is becoming increasingly concentrated in regional or local hubs closer to end markets – for example, the share of intra-African trade for most manufacturing industries has risen significantly since 2000. The strongest regional opportunities exist in commodity-based processing and the export and services trade. This promise applies particularly to agribusiness and food processing, the subsectors in which Rwanda has revealed a comparative advantage (WB and GoR, 2020).

Thus, rapidly growing domestic, regional and international markets open opportunities for exports and selling higher value products. However, there is increasing pressure for products to be commercially viable, with increasing competition domestically and abroad. Regional concentration has implications for manufacturing-led growth in Africa, where cross-border production networks have yet to materialise due to weak regional integration. Enormous opportunities for cross-border trade in food products, basic manufactured goods and services therefore remain unexploited because of high transport costs, nontariff barriers, and regulatory constraints (WB and GoR, 2020).

Trade integration accelerated after Rwanda's accession to the EAC in 2009, and as a result Rwanda has a large regional market. Rwanda's agricultural products have a preferential advantage to access markets like the EU, USA and United Emirates, the Common Market for Eastern and Southern Africa (COMESA), the East African Community (EAC), the Economic Community of Central African States (ECCAS) and the Economic Community of the Great Lakes Countries (CEPGL). Many products (for example, wood products, beverages) are typically traded regionally (rather than internationally) because they are bulky to transport or require proximity to raw materials (for example, food production). However, policy responses first need to address key cross-cutting constraints (such as skills, finance, infrastructure and business regulation), clarify the future role of state-owned enterprises and focus on export promotion rather than import substitution (WB and GoR, 2020).

Rwanda is generally not competitive with its EAC partners in most products, but EAC membership has reduced the time and costs of transportation. Meanwhile the West and Central African resource economies present themselves for Rwandan high-value produce, which is competitive in these markets. There is already significant informal cross-border trade at the western border, where prices for most agricultural products are considerably higher and paid mostly up-front in hard currency, with the populous towns of Goma and Bukavu in DRC. With investment in the Kivu Lake transport linking lake borders between the DRC and Rwanda as part of the Rwanda Transport Development Agency's (RTDA) plans, there is scope for further integration with these markets.

However, bigger growth perspectives are being able to access urban high-value markets by airfreight under the new AfCFTA agreement signed by the African Union member states in April 2023[26]. Rwandan products such as French beans, coffee and livestock products could be supplied by air. With Rwandair connections and AfCFTA regulations, this is an opportunity. However, there are still significant logistical challenges to address, observing the political economy of the countries that may inhibit market access. For example, previous studies found that many francophone countries import basic products such as eggs from France[27]. Due to the increasing importance of food exports to the sector, logistics is an area where significant improvements in resource use, efficiency and waste management will be needed.

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[26] The AfCFTA is the world's largest free trade area, bringing together the 55 countries of the African Union (AU) and eight Regional Economic Communities (RECs). It aims to create a single market for goods and services, facilitated by the movement of persons, in order to deepen the economic integration of the African continent (see Home - AfCFTA (au-afcfta.org)).

[27] Vanguard Economics (for UNECA): market entry studies to Congo Brazzaville, Gabon, and Senegal.

So far, international (overseas) markets have been available only for products in which Rwanda has a global comparative advantage that overcomes the significant logistical and regulatory trade barriers: mostly coffee, tea and pyrethrum. For diversification, Rwanda's comparative advantage in other crops for the international market will need to be determined. For instance, Rwanda was accredited in 2015 to export honey to the EU market, but production volumes have been so far inconsistent. Given Rwanda's land-size, population and geographic position, the comparative advantage is likely in products that are labour intensive, land extensive, relatively high value per kilogram and fit the agro-climatic conditions – products such as horticulture and feed-efficient animal products. Rwanda could expand horticulture exports —much like Peru has done with specialty agricultural products— beyond the region, building on its reputation for having a superior regulatory and policy environment (WB and GoR, 2020).

2.5   Quality and upgrade needs along the global value chains

The government of Rwanda has developed and implemented important measures for the economic development of the agricultural sector as well as agro-processing. The transformation of agriculture from supplying products for domestic use to processing higher-value-added goods through regional and global food supply chains requires further support and modernisation, improving certification for food safety, sanitary and phytosanitary conditions, and adopting transparent science-based standards, product registrations and certification of agricultural inputs (WB and GoR, 2020).

Policies and regulations have already been launched to improve the quality of products and introduce structural quality control actions. The quality issue starts at farm level, and can be facilitated by technological inputs: e.g. precision agriculture can help minimise the use of pesticides; in subsequent steps of the value chain, techniques for accurate tests – for traceability, proper storage and conservation – are all necessary to guarantee quality standards to the final customer. In this sense, some value chains start with greater organisation than others; for example, coffee and tea are more established and so able to invest in technology to guarantee international quality standards, while horticulture is a new, emerging part of the chain, with a lower degree of organisation and varying degrees of readiness of the various companies.

A related action to upgrade the positioning of Rwandan products towards the higher price segment of the value chain is linked to organic farming, food identity preservation, and the development of niche products or applications. Organic farming (i.e. certified) and its counterpart agroecology agriculture (based on agreements between small producers) are growing but need recognisable labels and more support to reduce costs and reach customers. A relevant factor is preserving the identity of foods, which need traceability technology but also skills and competences on how to protect and enhance local products. A higher selling value and better employment can be achieved through niche products, such as avocados, chili and its niche applications, for example its use as an ingredient for the cosmetic industry.

Regional and international trade require standards, conformity assessment (testing and certification), and calibration and verification (metrology) services to enhance the competitiveness of Rwandan products, fair trade and consumer protection, which, in the end, lead to trade promotion and the socio-economic growth of the country. The Rwanda Standards Board (RSB) is now accredited to carry out certification for *Hazard Analysis and Critical Control Points (HACCP)* and *Food Safety Management Systems (FSMS, or ISO 22000).* The trade of agricultural and food products is subject to strict control and certification mechanisms for food safety, which are vital for trade. Therefore, significant professional expertise is required to work on the following categories of certifications:

- *S-Mark Product Certification:* Certified products are given a standardisation mark (S-Mark), a quality mark issued by the RSB and displayed on the product. It is renewed annually and allows an agricultural product processed in Rwanda to be marketed on the national market.

- *HACCP System certification*: HACCP is an international standard defining the requirements for effective control of food safety[28]. The RSB HACCP certification scheme is accredited by the Dutch Accreditation Council (RvA). It allows an agricultural product processed in Rwanda to be sold in the regional market.

- *ISO Food Safety Management System (FSMS):* ISO 22000:2005 FSMS specifies requirements for a food safety management system where an organisation in the food chain needs to demonstrate its ability to control food safety hazards to ensure that food is safe at the time of human consumption. The RSB FSMS certification scheme is accredited by the Dutch Accreditation Council (RvA). It allows an agricultural product processed in Rwanda to be sold in international market.

2.6   Consumer awareness of healthy and organic food

The increasing demand for healthier food is growing worldwide and this creates opportunities for exported goods. The increasing preference in the western world for healthier and tastier foods, coupled with traceability and sustainability, clearly affects the way agriculture produces crops and vegetables. Industries are obliged to adapt and introduce innovation to achieve greener and more sustainable production. Interestingly, this type of change is directly related to innovation and technology used to bring about greener production and improved animal welfare. In the domestic market, there is also growing interest in environmental and nutritional aspects, especially among the educated middle classes and younger generations. The increased attention given to environmental and health issues creates new opportunities for business. For example, the stricter regulations introduced regarding pesticide residues in food affects pesticide producers and farmers.

Changing consumer tastes has led to the development of new consumption patterns and, therefore, a reshaping of business. Although the most widely marketed products in Rwanda are fresh ones, and most food products are made at home (subsistence economy), with the development of urbanisation and women entering the labour market, the demand for processed products has increased. Fresh products are experiencing a slowdown in consumption in favour of products with longer life. This leads food processing companies to offer new products in line with customer preferences. Some sectors, such as pastry and gastronomy, have developed recently, leading to a strong demand for new competences.

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[28] HACCP is a certification in the food production, processing and handling industry that is widely sought after by establishments such as restaurants, abattoirs, fruit juice and vegetable processors and pack-houses. It is a tool used to systemically identify, address and monitor food safety risks that may occur within the food handling process. HACCP certification assures buyers and consumers that food has been processed and handled in an environment that minimises the risk of food poisoning and the spread of food-borne infections.

3.   LABOUR MARKET STRUCTURE AND THE EVOLUTION OF EMPLOYMENT BY SECTORS

This chapter starts with an overview of the Rwandan labour market, based on the in-depth analysis of the annual *labour force survey data (LFS)* looking at age, gender, education, occupation and sector of the labour force. It makes a comparative analysis of the LFS annual data between 2017 and 2022 to understand temporal trends in labour force participation, employment and unemployment rates in the country[29]. Particular attention is given to gender, youth unemployment and NEETs. The employment definition in agriculture includes only *'market-oriented agriculture',* e.g. those whose products from agriculture are sold or those engaged in agriculture for pay, as per the NISR's adoption of the ILO decision on international standards on work statistics since 2013 (NISR, LFS 2022).

The next section analyses employment trends in economic sectors within a 5-year period. The sectoral structure of employment is generally a good indicator of the current skill needs of the economy. Changes over time both in employment share and the GDP contribution of economic sectors are presented and discussed as extensively as possible with the available data, as are the levels of earnings in economic sectors. The last section puts under the spotlight the evolution of workers' skills in the market-oriented agriculture and agro-processing sectors in Rwanda between 2017 and 2022. It focuses on the characteristics of workers in selected subsectors, such as age, gender, education level and occupation, and the changes over time. It tries to include all agriculture-related economic activities for a complete picture of the agrobusiness system.

3.1   A general overview of the Rwandan labour market

According to the LFS 2022 annual data, the working age population (16+ years old) was more than 7.9 million people, 56% of which were in the labour force (employed +unemployed). Men's participation has always been higher than women's participation (64% versus 49% in 2022). The remaining 3.5 million people were classified as 'inactive' or outside the labour force, as per the NISR's revised definition of employment, although a considerable part of them were still engaged in subsistence foodstuff production for their own consumption. Table 4 shows that annual labour force participation has increased from 53% in 2017 to 56% in 2022. This was due to both more men and women participating, although always with a lower participation rate for women. A similar gender inequality was also visible in the employment rate (44%), which has not changed in 5 years – 53% for men versus 37% for women. In 2022, more than 3.5 million persons were employed in Rwanda (Table 4).

Table 4: Key labour market indicators for the 16+ population by gender, 2017 and 2022

Labour force participation (16+)	2017			2022		
	Total	Men	Women	Total	Men	Women
In numbers LFP rate (16+)	**2 989 249**	1 670 552	1 318 697	3 546 352	1 977 704	1 568 648
	53.4%	62.6%	45.4%	56.0%	64.1%	48.8%
Employment rate	**44.2%**	52.8%	36.7%	44.5%	52.7%	37.3%
Unemployment rate	**17.3%**	15.6%	19.2%	20.5%	17.9%	23.7%

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[29] The time span between the two datasets was 5 years, due to the fact that the year 2017 was the earliest year with the same methodology and a comparable LFS dataset, and the year 2022 was the latest year with a comparable annual dataset.

Inactivity rate	**46.6%**	37.4%	54.6%	44.0%	35.9%	51.2%
Youth (16-30) unemployment rate	**21.3%**	18.5%	24.6%	25.6%	22.3%	29.4%
Youth (15-24) unemployment rate	**22.8%**	20.7%	25.0%	27.6%	25.4%	30.2%
NEETs rate (16-30)	**35.5%**	27.0%	43.4%	36.0%	30.6%	41.0%
NEETs rate (15-24)	**33.0%**	26.6%	39.0%	32.0%	30.0%	34.0%

Source: Author's calculations based on the annual datasets of LFS 2017 and 2022, NISR.

The composition of employed people by status in employment in a main job shows that the majority are wage workers, with 72.5% in 2022 (employees, paid apprentices and trainees). The share of own-account workers was 23.5%, followed by contributing family workers (2.7%), employers (1.2%) and members of producers' cooperatives (0.1%) (NISR, LFS 2022). These numbers show an increasing share of wage employees since 2017, possibly some moving from other categories. However, the median wage was estimated at RFR 20 000 per annum, which is lower than the international poverty line equivalent.

As reported by the NISR in several publications, employment in Rwanda is largely informal, although that is slowly decreasing. In 2022, the informal employment rate was 91.3% (when counting persons with a main job only), while the proportion of informal employment in non-agricultural employment was 84% (NISR, 2023). As is often the case in many countries, informality is much higher in agriculture and in rural areas. Men make-up almost two-thirds of employment in the informal sector outside agriculture. It must be mentioned that the number of active members in the pension system (both contributors and their covered families) was 721 871 in 2023 (almost two-thirds of whom are men), up from 553 876 people in 2019 (NISR, 2023). This gives a rough indication of the actual number of workers with 'decent' employment – although the number includes covered family members too.

An analysis of determining factors for individuals ending up in formal, informal or agricultural employment in Rwanda revealed some interesting results (AfDB, 2014). The results showed that gender and education were crucial factors in determining the employment type of individuals. For example, being a woman increased the likelihood of informal employment and lower-wage employment, especially in rural areas. Similarly, higher education attainment was positively associated with formal employment and negatively associated with agriculture and informal employment – although secondary and higher education were associated with unemployment among women. The presence of young children increased the likelihood of informal self-employment of women. Moreover, someone doing agricultural work at home is often a necessary precondition for another individual to be able to seek decent employment opportunities. Thus, the presence of adult women involved in agricultural production in households enabled other individuals at home (especially men) to find more lucrative non-farm employment.

Figure 5 shows an increasing total unemployment rate between 2017 and 2022, a 3-percentage-point increase from 17% to 20%. Roughly one out of five active people is unemployed, reaching 916 out of 944 people in 2022. Rwandan women had a higher unemployment rate than men with a 6-percentage-point difference in both years (almost 24% versus 18% respectively in 2022). The unemployment rate was relatively the same in the urban and rural areas, but consistently higher among young people than adults (RDB 2021, 2022). Unemployment was also higher among secondary education graduates and general education graduates (NISR, 2023). These developments demonstrate that the increasing labour force participation in the last 5 years was mainly due to the increasing number of people looking for jobs (unemployed), and the actual employment share of the working-age population had increased only marginally.

Figure 5: Total unemployment rate % (16+) by gender, 2017 and 2022
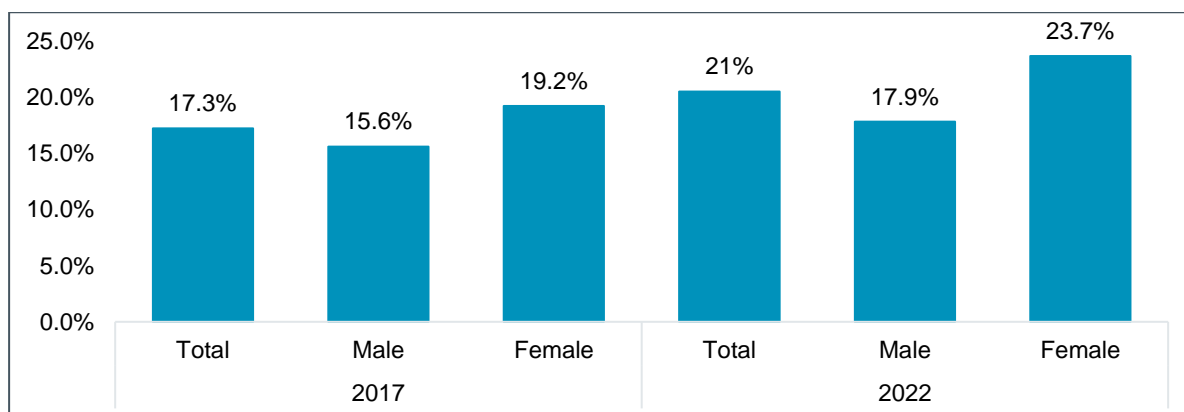
Source: Author's calculations based on the annual datasets of LFS 2017 and 2022, NISR.

However, these unemployment figures fail to represent the full scope of the challenges faced by young people and women in the labour market and mask persistent levels of working poverty and underemployment (FAO, 2020). Even more than unemployment, Rwanda's main employment challenges are limited decent jobs, e.g. many working poor and underemployed people who are often in agriculture. Time-related underemployment affects 30% of employed people, meaning they work less than 35 hours per week and would be willing to work more (ibid). Due to large subsistence farming, poverty remains high among employed people, especially in rural areas. These issues are mixed with persistent gender inequalities in the labour market, where women continue to be underrepresented in non-farm wage employment and over-represented in unpaid family labour, often in market-oriented and subsistence agriculture as crop farm labourers.

As in all countries, youth unemployment rates are higher in Rwanda as well, compared to the adult unemployment rate (RDB, 2021, 2022). Figure 6 demonstrates the increasing trend of unemployment among young people aged 16-30, since the rate increased from 21% in 2017 to almost 26% in 2022. Taking the traditional young people age group of 15-24, the unemployment rates were even higher. Moreover, young women were more likely to be unemployed compared to young men, and the gender difference among young people resembles the same gender difference among adults. In fact, the difference of the unemployment rate between young men and young women has increased from 2017 to 2022 (from 6 to 7 percentage points). In 2022, the unemployment rate of young men was around 22%, while for young women it was around 29%.

Figure 6: Youth unemployment rate % (aged 16-30) by gender, 2017 and 2022
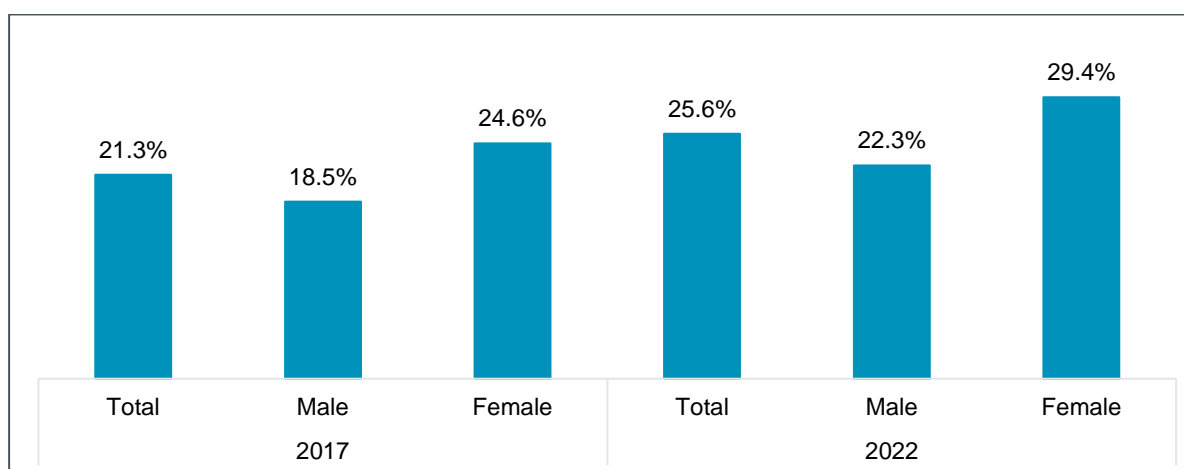
Source: Author's calculations based on the annual datasets of LFS 2017 and 2022, NISR.

A more detailed analysis of youth unemployment reveals 'increasing unemployment with education level'. The youth unemployment rate in 2022 was 21% for young people with no educational attainment, 39% for young people with a secondary education, and 32% among young people who had completed a university education. As quite often the case in other countries, it was lower among those who had completed TVET (almost 24%) compared to those with a general secondary education (almost 29%) (NISR, LFS 2022). These statistics indicates that once young people manage to reach and complete a TVET education, they fare better in the labour market than those with only a lower and upper secondary general education. At the same time, graduate unemployment indicates the problems faced in the creation of skilled jobs in the Rwandan economy. Given the quite limited numbers of graduates in the Rwandan labour market, this is not a good sign for the overall economy.

Another good indicator on youth engagement in the labour market is the rate of 'young people not in employment, education or training', known as NEETs. It is one of the key indicators used for young people in European Union statistics. Figure 7 shows the calculation of young NEETs (aged 16-30) in Rwanda in a comparison between 2017 and 2022. The overall share of Rwandan young people who are not in employment, education and training was 36% in 2022, and it even increased slightly since 2017. Moreover, the gender difference in this status was quite big, to the disadvantage of girls. This means that more young women than young men are not in employment, education or training in Rwanda. While there was a 6-percentage-point difference between men and women NEETs in 2017, this difference had increased to over 10 percentage points in 2022: the NEETs rate for women was 41% and for men it was 30.6%. These statistics prove the greater difficulties faced by women in the Rwandan labour market and the need for extra policy actions to tackle the problem.

Figure 7: Young people NEET rate % (aged 16-30) by gender, 2017 and 2022
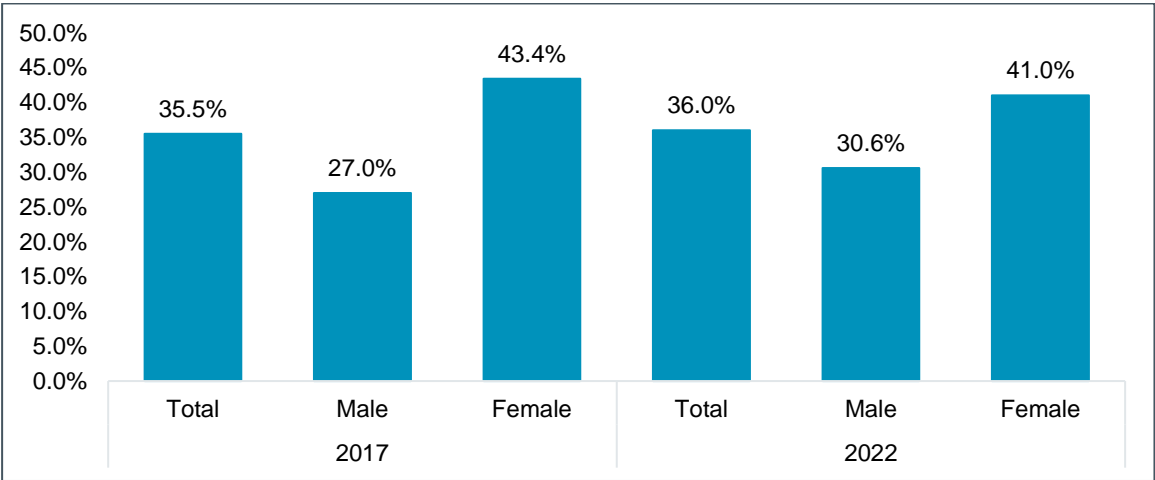
Source: Author's calculations based on the annual datasets of LFS 2017 and 2022, NISR.

The skills levels of the labour force can be assessed by the educational attainment of employed and unemployed people. As Figure 8 shows, in 2022, 44.3% of the labour force had not completed any form of education, while 32.3% of them had completed only a primary education. Together they constituted 76.6% of the active population in 2022. Comparing these figures with those of 2017, a slow increase in education levels could be observed, as the share of those with no education decreased by 4 percentage points, while the share of those with a primary education increased by 3 percentage points in 5 years (Figure 8). The share of the labour force in lower and upper secondary education was 6.5% and 10.1% respectively. Together, they reached almost 17% in 2022, which was up from 14% in 2017. Finally, the share of the labour force who had completed a tertiary education was 7%, representing a slight decrease over the 5 years.

Figure 8: Education levels of the labour force (16+) by gender, 2017 and 2022
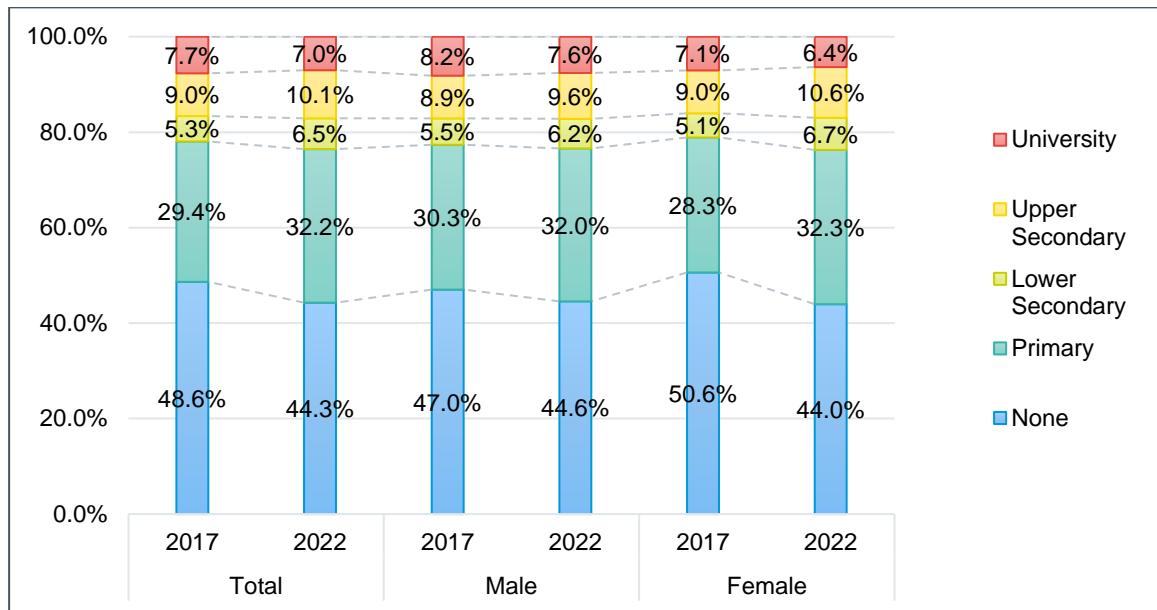
Source: Author's calculations based on the annual datasets of LFS 2017 and 2022, NISR.

Note: Labour force includes both employed and unemployed persons together.

It must be highlighted that the education levels of women were considerably lower than the education levels of men in 2017, as a higher share of women workers had not completed any education or had only completed a primary education (Figure 8). Interestingly, the gender share was more balanced among those with higher levels of education, even when males had a slightly higher share. By 2022, women caught up with men in terms of getting similar education levels, as seen in the equal shares of men and women with no education and with a primary education only. Moreover, women tended to exceed men in their share of attaining a lower and upper secondary education in 2022, although still more men than women tended to receive a tertiary education. These trends confirm the slowly increasing education levels of the labour force, particularly visible among the women workers.

Another way of assessing the skill levels of employed people is to look at their shares in the main occupational categories (as defined by ILO ISCO-2008). As seen in Figure 9, the occupation category with the highest frequency in Rwanda has been 'elementary occupations' involving the performance of simple and routine tasks. Contrary to general trends in other countries, this share increased from 55% in 2017 to almost 61% in 2022. A higher share of women than men perform these elementary jobs, with an almost 10-percentage-point difference in both years. This category includes cleaners and helpers, agricultural, forestry and fishery labourers, labourers in mining, construction, manufacturing and transport, food preparation assistants, street and related sales and service workers and other elementary workers.

Figure 9: Share of employed persons by occupational group in a main job (%), 2017 and 2022
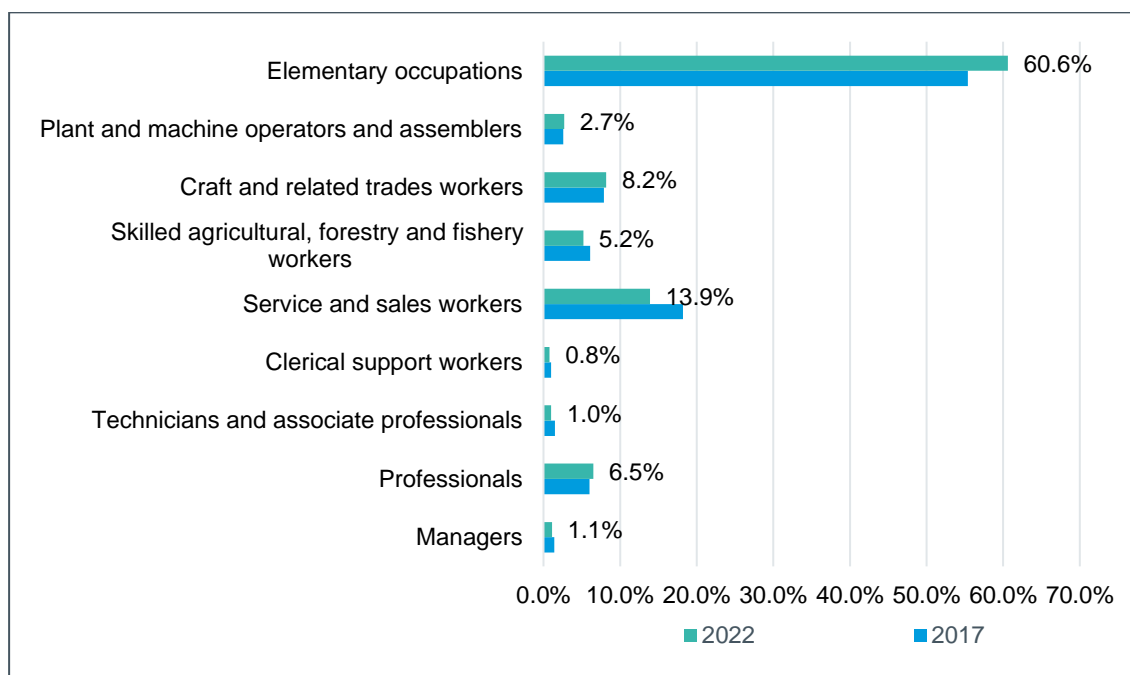
Source: Author's calculations based on the annual datasets of LFS 2017 and 2022, NISR.

The second highest occupation category was 'services and sales workers' (almost 14% in 2022), down from 18% in 2017. A higher share of women than men were engaged in this occupation (17% versus 12% in 2022). Interesting to note is the decrease in this category of occupations, maybe still linked to the impact of the Covid-19 pandemic. These were followed by 'craft and related trades workers' (8%), 'professionals' (6.5%) and 'skilled agricultural workers' (5.2%) in 2022 (Figure 9). Those in crafts and professions have recorded a very small increase since 2017, and more men than women are engaged in these professions. On the other hand, there was a small decrease among skills agricultural workers, and the gender balance reversed in 5 years from more men to more women. It is important to note the very low and decreasing share of 'technicians and associate professionals' in the Rwandan economy (only 1% of all those employed in 2022), with a higher percentage of men than women. Normally this occupational category is very important in developing economies, and it increases in particular with the expansion of the manufacturing sector, which seems to be not the case in Rwanda.

Each of the remaining occupational categories covered less than 3% of the whole employed population. The gender breakdown in each occupational group indicates that most of the main occupational categories are male dominated in 2022 (Figure 10). The bubbles in the figure visualise the size of each occupational group, being more towards the right meaning a higher share of males. In each bubble, you also see the share of women workers: there was a particularly high gender gap among 'plant and machine operators' where almost all workers are male, and a huge difference for men among 'legislators and managers', 'technicians and associate professionals' as well as 'craft and trade workers' – around three-quarters were men in each group. The only female-dominated occupations were clerical support workers and service and sales workers, while women's numbers were closer to men in elementary occupations, skilled agricultural workers and professionals (Figure 10). Therefore, it would not be wrong to say that women are mostly crop farm labourers, domestic cleaners and helpers, stall and market salespersons, and shopkeepers.

Figure 10: Gender share of employed persons in each occupational group (%), 2022

Managers (Share Women: 24%)

Professionals (Share Women: 43%)

Clerical support workers (Share Women: 58%)

Technicians and associate professionals (Share Women: 26%)

Service and sales workers (Share Women: 53%)

Skilled agricultural, forestry and fishery workers (Share Women: 45%)

Craft and related trades workers (Share Women 27%)

Plant and machine operators and assemblers (Share Women: 2%)

Elementary occupations (Share Women: 47%)

Share men

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Source: Author's calculations based on the annual datasets of LFS 2017 and 2022, NISR.

An overall comparison of the LFS between 2017 and 2022 indicates a growing working-age population in Rwanda, leading to a small increase in labour force participation over the last 5 years. However, increasing participation was mainly due to a considerable increase in unemployment rather than employment (both for adults and young people). The share of employment remained practically the same (with a minor increase). In all cases, women suffer more than men from unemployment in the labour market. At the same time, we observe a slow increase in the education levels of the labour force from 2017 to 2022, in particular among women, but the majority of the labour force remain low educated. In terms of occupational groups, the Rwandan economy has been dominated by an increasing share of elementary occupations and a decreasing share of services and sales workers since 2017 (NISR, LFS 2017 and 2022).

3.2 Sectoral structure of employment trends in Rwanda

The sectoral structure of employment along with the GDP contribution of economic sectors are good indicators for the economy's changing skill needs. Table 5 shows both the employment share and their contribution to GDP in three broad sectors, over five-year intervals in the last decade. Taking together both market-oriented and subsistence agriculture, *agricultural employment* stood at almost 73% in 2012, decreasing to over 67% in 2017 and further declining to 63% in 2022[30]. It is a common trend for

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[30] When all first, second and third jobs in subsistence agriculture are included, the number of people engaged in subsistence increased from 1.3 million people to 1.7 million people in 2022. Added to those in market-oriented agriculture (1.6 million), the total number reaches 3.4 million people, meaning 63.3% of the working age population is in agriculture (NISR, LFS 2022).

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labour to move out of agriculture into non-agricultural activities due to economic development, as jobs are often created off-farm instead of on-farm when agricultural productivity increases.

Table 5: Sectors' contribution to GDP and employment (%), 2012, 2017, 2022

Sectors	YEAR 2012		YEAR 2017		YEAR 2022	
	GDP cont.%	Employ. %	GDP cont.%	Employ. %	GDP cont.%	Employ. %
Agriculture	33	NA 72.7**	31	41.9* (67.4**)	25	46.8* (63.3)**
Industry	14	NA	16	16.6	21	17.3
Services	47	NA	46	41.5	47	35.9

Source: Author's calculations based on the 2017 and 2022 LFS datasets (NISR, Labour Force Surveys, 2017 and 2022). GDP National Accounts 2012, 2017, 2022.

*This is the share of employed people in market-oriented agriculture.

**It includes the population engaged in both market-oriented and subsistence agriculture.

Note: Missing value of GDP contribution from 100% was attributed to adjustment for taxes and subsidies on products

The picture in Rwanda reflects the *agricultural transformation process*, where agriculture's contribution to GDP also shows a similar declining trend, from 33% in 2012 to 31% in 2017, and to 25% in 2022. These numbers indicate low and decreasing productivity in agriculture, compared to other sectors. Nevertheless, the sector still contributes to broad economic growth and job creation, often through the pro-poor features of improving hunger and diet (Dusingizimana et al., 2022). Although the size of the sector and its breakdown between farm and off-farm components are typical of low-income countries, agriculture has increasingly contributed to growth in off-farm components of the agrifood system and helped cushion the economic damages from Covid-19 in 2020 (Diao et.al., 2023). Despite the declining share of primary agriculture in the economy, the contribution of off-farm components has risen from 26% in 2009 to 28% in 2019 (Diao et.al., 2023).

In spite of a continuous decrease of employment in agriculture for a long time, visible in the shares of both market-oriented and subsistence agriculture employment, ***market-oriented agricultural employment still dominates the labour market in Rwanda – constituting almost 47% of the market in 2022,*** with a 5-percentage-point increase from around 42% in 2017 (Table 5). The increase of employment in market-oriented agriculture over the last 5 years could be explained by several reasons – it may be a sign of a job contraction in other sectors (e.g. negative impact of Covid-19), but also an indication of a transformation in farming households who may move slowly from subsistence to market-oriented agriculture. Females were more likely to be engaged than males in the sector, even in market-oriented agriculture (56% versus 40% in 2022).

According to the IFPRI, each of the agricultural value chains differs considerably in its effectiveness in achieving development goals and there are significant trade-offs among the different development goals when promoting a specific value chain[31]. The value chains that have a larger contribution to GDP or jobs, such as coffee and tea, are not necessarily effective in reducing poverty or improving dietary quality, while value chains that play an important role in improving dietary quality, such as vegetables or fruits, may make less contribution to job creation. Choosing a single value chain to achieve all the development objectives seems to be unrealistic for any country to pursue, and a more pragmatic or realistic strategy requires choosing a portfolio of value chains that complement each other across the different development goals (Diao et.al., 2023).

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[31] The agricultural value chains include cereals, tea, coffee, pyrethrum, nuts, flowers, avocados, vegetables, fruits, roots, pulses and oilseeds, livestock products, forestry products, fish products, etc. (IFPRI, 2022).

Employment in the industry sector remained stable, with a slight increase from 16.6% in 2017 to ***17.3% in 2022*** (Table 5). Thus, the sector did not create many new jobs and remained relatively small, with more males than females being engaged (23% versus 10% in 2022). On the other hand, industry's contribution to GDP has slowly increased: from 14% in 2012 to 21% in 2022, showing increasing productivity. ***The services sector accounted for almost 36% of total employment in 2022,*** down from 41% in 2017. This decrease may be a sign of a job contraction, linked to the Covid-19 pandemic and of a limited job creation capacity. The gender distribution was more balanced in the services sector, where slightly more males than females worked (37% vs 35% in 2022). Services' contribution to GDP was the highest of all sectors (46% in 2022) without no change in the last decade.

For a more nuanced employment analysis in the industrial and services sectors, Table 6 shows the employment shares in 21 economic sectors in 2017 and 2022. The list of economic sectors is ranked from the highest to the lowest share of employment (in 2022 figures) to highlight the most important sectors for employment. Keeping aside the agricultural employment dominating the economy, the second sector with the highest employment was the wholesale and retail trade (10.5% of total employment), although it contracted by 5 percentage points from 2017 to 2022. The third biggest sector was construction (10.3% of employment), which has increased 1 percentage point since 2017. While a higher share of women than men were involved in trade activities (5-percentage-point difference), the construction sector was dominated by men (16% men versus 3% women in 2022).

Table 6: Employed persons by branch of economic activity in a main job (%), 2017 and 2022

Percentage of employed persons by branch of economic activity (ISIC classification 1-digit level)	YEAR 2017 %	YEAR 2022 %
A-Agriculture, forestry and fishing	41.9	46.8
G-Wholesale and retail trade; repair of motor vehicles and motorcycles	15.7	10.5
F-Construction activities	9.1	10.3
H-Transportation and storage activities	4.2	5.6
C-Manufacturing	5.3	5.3
P-Education and training	3.7	4.1
T-Activities of households as employers	7.0	4.0
S-Other service activities	1.8	2.9
I-Accommodation and food services	1.5	2.1
O-Public administration, defence, compulsory social security	2.1	1.7
N-Administrative and support service activities	1.2	1.7
Q-Human health and social work activities	1.6	1.4
B-Mining and quarrying activities	1.6	1.4
K-Financial and insurance services	0.7	0.8
M-Professional, scientific, and technical activities	0.8	0.7
J-Information and communication	0.4	0.2
R-Arts, entertainment, and recreation activities	0.4	0.2

E-Water supply, sewage, waste management and remediation activity	0.3	0.2
D-Electricity, gas, steam, and air conditioning supply	0.3	0.1
L-Real estate activities	0.1	0.1
U-Activities of extraterritorial organisations and bodies	0.4	0.1

Source: Author's calculations based on the annual LFS datasets of 2017 and 2022 (NISR, Labour Force Surveys, 2017 and 2022).

The next biggest share of employment was in transportation and storage (5.6% in 2022), which has increased by 1 percentage point since 2017. Men also dominated this sector's workforce. Another reasonably important sector is manufacturing, where the employment share remained the same during the five-year period, at 5.3%. Employment in education and training services recorded a small increase (from 3.7% in 2017 to 4.1% in 2022), while the activities of households as employers decreased in the same period from 7% to 4%. It is worth noting the small share of other service activities (2.9%) and food and accommodation services (2.1%), although both have slightly increased in the same period (Table 6).

As expected, the share of women in the education sector was slightly higher than the share of men in 2022, an increase since 2017. Accommodation and food services included a balanced gender share, although men's employment has increased in the sector. Finally, it is not promising to observe the small decrease of employment in the following highly skilled and already small employment sectors: Professional, scientific, and technical activities; Human health and social work activities; Financial and insurance services; Information and communication; Arts, entertainment, and recreation activities. In conclusion, the sectoral structure of employment in Rwanda indicates limited job creation in several sub-sectors, especially the industrial and services-related sectors.

Productivity and earnings are closely related to employment trends, as earnings (and labour costs) are fundamental factors affecting the behaviours of individuals and employers in the market. The statistics from the NISR on three broad sectors indicate the *continuously lowest average earnings in agriculture, compared to higher average earnings in industry and services*[32]. In 2022, the overall average hourly cash income from employees' employment in a main job was RWF 253 per hour in agriculture, RWF 581 per hour in industry, and RWF 764 per hour in services (NISR, LFS 2022). Table 7 on monthly average earnings clearly confirms that the agricultural sector has significantly lagged behind industry and services in last 6 years: *jobs in services sectors consistently pay the highest – 5.5 times higher than agricultural jobs and almost double industry jobs – while industry jobs pay more than 3 times higher than agriculture jobs* (Table 7).

Table 7: Average monthly earnings in three broad sectors (in RWF), 2017-2022

Sectors	2017	2018	2019	2020	2021	2022
Agriculture	21 134	20 352	20 384	20 813	21 215	22 532
Industry	67 232	58 509	63 346	61 547	69 787	75 148
Services	105 784	108 722	103 694	104 749	114 224	122 879

Source: NISR, Rwanda Statistical Yearbook 2023.

For the agricultural sector to deliver on its full social and economic potential, specific opportunities for skilled young people must be developed. This includes making the sector sufficiently attractive for them in terms of the number of jobs, decent working conditions and meeting their skills and aspirations. Otherwise, the country may face an exodus of skilled young people from rural to urban

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[32] Note that agro processing is classified under 'industry' in the sub-heading of manufacturing, thus low earnings in agriculture do not include agro processing.

areas. To counteract the trend, a certain vision is needed to generate attractive employment options through investments and policy actions in several agriculture-related fields – many of which need to be implemented right now.

3.3 The evolution of workers' skills in agriculture and agro-processing

This section presents the characteristics of workers employed in the different sub-sectors of the agrifood/agrobusiness system in Rwanda and compares changes from 2017 to 2022. The main sub-sectors being analysed are market-oriented agriculture and agro-processing, but whenever data is available other sub-sectors are included as well. Table 8 starts with the relative GDP contribution of each sub-sector under agriculture and agro processing, based on the national accounts of 2012, 2017 and 2022. Keeping in mind the overall GDP contribution in 2022 (one-quarter), **food crops** is the dominant sub-sector of agriculture, accounting more than half of the total value (55%), followed by forestry (24%), livestock products (13%), export crops (6%) and fishing (2%). However, this distribution fluctuates according to the year as, for example, food crops' contribution was 48% in 2012 and 64% in 2017.

Table 8: Contribution of selected sub-sectors to GDP (% shares at current prices of 2022)

Selected sub-sectors	2012	2017	2022
A-Agriculture, forestry and fishing, %	**33% (+7%)**	**26% (+5%)**	**25% (+2%)**
Food crops	16 (+8%)	17 (+5%)	14 (-1%)
Export crops	2 (+9%)	2 (+2%)	2 (+4%)
Livestock & livestock products	3 (+6%)	2 (+9%)	3 (+9%)
Forestry	7 (+4%)	5 (+3%)	6 (+5%)
Fishing	0 (-2%)	0 (+5%)	0 (+3%)
C-Manufacturing, %	**5% (+6%)**	**8% (+7%)**	**10% (+11%)**
Food products	1 (+1%)	3 (+12%)	4 (+13%)
Beverages and tobacco	3 (+4%)	2 (-8%)	2 (+9%)
Textile, clothing and leather goods	0 (+8%)	0 (+40%)	1 (+21%)
Wood & paper, printing	0 (+15%)	0 (-8%)	0 (+16%)

Source: NISR 2023, NISR GDP National Accounts 2012, 2017, 2022

Note: % in brackets indicate the difference in the GDP contribution of the sub-sector, compared to its value in the previous year.

The second part of Table 8 includes *agro-processing* sub-sectors, as they are classified under 'Manufacturing' in the national accounts. The overall contribution of manufacturing to GDP was 10% in 2022, 60% of which came from food products, beverages, and tobacco processing together. Noting the growth potential of the manufacturing sector and based on the trends from previous years, it is possible to foresee a continuous growth in food product and beverage processing, textiles, clothing & leather goods, wood processing, and others. Combined with the relative growth in hotel & restaurant services, agricultural transformation can create more jobs in agro processing with the right policies in place. As analysed nicely by the IFPRI, domestic markets have been the main driving force of growth in Rwanda's agrifood system so far, not exports (Diao et.al., 2023). Growth in domestic demand for agrifood comes from household income growth.

These growth patterns are expected to continue in the coming decades as household incomes continue to grow (Diao et.al., 2023). With urbanisation and increasing rural non-farm opportunities, patterns of non-farm incomes and the pace of their growth will further change the country's consumption and dietary patterns. This is a fundamental part of the transformation process, creating growth opportunities for many domestic market-oriented or import-substitutable agricultural value chains. Thus, understanding the role of domestic demand in agricultural transformation is important for designing policies, investments, and programmes to promote value chain growth more efficiently.

Workers' characteristics in the three sub-sectors of agriculture: Crops & livestock (A01), Forestry (A02), and Fishing (A03)[33]

✓ Let's start with the absolute number of people employed in market-oriented agriculture in Rwanda, 1.66 million people in 2022. This represents an increase of workers from 1.1 million people in 2017.
✓ Among its three sub-sectors, crops and livestock had by far the largest number of workers, constituting 98% of all workers in the sector (up from 97% in 2017).
✓ The very limited employment in forestry has decreased even further in the same period, while the tiny fishing workforce remained similar. The respective numbers of workers in the two sectors were around 21 000 and 6 000 in 2022.
✓ In terms of gender, almost 53% in the whole sector were women in 2022 (down from over 54%), although the forestry and fishing subsectors had always been dominated by men.
✓ Young people aged 16-30 represented 34% of the agricultural workforce in 2022 (down from 36% in 2017), while the majority of remaining workers aged 31-60 slightly increased in this period.

Source: Author's calculations based on the annual LFS datasets of 2017 and 2022 (NISR, Labour Force Surveys, 2017 and 2022).

A comparison of the education levels of employed persons between 2017 and 2022 in the agricultural sector reveals an increase in basic education but decreasing numbers completing upper secondary and higher education. As Figure 11 shows, the share of workers with no education has decreased from almost 70% to 62% over the 5 years, thanks to increasing school attendance both among males and females. Similarly, the share of primary graduates increased by almost 6 percentage points (from 26% to 32%), visible in both genders. Even the numbers for lower secondary education were slightly higher for both genders, reaching a 3.7% total share in 2022. Educational improvement stopped at upper secondary level, as the number of workers with this level of education remained similar between 2017 and 2022, with no significant increase (1.7%). Moreover, the share of university graduates decreased by half from 0.6% to 0.3% in the same period, despite the absolute increase in the total numbers of workers in the sector.

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[33] Employment data for each sub-sector was also analysed, but there were not enough observations in sub-sectors A02 and A03 to get reliable results, therefore our analysis focused on the total number of observations in all three sub-sectors.

Figure 11: Share of employed persons by level of education in agriculture, 2017 and 2022
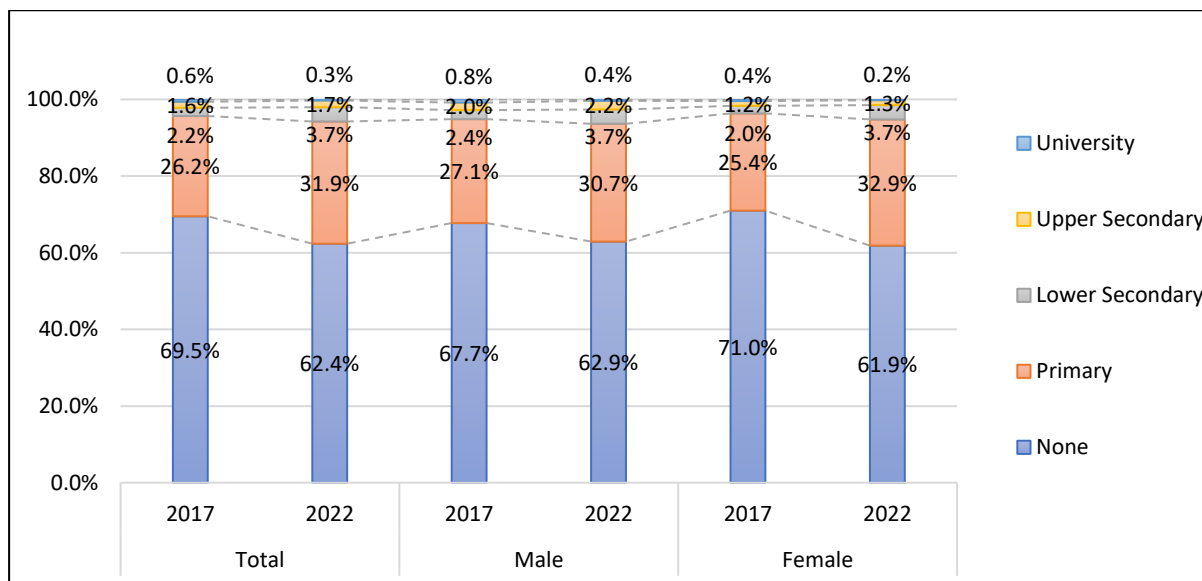
Source: Author's calculations based on the LFS annual microdata analysis of 2017 and 2022

Note: Agriculture included here the market-oriented employment in crops and livestock (A01), forestry (A02) and fishing (A03).

The gender difference is also striking for upper secondary and higher education: the share of men workers with an upper secondary education was 2.2%, compared to that of women workers at 1.3% in 2022. Similarly, the share of men workers with a university education was 0.4% compared to that of women at 0.2% in 2022 (Figure 11). The numbers confirm a ***self-selected exit from agriculture by more educated people: as soon as people get more education and skills (especially at upper secondary and tertiary level), they tend to leave agriculture and move to other sectors.*** As this happens more often to men, the education levels of the remaining workers look even lower. Given the low wages and difficult working conditions in the sector, young and educated people leaving agriculture is not surprising, but it creates a vicious cycle that hinders the development of the sector: the remaining people are increasingly older and are women who have often very limited land, limited knowledge and difficulty accessing finance due to a lack of collateral.

Another cross-check that can be done of the sector's skills base is to look at the occupations performed by agriculture workers between 2017 and 2022. Table 9 illustrates the shares of different occupational groups in both agriculture and the agro-processing sectors between 2017 and 2022. ***The picture in the agricultural sector reveals a dramatically low skills base where 88.6% of workers performed elementary jobs in 2022.*** An even more striking trend is the continuous decrease of skills base over the last 5 years, as the share of elementary occupations has increased by 7 percentage points since 2017. The second biggest occupation was 'skilled agricultural workers' (11%), followed by 'service and sales workers' (0.2%) and 'professionals (0.1%), all whom have decreased their shares since 2017.

Table 9: Share of employed persons by occupation in a main job in agriculture and agro-processing sectors (%), 2017 and 2022

Major occupational groups (ISCO-08) %	Agriculture		Agro-processing	
	2017 (41.9%)	2022 (46.8%)	2017 (2.0%)	2022 (1.9%)
Legislators, managers and senior officials	0.1	0.0	1.1	3.7
Professionals	0.3	0.1	0.7	2.8
Technicians and associate professionals	0.1	0.0	3.4	0.5
Clerical support workers	0.1	0.0	0.8	2.1
Service and sales workers	2.4	0.2	25.1	18.8
Skilled agriculture, forestry and fishery workers	14.4	11.0	1.5	0.4
Craft and related trades workers	0.3	0.0	18.8	7.7
Plant and machine operators and assemblers	0.2	0.0	8.5	10.7
Elementary occupations	82.1	88.6	40.1	53.2

Source: Author's calculations based on the LFS microdata analysis of 2017 and 2022.

Note: Agriculture included market-oriented employment in crops and livestock (A01), forestry (A02) and fishing (A03), while agro-processing included the manufacturing of food products (C10), beverages (C11), tobacco (C12), leather (C15), wood (C16) and paper production (C17).

In contrast, workers with other medium or high-skilled occupations (however tiny this number is) seem to have left the sector in the same period. This means that the *agricultural sector lacks a critical mass of managers, professionals, technicians and associate professionals, craft and related trades workers, plant and machine operators and assemblers.* The overall shares of these occupations have actually decreased in the last 5 years, another confirmation of the skills exodus from agriculture.

Women were the majority in elementary jobs in agriculture, while men were the majority in other occupations (Figure 12). The bubbles in the figure visualise the size of each occupational group, and being more towards the right means a higher share of males. In each bubble, we see the share of women workers, 54% in elementary jobs and 82% in managerial positions in 2022 – the latter is possibly linked to high number of small farming households with female heads. Women also constituted 45% of 'skilled agricultural workers' and 33% of 'professionals'. In contrast, almost no women worked as 'technicians and associate professionals', 'craft and trade workers', 'plant and machine operators' or 'clerical support workers' in agriculture. And only 1% of 'service and sales workers' were women (Figure 12).

Figure 12: Gender breakdown of employed persons by occupation in agriculture, 2022

Managers (Share Women: 82%)

Professionals (Share Women: 33%)

Technicians and associate professionals (Share Women: 0%)

Clerical support workers (Share Women: 0%)

Service and sales…

Skilled agricultural, forestry and fishery workers (Share Women: 45%)

Craft and related trades workers (Share Women 0%)

Elementary occupations (Share Women: 54%)

Plant and machine operators and assemblers (Share…

0%   10%   20%   30%   40%   50%   60%   70%   80%   90%   100%
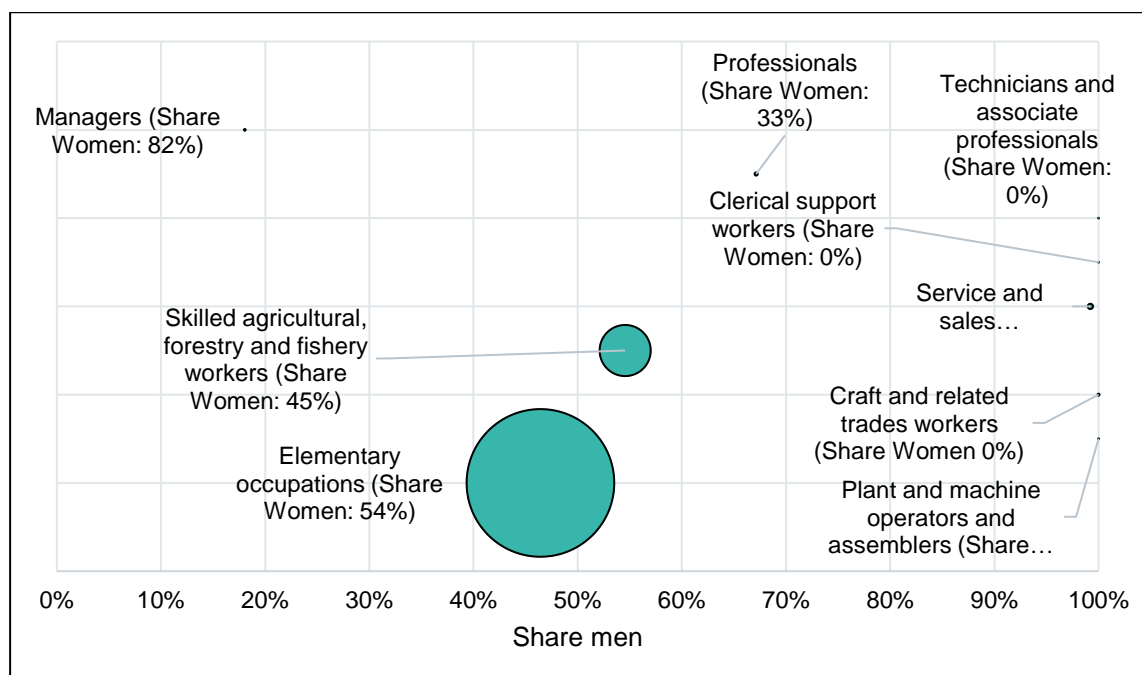
Share men

Source: Author's calculations based on the LFS annual microdata analysis of 2017 and 2022

Workers' characteristics in agro-processing, which is part of the manufacturing sector

✓ It is important to remember the small employment share of the manufacturing sector (5.3% in 2022), which included around 187 000 workers in total within the whole manufacturing sector.

✓ Agro-processing typically includes the manufacturing of food products (C10), of beverages (C11), and of tobacco (C12). On top of these three sub-sectors, this study also included the manufacturing of leather (C15), of wood (C16), and of paper production (C17) under agro-processing[34].

✓ The agro-processing sector (six sub-sectors all together) constituted over one-third of the total manufacturing employment in Rwanda in 2022, representing 1.9% of total employment (down from 2.0% in 2017).

✓ In 2022, the total number of workers in six agro-processing subsectors was around 68 000, with over 40 000 workers employed in the first three sub-sectors.

✓ Food processing had the highest number of workers among the six sub-sectors in 2022, followed by wood production, while workers in tobacco, paper and leather processing were very few with no impact on total employment.

✓ With the exception of a small increase in food processing, employment in agro-processing did not increase much over the five-year period.

✓ In terms of gender, almost three-quarters of workers in the sector were men, with no change in last 5 years. The share of women workers was relatively higher in the sub-sectors of food and beverage processing (33%) compared to leather, wood and paper production (17% in 2022).

✓ The share of young workers was 39% of the total workforce in 2022, with a small increase due to the newly recruited young and more educated females and males in food processing.

Source: Author's calculations based on the annual LFS datasets of 2017 and 2022 (NISR, Labour Force Surveys, 2017 and 2022).

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[34] As there were not enough observations in each sub-sector to get reliable results, the main unit of analysis was the total number of observations in all six sub-sectors together as the agro-processing sector.

The education levels of workers in the agro-processing sector are much higher than the levels in agriculture (Figure 13) – always keeping in mind their limited share in total employment (1.9% of employment). The share of workers with no education in agro-processing was 41% in 2022, down from close to 44% in 2017. Similarly, the share of primary graduates decreased by 5 percentage points (33% in 2022). What is interesting is the opposite gender trends in these education levels: the share of men workers with no education decreased by 4 percentage points in 5 years, while the share of women workers with no education increased by almost 3 percentage points. At the same time, the share of men workers with a primary education decreased by 3 points (37% in 2022) in favour of workers with higher education levels. But the highest decrease was among women workers with a primary education (12 percentage points to 23%) at the expense of workers with higher education levels.

Figure 13: Share of employed persons by education level in agro-processing, 2017 and 2022
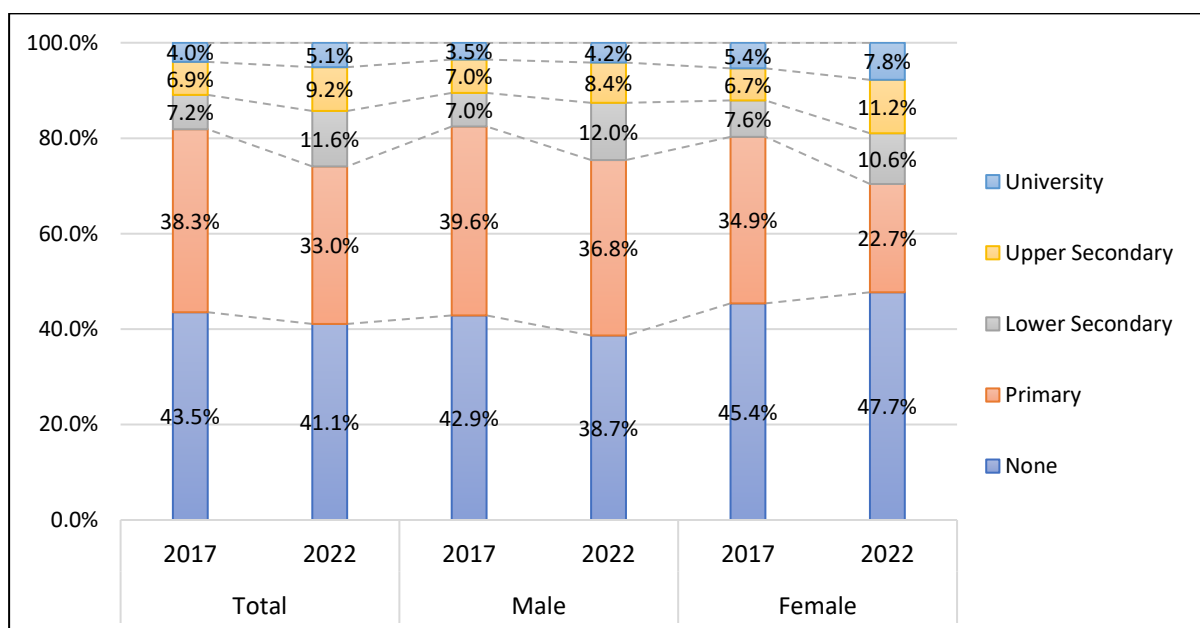
Source: Author's calculations based on the LFS annual microdata analysis of 2017 and 2022

Notes: The agro-processing sector here included the manufacturing of food products (C10), beverages (C11), tobacco (C12), leather (C15), wood (C16) and paper production (C17).

By 2022, there were many more workers with a lower secondary education (11.6%) as well as workers with an upper secondary education (9.2%) in agro-processing. Workers with a tertiary education also increased by 1 percentage point to 5.1% in 2022. Although these educational improvements are visible among both genders, the steep educational increase of women workers is astonishing, especially at upper secondary and tertiary education level. As seen in Figure 12, the share of women workers with an upper secondary education was 11.2 % in 2022, compared to that of men at 8.4%. Similarly, the share of women workers with a tertiary education was 7.8% in 2022, compared to that of men at 4.2%. *These confirm increasing skills needs in the agro-processing sector, attracting gradually more educated workers (19% of women and 12.6% of men workers had an upper secondary or higher education),* although the sector was still dominated by more low-skilled and male workers.

The occupational picture of the workers in the agro-processing sector is different, with a higher share of highly skilled and medium-skilled workers, whose share seems to have increased from 2017 to 2022, albeit with a few exceptions (Table 9). In the highly-skilled category, the share of managers and professionals increased from 2017 to 2022 (3.7% and 2.8% respectively), although at the same time there was a strong decrease in the 'technicians and associate professionals' category. The latter is difficult to interpret since this is a category that is often employed in the manufacturing sector. Similarly, the share of 'service and sales workers' decreased from 25% to 19%, and 'craft and

related trades workers' decreased from 19% to 8%. These developments might be linked to the purchase of new machinery which led to some automation in certain production units.

Table 9 also shows that elementary jobs in agro-processing were still considerable and became the highest category, increasing from 40% in 2017 to 53% in 2022. The second highest category was 'service and sales workers' (almost 19%), and the third was 'plant and machine operators and assemblers (almost 11% in 2022, up from 8.5%). In addition, there was a small increase in 'clerical support workers' (2.1%) and a decrease in skilled agricultural workers. *Overall, the agro-processing sector attracts many more medium-skilled and highly skilled workers in the production process, but elementary jobs still constituted more than half of the workers.*

Almost all occupational categories in agro-processing were male-dominated in 2022 (Figure 14). The bubbles in the figure visualise the size of each occupational group, with being more towards the right meaning a higher share of men. The three bubbles with the highest share of women workers were 'clerical support workers' (53%), 'professionals' (45%), and elementary jobs (43%). Women also constituted 29% of all 'service and sales workers', 16% of 'craft and trade workers', and 14% of 'plant and machine operators'. While women occupied 7% of managerial positions, interestingly there were almost no women workers among technicians or skilled agricultural workers in 2022 (Figure 14).

Figure 14: The gender breakdown of employed persons by occupation in agro-processing, 2022
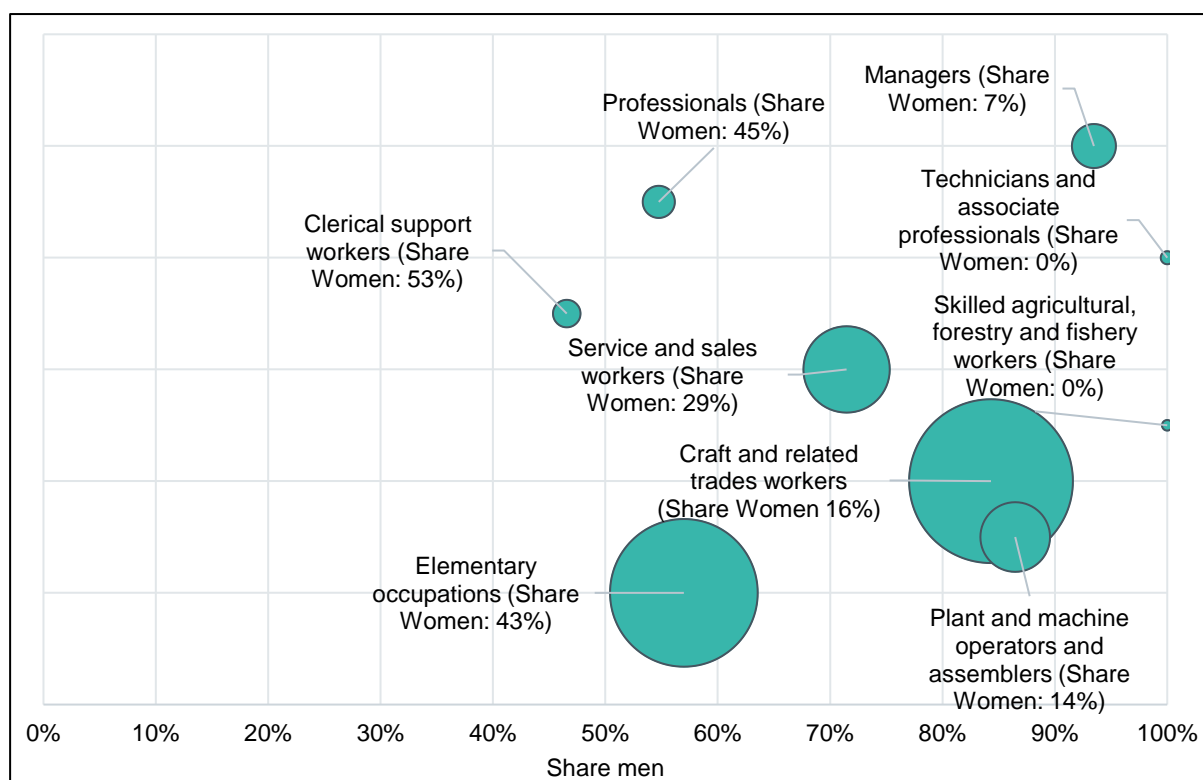
Source: Author's calculations based on the LFS annual microdata analysis of 2017 and 2022

Besides agriculture and agro-processing, there are a few other relevant sub-sectors at ISIC 2-digit levels: **Food and beverage services (I56) and Veterinary services (M75).[35] Employment in food services represented only 1.7% of total employment in 2022,** but it is a dynamic sector which has grown from 1.1% in 2017. The number of workers involved in this sub-sector doubled from 30 000 in 2017 to almost 60 000 workers in 2022. The gender share was slightly in favour of men (58%). Food services is a promising sub-sector in terms of employment growth, if it expands to its potential as it

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[35] The number of observations in both sub-sectors was very small, preventing any reliable analysis of the workforce in terms of education and occupation levels.

has in other developing countries. However, this expansion will depend on several factors, including the increasing purchasing power of households in urban areas.

Employment in veterinary services (M75) had been extremely small, as it constitutes less than 3 000 people in total in 2022 (with no visible percentage in the statistics). It seems that two-thirds of workers in this area were male in 2022, although the female share has increased quite substantially in the last 5 years. The majority of those employed were professionals who had graduated from an upper secondary and university education, although there were also some women performing elementary jobs in veterinary services. Given the large employment numbers in the agricultural sector, the number of veterinary professionals is markedly low, so this group also needs to expand substantially.

Other relevant sub-sectors are **the wholesale and retail trade of agricultural food and non-food products (G46 and G47), land and air transportation of same products (H49 and H51), and warehousing for the storage of those products (H52).** Employment in these 2-digit subsectors is estimated to be quite significant as well, but it is impossible to differentiate in the employment statistics which share of these workers was involved specifically in the handling of agricultural food and non-food products. These sectors will therefore be other important contributors to job creation in the agricultural sector. However, their expansion will depend on several factors, including improvements in the transportation and logistics system and the road infrastructure connecting the production with the markets across the country.

4. SKILLS DEMAND IN THE BROADER AGRICULTURAL SECTOR

This chapter brings together all the information and data available on the skills demand of the agrifood/agribusiness system in Rwanda. The first section starts with a review of existing studies on skills demand in the Rwandan economy, including a presentation of skills demand from agriculture and agro-food sector studies. Within the framework of this study, semi-structured interviews were held on skills demand, with 30 companies and/or institutions selected from a variety of agrobusiness sub-sectors in October 2023 (see section 1.2). The next section summarises the findings from these interviews on skills demand in the sector. Being limited in numbers, the results are not representative of all sectors, but they provide a good indication of skills and occupations for which there is a shortage in the agrobusiness system. The company interviews were complemented by around 15 bilateral consultations with national stakeholders and donors to understand their perception of the sectors and of skills needs. The last section presents the results from these meetings, highlighting key similarities and differences in their perspectives.

4.1. Review of existing studies on skills demand in the Rwandan economy

There are several studies available on skills demands in the Rwandan economy, often covering many different sectors. In agriculture, most studies followed the value chain concept and covered the needs of different stakeholders, from producers to traders and markets, processors, service providers, financers and skills developers (see CESB, 2017a; CESB, 2017b; Diao et. al., 2023; Mastercard, 2021; PSF, 2021; MIFOTRA, 2022b; USAID/RTI, 2023; Enabel, 2023). There are also some stand-alone value chain studies, e.g. on coffee, tea, dairy, poultry, cassava, Irish potato, and horticulture (MINAGRI, 2021). Most studies documented the issue of particularly poor access to finance in the agricultural sector, which was the main reason for the adoption of the 'leveraging private sector strategy' by the government (RDB, 2019a). The recommendations often included unlocking the sector by private business investments, which could be facilitated by access to low-cost loans and grants by private sector and promoting public-private partnerships.

According to the results of World Bank Enterprise Survey conducted in Rwanda in 2019[36], the top two obstacles to growth faced by the 360 firms interviewed were access to finance and tax rates (World Bank, 2020). The third obstacle was equally shared between 'inadequately educated workforce' and 'access to land'. While the former is more important for medium-sized (18%) and large firms (24%), the latter is more important for small firms. All these obstacles were much higher in Rwanda compared to the average in sub-Saharan Africa. The new round of the World Bank's enterprise survey showed a repeat of the same problems for firms, in the same order, namely access to finance, tax rates and unskilled labour (World Bank, 2022). Given the higher unemployment rates among individuals with a secondary education (more than for those with no education or a primary education), the Rwandan economy might be creating more low-skilled jobs in subsistence occupations and thus leaving a 'missing middle' of medium-skilled jobs (World Bank, 2022).

To be more specific, firms in both surveys cited skills gaps in (i) technical, vocational and job-specific skills, (ii) foreign languages, (iii) interpersonal and communication skills, (iv) problem-solving and critical thinking, (v) management and leadership skills, and (vi) IT and computer skills (Shukla, 2023). The top reasons for employee turnover included a low income, poor career prospects, and no job security. Therefore, most of the workforce has a very low level of education or none at all, with very few shares of medium-skilled and highly skilled workers. University graduates form the smallest part of

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[36] For the survey, business owners and top managers in 360 firms were interviewed between November 2019 and March 2020. These companies were primarily selected from manufacturing (all subsectors), construction, motor sales and repair, the wholesale and retail trade, IT, hotels and restaurants, transport and storage. The sample excluded agriculture, fishing, mining, public utilities and public administration, education, health and social work.

the labour force, and despite some differences according to the field of education, they have lower unemployment rates, enjoy higher salaries, and occupy more technical and managerial positions, suggesting high returns for completing higher education and a demand for specialised skills. It is interesting to note, however, that a large majority of these graduates work in the public sector, again hinting at the limited ability of the private sector both in industry and services to absorb and retain them (Shukla, 2023)[37].

A skills audit conducted in the manufacturing sector in 2017 revealed high skill gaps in both technical and soft skills in the dairy, textile and cement sub-sectors (CESB, 2017a). The gaps were particularly high in the dairy sub-sector, limiting the variety and quantity of outputs produced due to low-qualified staff and the practice of hiring expatriates. In 2017, the country had only five main milk-processing plants[38] and about 25-30 small and medium scale processors of cheese and other dairy products. Three-quarters of their employees were male and mostly with only a primary or secondary education, while 4% were expatriates working mainly as operational managers and production managers.

Missing technical skills included all aspects of the dairy value chain from logistics and quality assurance, to processing and marketing (mostly the positions of technicians, specialists, managers, officers in all these phases, including laboratory work). Communication skills, English language and leadership skills were also reported as inadequate and hampering their operations (CESB, 2017a). Missing skills were further aggregated by a low and inconsistent supply of good quality milk, the high cost of processing and packaging, the cost of energy and inefficient processing technologies, and low product diversification and market penetration in the local and regional markets. Given the limited training provided by companies to their employees, recommendations included developing a continuing professional development system by creating a pool of quality industry learning centres (CESB, 2017a).

A gender assessment study of dairy value chains in Rwanda concluded that the policy and legal environment is conducive to gender equality but has yet to translate into fully gender-sensitive dairy value chains (FAO, 2017). Women tend to be most concentrated within production and home processing, and in zero-grazing production systems, which implies a heavy, home-based workload. While they participate in milk collection centres and cooperatives, they tend to be reluctant to take on management roles and are seldom involved in the transport and selling of the milk. Generally, men carry milk on motorbikes and bicycles, or hand-deliver it to the centres, except in women-headed households (FAO, 2017). The benefits associated with milk delivery are affected by accessibility due to difficult terrain. In areas where infrastructure is not in good condition, milk may be wasted due to bad roads and to the long length of time it takes to reach the supply point. Finally, more men than women provide dairy production services, which are tailored more to men than women.

Another skills audit conducted in the agricultural sector in 2017 also showed high skill gaps in the horticulture, coffee and tea sub-sectors (CESB, 2017b). The private sector of horticulture, tea and coffee sub-sectors employed 4 758 qualified staff in 2017, 38% of whom were women. The education levels of staff were slightly higher. The employment of expatriates was lower compared to in manufacturing, and they mainly worked as managers, accountants, and heads of production, maintenance, HR. Hard-to-fill vacant positions included agronomists, IT roles, production and processing managers, quality controllers, artisans, technicians; existing staff in these positions were also missing some technical and soft skills (English, customer care, teamwork, leadership, critical thinking). The study provided a detailed list of the necessary skills and competences for each position in these sectors.

Given the strategic importance of horticulture, coffee and tea in Rwanda's production and export, the main conclusion was that there was the need to train a large and critical mass of professionals as

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[37] The Jobs vs Skills Conundrum: How do we create enough quality jobs and skill the population to meet Rwanda's ambitious growth targets? (worldbank.org), Ananya Shukla, 2023.

[38] These include Inyange Industries, Crystal Industries, Nyanza Dairy, Savanah Dairy, Haji Dairy and Blessed Dairies. The largest milk processor is Inyange, which controls over 75% of the market share of processed milk and milk products in the country (CESB, 2017a).

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horticulturists, agricultural engineers (processing, irrigation, soil and water conservation), food processors/technologists, soil scientists, crop protection and seed technologists, agricultural research officers and post-harvest technology experts. These professionals were only 1% of the total labour force in agriculture in 2017. Skills gaps in coffee and tea production particularly arose from the increasingly stringent quality and traceability requirements, export procedures and standards, marketing and branding, and quality certification standards. An upgrade of skills was strongly needed for professionals and technicians working in production, processing and storage, marketing and distribution, financial risk management and implementation of traceability. The analysis looked at skills gaps both in the public sector (MINAGRI, NAB, NAEB) and in the private sector (CESB, 2017b).

The challenges and opportunities in food and agro-processing have been well-documented in Rwanda in several studies, especially regarding unreliable electric supply, high transportation costs, access to inputs, finance and technology, besides the lack of skills (GIZ, 2019; MasterCard, 2021; PSF, 2021). The latest MIFOTRA study (2022b) described the situation of smallholder farmers in rural areas well, with their lack of access to good quality inputs and training, to good warehousing to store their post-harvest crops, to renting additional land to produce more, to financial opportunities to add value to their production and increase their income. The lack of financial skills (or inadequate financial literacy) among the rural population was astonishing as only half of farmers had their individual bank accounts in the country, predominantly male farmers. Financial literacy was mentioned as the key step necessary in transitioning from subsistence farming to market-driven commercial agriculture by selling outputs into value chains (MIFOTRA, 2022b).

The Private Sector Federation (PSF) also made a skills needs assessment in the agro-processing sector in 2021. According to their findings, the critical skills gaps relate to crop planting techniques, harvest and post-harvest, compliance with the rules, principles and measures required in food processing, conditioning, knowledge of the laws and regulations of the target markets, and knowledge of the rate of change of coffee stocks (PSF, 2021). Particular areas mentioned for skills development were not only technical skills in agriculture (agricultural inputs, cultivation, post-harvest, storage and cold chain, food processing, cheese production, coffee washing and processing) but also managerial and business skills in marketing, managerial and strategic thinking, certification requirements and processes, organising and planning skills. Moreover, soft skills were found to be as important as technical skills. Most of the occupations needed were financial specialists, human resources specialists, procurement specialists, store keeping managers, agronomists, food scientists, mechanics, engineers and technicians in electricity, plumbing and electro-mechanics (PSF, 2021).

The *agricultural sector diagnostics* conducted by the MasterCard Foundation focused particularly on the role of young people in market-oriented agriculture as farmers, traders, service providers and agro-processors, although young people with more education were less interested in 'dirty seasonal work with little earnings' and they had less access to land and finance than the older population (MasterCard, 2021). There was a particular emphasis on three aspects. The first aspect was a conducive ecosystem for entrepreneurship, providing the appropriate support from the start for entrepreneurs. This entails provision of relevant education and training paired with inspiration, mentorships and business development services. The second aspect was financial sector development and support for accessing finance, despite the inhibiting factors, e.g. lack of financial literacy, lack of collateral, lack of formal cash-flows and accounts, and lack of facilities to mitigate risks (MasterCard, 2021).

The third and the last factor was the need for upgrading skills across the entire agriculture market system, including improved agriculture techniques, post-harvest handling and traceability certification. Certification in post-harvest handling and traceability was seen as critical for traders. The needs of the sector range from graduate-level training in areas such as veterinary services, agronomy and food technology, and training to accrediting standards providers, to maintaining mechanical equipment and irrigation and post-harvest infrastructure. Curricula need to include more practical learning and industrial placements where possible (MasterCard, 2021). The application of labour regulations around salaries, written contracts and social security payments was also mentioned, as were reforms for easing formalisation and international certification processes and rationalising tax and tariff barriers to support private sector growth (Shukla, 2023).

The most recent study conducted on agrifood system needs (USAID/ RTI, 2023) also confirms the lack or limited number of specialised agriculture professionals, which limits the sector's ability to adopt modern agricultural technologies and techniques, leading to lower productivity levels, low wages, and limited business growth. It also mentioned limited soft skills and business skills among jobseekers, and the strong need for capacity building for farmers on soil management, crop selection, mechanisation, and irrigation. Rwanda had a shortage of veterinary service providers as well, especially in relation to its small livestock – goats, sheep, pigs, and poultry (USAID/ RTI, 2023). Low digital literacy was another obstacle, although firms have started to adopt new operational models that deliver greater efficiency. Increased internship opportunities for young people, incentives for the private sector to absorb interns and frameworks around how to manage and productively utilise them, and boosting and scaling extension service delivery, were all necessary for creating jobs (ibid).

4.2. Findings from company interviews on skills demand in the sector

As mentioned in section 1.2, we conducted semi-structured interviews with 30 selected companies from the agrobusiness system in the framework of this study *(see **Annex 1** for the list of institutions interviewed or met).* Although the results are not nationally representative due to the limited number of interviews, they show the main issues faced by companies and the skills and occupations that are lacking (Kiberu and Mushumba, 2023).

Cautious optimism in the sector. The findings show a cautious optimism in the agrobusiness sector due to rising opportunities in Rwanda thanks to government policies and support provided to the sector, the emergence of new business models using technology, the rising incomes of customers coupled with population growth and urbanisation, increased demand for processed agricultural foods and increasing private sector investment in the sector. *These are reflected in the rapid growth of the agro-food sector, with many new jobs created in the interviewed companies: in fact, short-term hiring in the last year accounted for 6.8% of their total workforce.* The majority of the newly recruited were young people with an upper secondary and university education, and slightly more men (55%) than women. *This suggests a growing demand for skilled workers in the sector, including higher female employment* (Kiberu and Mushumba, 2023).

For the overall growth of their business and Rwanda's agricultural sector in general, the interviewed companies from different subsectors listed **the most demanded professional and technical occupations** (on the right). In their opinion, "*having a critical mass of these professions is key for transforming agriculture into high-productivity and profitable industry, and a guarantee for food sustainability*" (Kiberu and Mushumba, 2023). This is not about providing a precise number of agronomists needed by each company, but the importance of having fully equipped agronomists in mass numbers for business creation and/or expansion in the country. "*We need many agricultural engineers to help us design and develop new agricultural machinery and equipment for our land*".	The most demanded professional and technical occupations for the growth of their sectors - Agronomists - Agricultural engineers/technicians - Food scientists - Food technologists - Food processing technicians - Quality assurance managers/ technicians - Agricultural equipment operators - Veterinary doctors - Animal science technicians - Agribusiness professionals/technicians - Farm managers/ technicians

Source: Kiberu and Mushumba, 2023, the company interviews conducted in October 2023.

Constraints to business growth. At the same time, the key constraints impeding business growth remained the same: **limited access to finance** (high interest rates, insufficient collateral, a shortage of financial products, etc.); **inadequate infrastructure** (e.g. poor road conditions and unstable energy

supply)[39]; and **skilled labour shortage** leading to high labour costs in the domestic agrifood market (limited Rwandan specialists and imported expatriate experts). Other constraints included **escalating input costs** (e.g. seeds, fertilisers, pesticides) with the high volatility of imports; **import competition** (fierce competition from imported goods, especially the pricing of processed foods); and **climate change impact** (more frequent and severe droughts and floods leading to inconsistent supply of 'raw agricultural products' for processing) (Kiberu and Mushumba, 2023).

Challenges in recruiting and retaining professional workers. Despite advertising the same vacancy many times, the interviewed companies either failed or took more than 6 months to find a worker they needed in their sector. They also experience a high turnover among their skilled employees due to the competition from other sectors. The main reason given is the lack of enough qualified candidates in Rwanda, which is linked to the limited offer of good quality education and training. For the sector to develop, the country needs a 'critical mass' of those professionals listed above[40]. Other reasons are misconceptions about the sector – it is considered a dirty, low-paid and outdated profession; and has notably lower salaries and benefits than those in other sectors for the same professionals[41]. '*Particularly young people do not want to work in farms and post-harvest handling due to the long working hours, physically demanding tasks, exposure to hazardous chemicals, and distance to urban areas*' (Kiberu and Mushumba, 2023).

Hard-to-fill occupations in the last year. Based on the reporting from the interviewed companies on their recruitment efforts in the last year, two such lists have been compiled below, one for agriculture-related and another for non-agricultural occupations needed in the sector. '*Business management skills are essential to help us manage our finances, accounting, marketing and sales, so that we grow and increase our profits*'. The lists reflect the short-term needs of the interviewed companies, equally divided between agricultural and non-agricultural occupations (Kiberu and Mushumba, 2023). It is important to note that several types of medium-skilled occupations are among the hard-to-fill occupations for companies.

Hard-to-fill occupations (agriculture-related)	*Hard-to-fill occupations (non-agricultural)*
✓ Agronomists ✓ Agricultural engineers (mostly irrigation) ✓ Animal scientists ✓ Veterinarians ✓ Food scientists and technologists ✓ Food safety and quality control inspectors ✓ Post-harvest handling/processing machinery operators ✓ Farm managers ✓ Agricultural technicians ✓ Livestock technicians ✓ Dairy technicians ✓ Agribusiness professionals	✓ Different types of managers ✓ Finance officers ✓ Accountants ✓ Electric/electronic engineers ✓ Electric/electronic technicians ✓ Engineering technicians ✓ Machine operators ✓ Machine assemblers ✓ Craft designers ✓ Spatial analysts and technicians ✓ Data analysts ✓ Energy experts ✓ Quality assurance/certification experts

Source: Company interviews conducted in October 2023.

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[39] The statements given in italics between quotation marks are the expressions used by respondents during the interviews. In the words of a company, *'although Rwanda's overall infrastructure is satisfactory, it remains a work in progress, posing challenges and cost increase for our businesses… for instance unreliable and costly power supplies disrupt the smooth operation of the food supply chain, particularly the cold chain segment… this is expounded by poor community roads from agricultural production areas…'*

[40] In the words of companies, '*we are offering a competitive salary and benefits package for a quality assurance manager, but we are unable to find a suitable candidate', 'we are looking for a food scientist to join our team, but we are having difficulty finding qualified candidates'.*

[41] For example, an accountant or an electric technician working in the construction or IT sector is paid much higher than an accountant or an electric technician working in agricultural sector. This is of course also linked to the respective productivity of each sector.

Core, generic and soft skills. There is a consensus among respondents regarding the importance of several core, generic and soft skills in the sector. Almost all respondents mentioned the need for a good level of core skills such as ***literacy and numeracy, foreign languages (English, French and Chinese), digital skills and marketing skills***. Companies consider soft skills to be as important as technical skills for their business. The most important soft skills needed are ***communication skills, teamwork and collaboration skills, problem-solving skills, creativity and leadership***. Respondents also stressed the importance of adaptability, work ethics, customer-orientation, self-initiative, dependability, resilience, and stress resilience or prevention measures in their business. Some of the soft skills are considered gender-neutral, such as dependability, resilience, and stress tolerance, while other soft skills are perceived differently according to gender.

Missing practical skills and work-based learning. There was a consensus among all company interviews, existing studies, donors and national institutions on the need for more practical skills, hands-on training and work-based learning for the graduates of all education levels (secondary TVET, polytechnics, higher education) (Gevel 2022; PSF 2021). This is despite existing internships in companies, industrial attachments, some dual education projects and the emphasis in curricula on both theoretical and practical learning. The respondents mentioned as the reason *'limited period of internships of 1-month, or the low-quality internships due to poor implementation'.* Several stakeholders mentioned the need to increase internship period to at least 3 months. '*There are also many grey areas in internships: who will pay if a student breaks a machinery in workplace? Who will take care if an accident happens to student at work?...The standard checklist given for trainees are prepared from educator perspective only, but it does not include real workplace skills…'* All these aspects need further attention and clarification for the three sides of internships.

Gender inclusion in the sector. The agribusiness/agri-food sector in Rwanda seems to be a significant employer both for men and women, especially in its recent recruitments. In general, all interviewed employers accept the idea that women can perform as capably as their male counterparts, particularly in less physically demanding roles. This is reflected in *'gender-neutral occupations such as agronomy, animal science, farm management, business management'* where companies have no specific gender preference in recruitment. There are also several women-dominated occupations with more women employed than men. According to the interviewed companies, women excel in the occupations listed below, with the reasons specified by them[42]:

- **Quality assurance:** Women's tendency for precision and ability to follow procedures attentively makes them perfect in quality assurance roles, *'they are very good at paying attention to detail which is very important for quality assurance jobs in the agri-food sector'.*

- **Marketing and sales:** Women's interpersonal skills and gift for relationship-building make them particularly adept in marketing and sales occupations throughout the food supply chain, *'women are often more relationship-oriented than men, more customer-oriented than men, which is valuable skills for customer service jobs'.*

- **Food processing and safety:** Women can succeed in food processing occupations, from laboratory services to food safety and hygiene, *'capitalising on their historical role in household food preparation and processing…and their attention to cleanliness and hygiene'.*

- **Finance and accounting:** Attention to detail, precision, and trustworthiness are often considered to be characteristics of women, rendering them well-placed for success in finance and accounting occupations.

Nevertheless, several occupations within the sector are predominantly male dominated, driven by the perception that men possess specific technical and physical capabilities that align with these roles (Kiberu and Mushumba, 2023). For a long time, TVET technical jobs have not been considered

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[42] The statements given in italics between quotation marks were the expressions used by the respondents during the interviews (Kiberu and Mushumba, 2023).

suitable for women, who were seen inherently less capable of performing technical and physically demanding tasks. According to the interviewed companies, the following positions exemplify this trend:

- **Food processing technicians:** As a food processing company owner explained, 'we find that men are more likely to have the technical skills needed for food processing jobs, especially for operating and maintaining machinery…their technical insight is essential for efficiently handling food processing equipment and ensuring the smooth operation of production processes'.

- **Agricultural engineers/technicians:** Engineering skills within the agricultural domain are typically considered physically demanding and are commonly associated with men. 'Men are more likely to have the engineering skills needed in farms that are energy-demanding… their roles often entail heavy machinery operation, construction, and maintenance'.

- **Sales managers:** Men frequently dominate sales positions because they are often associated with assertive negotiation and a persuasive demeanour.

- **IT technicians:** IT skills are traditionally more commonly associated with men, linked to the historical dominance of men in technology and the stereotype of men's strength in technical skills.

Among the interviewed companies, women generally comprise 30-40% of their workforce. This underrepresentation is exacerbated in leadership positions, where women hold about 20-30% of leadership positions. Several underlying reasons contribute to this imbalance, hindering women's participation in the agri-food workforce. The primary barrier is the influence of traditional gender stereotypes; *'women are less enthusiastic to pursue a career in agrifood… family responsibilities prevent them to dedicate themselves, as they want to balance work and family lives... women are often also perceived as being less capable than men of managing and leading businesses…'.* Although many recognise that these perceptions do not accurately represent the potential and abilities of individuals, and promoting diversity and inclusivity in the workforce can lead to more balanced and successful teams, the respondents could not help themselves in perceiving and differentiating gender-specific soft skills.

For example, women are often viewed as good at active listening and empathy, reinforcing gender stereotypes associated with supporting roles in relationship-building. Men and women are considered equally creative, but women are perceived as more intuitive and empathetic, suggesting a holistic and emotionally intelligent approach to creative problem-solving. Additionally, in customer service, women are seen as superior due to their perceived exceptional communication and empathy skills. On the other hand, men are perceived as more assertive and decisive, mirroring traditional stereotypes linking assertiveness with leadership and decision-making. They are often seen as natural leaders, as authoritative, while women are recognised for their collaborative, empathetic and inclusive approach. Adaptability is considered a shared quality, but men are typically viewed as more risk-taking and decisive, suggesting a tendency for bold decisions in uncertain situations. Men are thought to be more analytical and rational, reinforcing the belief that men lean toward logical and data-driven decisions to address challenges (Kiberu and Mushumba, 2023).

Firm strategies to address skill shortages. Many interviewed companies have adopted various strategies to tackle skills shortages, from investing in training and development in the workplace, to offering competitive compensation packages and forming partnerships with education institutions. Some businesses introduced apprenticeship programmes and start-up cooperation. Investing in training remains a core strategy in the sector via **on-the-job training and induction programmes**. Medium and large companies also offer **formal professional training and mentorship** (Kiberu and Mushumba, 2023). Examples of such external courses (paid by companies) in the last year included technical skills training (e.g. agricultural practices, food processing techniques, and the operation of equipment and machinery), soft skills training (communication, teamwork, and leadership), and the new machinery training provided by the owners of the technology bought by the company.

Other most common training topics to be noted are **quality assurance, food safety and hygiene, HACCP system, and accreditation and export procedures in the sector**. These training topics are a good indication of needed skills in the sector. Partnering with education institutions is not rare

among the companies interviewed, but there seems to be a higher preference for higher education institutions. Many of them offer internships to students from various education institutions; their partnerships range from formal Memorandums of Understanding (MoUs) to more informal or ad hoc arrangements. Although relatively less common, some agri-food businesses engage in collaborative research projects with education and research institutions as well.

4.3. Findings from interviews with national stakeholders and donors in the sector

In addition to the semi-structured interviews with 30 selected companies from the agrobusiness system, around 15 bilateral meetings were organised with national stakeholders and donors to understand their perception of the sector and its skills needs *(see **Annex 1** for the list).* This section summarises the findings from these consultations, some of which overlapped with the findings from the company interviews and some others which were new. The first common finding was a *lack of practical skills and work experience*; everybody in Rwanda seems to have this perception of 'lacking practical skills' among graduates of secondary TVET, polytechnics and universities, with exceptions like RICA. They all agree on the limited availability of workplaces for internships in the country, the need to extend internship periods and improve the way they are implemented, with more resources and the involvement of schools and workplaces.

In addition to internships, some stakeholders mentioned *community outreach programmes* as an alternative for workplace learning, when there are not enough workplaces. Although it was not clear what 'community outreach/support programmes' means, it was proposed as a solution for students to replace lacking internships in companies. The idea is that students could get project assignments to improve existing farms, where each student works together with some farmers to deal with the real-life problems of primary production, harvesting, post-harvest activities, marketing and trade. For these project assignments to improve a farm's production and management, however, there is a need for additional resources for agricultural inputs.

Another skill set often mentioned by national stakeholders and donors was *entrepreneurial skills,* seen as vital for the transformation of the agricultural sector in Rwanda (PSF 2021; MIFOTRA 2022b; MINAGRI, 2021). Entrepreneurial skills are often not related to a specific occupation or discipline, but are a combination of technical, management and personal skills such as creativity and innovation, marketing, sense of responsibility and risk-taking (ETF, 2021a). This requires the creation of entrepreneurship ecosystem that is more than teaching entrepreneurship-related subjects in the curricula (e.g. accounting, financial management, marketing skills); students need to experience business development and start-up processes first hand, guided by fresh business owners as coaches to teach, to guide, to inspire students. This could prove to be better way of learning than internships in the longer term.

The *emphasis on entrepreneurship* also comes from the four statements repeated by every stakeholder in the agricultural sector: (i) lack of financial literacy and financial management skills, (ii) extremely low access to finance due to lack of knowledge of financial systems; (iii) lacking business orientation skills (developing business ideas, preparing business plans, procedures for registry and tax systems, accounting); (iv) lack of marketing, packaging, branding skills (see MasterCard, 2021). Therefore, training courses must include ideas on how to increase the value of agricultural products with concrete examples, e.g. maize is sold fresh, but it could be processed for longer-term consumption so that its value is higher for farmers, but it needs packaging, branding, marketing as well.

Training for life skills. Given the very low education level of the young people and women in rural areas often involved in informal operations in Rwanda, several donors mentioned a strong need for large-scale training for life skills as well as vocational or technical skills. This will require off-school skills development programmes for vulnerable women and young people (such as NEETs) and farmers, and extension service officers, possibly in the form of short-term courses and certification of

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informal skills (or validation of non-formal and informal skills). According to a study by Enabel (2023), the majority of vulnerable women and young people in six districts (Kigali, Karongi, Nyamasheke, Rubavu, Rusizi, and Rutsiro) aspire to become an entrepreneur, but often lack any business skills. This requires increasing women's access to extension services, to training, entrepreneurship support and finance (DfID, 2020).

Skills for sustainability was another skillset often mentioned by national stakeholders and donors. These skills are often knowledge, values and attitudes for environmental protection and biodiversity, reducing energy, materials and water consumption, technical skills on green technology (e.g. renewable energy), sewage treatment, waste management (in agriculture and other areas), and the circular economy and recycling. Environmental challenges experienced in agriculture (e.g. floods, landslides, droughts) make these skills vital. Given Rwanda's environmental policy (e.g. ban on plastic bags), the need for sustainable and affordable packaging is high.

The circular economy and recycling are creating new business opportunities. With increasing waste both in urban and rural areas, the skills to be able to transform waste into higher value products presents a niche. Potential areas are: converting wastepaper into single use bio-packaging; use of fruit peel waste to create environmentally safe cleaning enzymes as an alternative to chemical soaps; textile waste recycled into decorative bricks and wall finishings; charcoal bricks from coffee and rice husks (Enabel, 2023). Another idea developed by Enabel was based on the extensive use of bicycles in the Kivu belt districts to carry limited agricultural products. Electrifying these bicycles could improve the transport of products for farmers. Developing electric-powered hand tools in agriculture such as electric mowers, pruners, planters and harvesters is another example (Enabel, 2023).

Several institutions mentioned the lack of **highly specialised skills in food processing** and frequent use of expatriate specialists (Kenyans, Ethiopians, Ugandans, Rwandans abroad) as their replacement. Moreover, the companies interviewed often organise and pay for training courses for their employees, mostly on sanitation, food hygiene and safety, safe packaging, occupational health and safety, and transport and cold storage conditions for primary products. Several companies mentioned lacking experts in 'applied micro-biology' and food testing. There is no 'dairy science' or 'meat science' in the current university system; a highly developed 'food science and technology centre' is strongly needed. At the same time, it must be noted that there is currently an Erasmus+ project (EnrHed) working on establishing an MSc programme on 'Food Science and Technology' at the University of Rwanda with support from the University of Parma and others.

Food services (both food production and consumption places) are another fast development area in need of a high number of professional staff (gastronomists, chefs, sommeliers, etc.). According to some observations, agro-science at Level 4 TVET is highly needed in the sector, especially linked to occupations in the culinary field, hospitality and tourism. Intermediation services are also needed, from harvesting and post-harvest handling of food, to their arrival at the food processing factory. According to some interviews, food scientists at TVET level could fill in this gap in Rwanda. Post-harvest loss is a big issue, mainly in terms of waste from excess production and no logistics facility, and TVET graduates could ensure a hygienic connection from production to processing.

In addition, there could be more training investment in areas that are not common in Rwanda, such as *beekeeping, fishing and aquaculture*. A recent Enabel study (2023) found that the KIVU belt has a potential for fish farming (e.g. cage fishing), but no specific courses/training are found on aquaculture and the fish value chain. This could be a burgeoning sector with the potential to create meaningful jobs for young people and women (Enabel, 2023).

Regarding some non-farm technical occupations, the maintenance and repair of agricultural machinery was reported as a big problem in Rwanda; if a tractor is broken it is very difficult to find someone to repair it. There is a strong need for machinery technicians who can maintain and repair the machines of food production companies – which are currently imported from Kenya and Uganda. Vehicle mechanics need to have a specialty in these agricultural machines. Engine and machinery repair and plumbing are in high demand in agriculture. Mechanical engineers need to know about specific farm construction and animal barns, which are different from apartments. Farm infrastructure must have an efficient design, for the sake of both animals and farmers.

Like any other sector, the agricultural sector also uses ***business services and related occupations,*** such as: salespeople and export and trade officers; different types of managers; project managers and operation managers; production team leaders, etc. The current situation in agriculture points to a strong need for workers with business skills in Rwanda – that has nothing to do with agriculture-related programmes. Business services includes management, marketing and sales, and export and trade. Such professions are relevant to the business models that companies adopt and the way they organise production, marketing and sales (work organisation). For example, adding value to a traditional export product (e.g. tea, coffee) is often the task of business consultants (marketing, branding, selling), sometimes with the support of agro-scientists.

5. THE RWANDAN EDUCATION SYSTEM AND SKILLS SUPPLY IN AGRICULTURE

This chapter focuses on the Rwandan education system, starting from a broad overview of education and finishing with specific vocational skills in agriculture. The first section provides a brief picture of developments in primary, lower and upper secondary and higher education, with statistics. After highlighting the main issues needing attention in the system, the second section presents the skills provision of the technical and vocation education system (TVET). Special attention is given to courses in agriculture-related trades at different levels of education.

The third section discusses access, quality and gender equality in TVET supply, where there are few studies in the literature. This missing information is partially compensated for with the findings from the semi-structured interviews and focus groups conducted in seven selected schools in the framework of this study in October 2023 (*see Section 1.2 and Annex 1 for the list*). Due to the limited number, the results are not representative of all schools, but they provide a good basis for the main challenges faced in agriculture-related courses. Finally, the last section reviews the trends of young people transitioning from school to work in agricultural trades, mainly by summarising the results of tracer studies as well as the findings from the interviews and focus groups.

5.1. An overview of the Rwandan education system

The Rwandan government is committed to reaching **Universal Education for All,** which is one of the most important Millennium Development Goals. In line with national development strategies, the **Ministry of Education (MINEDUC) has focused on rebuilding human capital and increasing enrolment rates in the post-genocide years:** in 1996 it introduced 6-year primary, 3-year junior (lower) secondary, and 3-year senior (upper) secondary education. In 2006, *the Education Sector Strategic Plan (ESSP 2006–2010)* introduced free compulsory schooling for a *9-Year Basic Education* (so-called 9YBE), including primary and lower secondary. While enrolment rates have gone up, school-related costs remain a barrier for many.

In 2008, in an effort to stimulate Rwanda's integration within the East African Community (EAC), English was adopted as the national teaching language, and only the first three years of primary (P1-P3) are still taught in Kinyarwanda. French and Swahili are taught as an elective or supplementary subject in public primary and secondary schools. Each year, over a hundred thousand Rwandan students take the national secondary education ordinary level test at the end of Junior Secondary School (9th grade) in nine subjects. If failed, a student can retake the third year or decide to join a private school. Many Rwandan students attend public boarding schools, many of which are highly competitive. There are also private secondary schools in the country. Students must take a national secondary education advance level exam to graduate.

Since 2012, under the *Education Sector Strategic Plan (ESSP 2013-2015),* the focus has shifted from increasing 9YBE access and enrolment to improving the quality and relevance of schooling, as well as increasing access to secondary level schooling with the introduction of the *12-Year Basic Education (12YBE).* This made 12-year schooling free up to upper secondary in Rwanda, although full implementation still needs significant investment and improvements. The latest **Education Sector Strategic Plan (2018-2024)** has been developed through the collective efforts of MINEDUC and relevant stakeholders in the education sector. The overarching objective of the strategy is to develop skills to strengthen the quality and relevance of education, and to better prepare students to meet the demands of the labour market.

In addition, Law No 010/2021 of 16/02/2021 determining the organisation of education lowered the official school age by one year at all levels: for pre-primary from 3 to 5 years old, for primary from 6 to 11 years old, for lower secondary from 12 to 14 years old and for upper secondary from 15 to 17 years old. This means that school attendance is mandatory in Rwanda for the 6-17 years age group. In the

same year, MINEDUC also started to build 56 TVET wings at existing 12YBE schools (all day schools) and introduce professional/vocational courses within this programme.

All these initiatives to expand free and compulsory education to 12 years show the government's considerable commitment to the sector. As a result, the literacy rate of the population aged 15+ has increased from 68% in 2012 to 79% in 2022, although 22% of the population has still never attended school (NISR, RPHC5 2022). Another major reform was changing the curriculum, switching from knowledge-based to competence-based, thus making it responsive to the needs of learners, society and the labour market. The new curriculum requires major changes in the teaching methodology and the use of a wider range of assessment techniques.

Table 10 gives a snapshot of education statistics in the 2021/22 school year. According to the NISR, there were a total of 4 842 schools, with pre-primary, primary, secondary levels and TVET L1-L5 in Rwanda, levels that are collected through SDMS (School Data Management System). As schools often offer multiple levels of education, the number of schools cannot be summed up based on each level. In the same year, the total number of school staff was 125 621, including both teaching and administrative staff, while the total number of learners in the system exceeded 4.16 million (Table 10). It must be noted that the share of female staff is high only in pre-primary and primary education, but their share decreases significantly in upper secondary education (below 34%), TVET education (below 30%), and polytechnics and higher education (29% both) (NISR, 2021/22 ESY).

Table 10: Rwandan Education System in numbers, school year 2021/22

Education levels	No of schools	No of teachers/staff*	No of learners
Pre-primary education	3 808	8 902 (78.8% female)	355 325 (gender equal)
Primary education	3 831	66 559 (57.4% female)	2 742 551 (49.5% girls)
Lower secondary education	1 955**	31 999** (33.5% female)	540 634 (54.5% girls)
Upper secondary general+ professional			189 660 (58.2% girls)
TVET Schools L1-L5	422	5 828 (29.5% female)	83 458 (41.7% girls)
Polytechnics	8	1 492 (29% female)	13 393 (25.6% girls)
Higher education	31	4 758 (29% female)	82 470 (38.7% girls)
Adult literacy	5 076	6 083 (41.3% female)	116 028 (62% females)

Source: NISR, 2021/22 ESY, 2023. Notes: *The number includes both teaching and administrative staff.

** The numbers of schools and staff include both lower secondary and upper secondary education together.

A comparison of these numbers with previous years reveals a school system that is still expanding in terms of numbers of schools, classrooms, teachers and learners over recent years. There are on average 41 pupils per classroom at pre-primary, and 60 pupils per classroom during primary education, despite the existence of double shift education at this level. At secondary level, the students-per-classroom ratio remains at 37, while at TVET level, the trainees-per-classroom ratio improved to 25 (NISR, 2021/22 ESY). There is a gender disparity in favour of females in pre-primary, primary, lower and upper secondary levels, while males have higher enrolment in TVET and higher education institutions.

As seen in Table 11, **the gross and net enrolment rates in Rwanda are still very low – except for primary education – and need to be improved substantially**. After primary education, the gross enrolment rate (GER) decreases to 57% in lower secondary education and further falls to as low as 28% in upper secondary education (NISR, 2021/22 ESY). In fact, school attendance among children aged 13-18 years was 65% in 2022, and less than half of the Rwandan children who are supposed to attend secondary school do actually attend that level (NISR, RPHC5 2022). Compared to the high

number of students in primary education in the first 6-years (2.7 million), the total number of students in lower and upper secondary education in the next 6 years was considerably low (800 000) – one-third of primary school students. **This indicates high early school leaving at the end of primary education and the need to keep students in the following phases of education** (World Bank, 2022). If the government wants to increase enrolment in secondary education, it will require heavy investment both in lower and upper secondary school systems.

Table 11: Gross and net enrolment rates and students in the Rwandan education system, 2021/22

Education levels	GER	NER	No of students
Pre-primary education (aged 3-5)	33.2	24.2	355 325
Primary education (aged 6-11)	141.5	87.3	2 742 901
Lower secondary educ. (aged 12-14)	57.1	12.8	540 671
Upper secondary education (aged 15-17)*	27.6	5.7	273 118
Higher education	7.1	-	82 470

Source: NISR, 2021/22 ESY, 2023. Notes: *Upper secondary education includes general upper secondary (sciences, humanities, languages), professional upper secondary (TTCs, Nursing and Accounting), and TVET schools (L3-L5). GER: Gross enrolment rate, NER: Net enrolment rate.

According to the NISR, *there are serious education losses at different levels of education.* In the 2021/22 school year, almost 63% of students in primary education experienced delays or difficulties in completing their education within the expected timeframe. This number was more than 46% in secondary education. In primary education, only 68% of students could meet the academic requirements set for promotion, while the repetition rate increased to 24.6% partly due to the Covid-19 pandemic effect on learning, and the dropout rate was 6.4%. At lower secondary level, the corresponding numbers were a 73.5% promotion rate, a 14% repetition rate, and a 12.5% dropout rate. In both levels, failure has been more common among boys. At upper secondary level, the respective shares were 89.3%, 4.8% and 5.9%, but more girls than boys failed this time. Overall transition rates were 67% from primary to lower secondary school (more girls), and 74% from lower to upper secondary education (more boys) in Rwanda (NISR, 2021/22 ESY). *These issues require several measures to reduce pupils repeating years, to reduce dropouts and to increase the quality of learning at these levels.*

The state has already developed several actions to increase school attendance, such as school feeding programmes or boarding schools. Recognising the effectiveness of school feeding programmes also in addressing child nutrition and improving educational outcomes, they were scaled up to all education levels, resulted in 86.3% of schools included in this programme in 2021/22. Boarding facilities were also expanded, reaching almost 69% of all students in TVET L1-L5 programmes, and 19% boarding for students in other secondary education institutions. The share of schools using ICT for teaching and learning reached 47.2% in 2021/22, while internet connectivity rose to 56.7% during the same period. The number of students per computer was 9 students in 2021/22. At the same time, however, around 81% of schools had access to on-grid electricity, and 82% of schools had access to tap water. *Therefore, almost one-fifth of all schools need significant improvements in access to electricity and water, as well as other infrastructure as basic as toilets.*

It must be emphasised that a significant number of Rwandan schools are owned and run by government-subsidised religious groups, NGOs and private individuals. Out of 4 842 schools at all levels, only 32% are owned by the government. Almost 29% of schools are Catholic-affiliated, 17% Protestant, 14% individuals or NGO-owned schools, 2% Adventist schools, 0.7% Islamic schools and 6% are owned by parents' associations or teachers (NISR, 2021/22 ESY). The share of government-owned (public) schools is 34% in primary education, 36% in both secondary and TVET education, and

a small minority in polytechnics and universities. Out of all students, 38% of them attend public schools, 52% government-subsidised schools, and almost 10% private schools. This highlights the significant presence of religiously affiliated schools (almost half of them and over half of students), alongside contributions from parents' associations, teachers and private entities.

Table 12 shows the increasing number of students at upper secondary, TVET and higher education over recent years. Upper secondary education consists of general upper secondary (science, humanities, languages), professional upper secondary (teacher training colleges, nursing, accounting), and TVET schools L3-L5. Their respective shares among the total upper secondary students were around 65%, 8% and 27% in the 2021/22 school year. From 2017 to 2022, the number of general upper secondary students increased by 21%, the number of TVET students by 5.9%, the number of professional upper secondary students by 124%. The unusual increase in the last one is linked to shifting the categories of nursing and accounting from TVET to professional upper secondary last year. On the other hand, the increase of students in polytechnics has been 28.5%, while in universities it remained very modest (2.1%) – similar to TVET. *Girls are in the majority in pre-primary, primary, lower and upper secondary levels, while boys have higher enrolment rates in TVET and higher education institutions* (Table 12).

Table 12: Number of students in upper secondary, TVET, and higher education in Rwanda

EDUCATION LEVELS	2017	2019	2021/22
UPPER SECONDARY TOTAL	**214 960**	**235 178**	**259 822 students**
General upper secondary- total	**139 319**	**158 489**	**168 595 (Females: 56.4%)**
• *Sciences*	*78 892*	*90 567*	*99 630 (Females: 57.5%)*
• *Humanities*	*30 562*	*34 981*	*32 671 (Females: 53.5%)*
• *Languages*	*29 865*	*32 941*	*36 294 (Females: 58.3%)*
Professional upper secondary- total	**9 397**	**9 320**	**21 065 (Females: 61.7%)**
• *Teacher Training Colleges (TTC)*	*9 397*	*9 320*	*11 565 (Females: 57.4%)*
• *Nursing**	*-*	*-*	*209 (Females: 44%)*
• *Accounting**	*-*	*-*	*9 291 (Females: 83.6%)*
TVET Schools L3-L5	**66 244**	**67 369**	**70 162 (Females: 39.6%)**
TVET L1-L2	**13 351**	**15 788**	**13 296 (Females: 53.1%)**
TVET short courses	**17 486**	**9 932**	**35 876 (Females: 52.9%)**
Polytechnics	**10 420**	**14 078**	**13 393 (Females: 25.6%)**
Higher education	**80 773**	**72 128**	**82 470 (Females: 38.7%)**

Source: NISR, 2021/22 ESY, 2023. Notes: *Previously Nursing and Accounting were counted among TVET but shifted to professional upper secondary since the 2021/22 school year.

As per government policy, both secondary schools and TVET schools are being expanded to more than one level to maximise the efficiency of sources. The number of schools with TVET L1-L5 increased to 422 schools in 2020/21, around 55% of which have only TVET level, while around 45% of them introduced new levels (pre-primary, primary or secondary levels). **The creation of 56 TVET wings could explain the increase of TVET schools with more than one level.** At the same time, only 36% of these TVET schools are public (though their number is increasing), while 21% are government-subsidised and 43% are private schools. The breakdown of data indicates that the

Government and the Catholic church owns most TVET schools (36% and 22% respectively), while another considerable share is owned by individuals/NGOs and parents' associations, 14.7% and 12.3% respectively.

These education statistics indicate that Rwanda needs to continue its massive efforts to build human capital if it wants to realise its ambitious growth targets – '*its own education-focused Marshall Plan'* in the words of the World Bank. *A strong foundation in basic education is a must since a lot of discussions are ongoing for high repetition rates, high dropouts, poor quality of education*. The number of schools, teachers and students has been increasing at all education levels, including pre-primary, primary, secondary and TVET, while significant growth is noticed in the number of schools offering TVET education. Yet, the country still lags behind the average of low-income countries in primary and lower-secondary school completion (WB and GoR, 2020). Given the high number of students in primary education, the education system needs to expand further to accommodate the transition of new students from primary to lower and upper secondary. The most important actions needed are increasing enrolment and completion rates, reducing dropouts and repetition rates, ensuring better learning outcomes and building school and teacher capacities.

5.2. Technical and vocational skills supply in Rwanda

This section focuses on TVET provision, to understand its position within the whole education system, including training levels, trades and the conditions of the courses offered. Given the direct relationship between the quality of primary and secondary education and the quality of TVET, we should not forget the critical importance of a firm foundation of basic skills in primary and secondary education as a precondition for TVET's success (WB and GoR, 2020).

The Rwandan TVET system includes **three levels.** *The first level is Vocational Training Centres (VTC) (Level 1-2),* managed by the **Rwanda TVET Board (RTB)**. Level 1 is the lowest level of short-term training course (3,6,9 months) instructed in the local language (Kinyarwanda), often addressing the needs of adults with a low level of education or no education at all who are 16 years and over. Level 2 is a 1-year course instructed in English for those who are 16 years and over and have completed 6 years of primary education (RTB, 2022). The total number of students in the 2021/22 year was 13 296 and more than 53% of them were female (Table 12). Compared to previous years, the number of students at L1-L2 level has remained the same, if not decreased.

In addition, short-term TVET courses are available to adults. Table 13 below shows the total number of trainees in short TVET courses by year and type of intervention. The number of trainees in short TVET courses varies greatly from one school year to another, indicating the instability of resources and improvisation. In the 2021/22 school year, 35 876 trainees took short-term TVET courses in Rwanda. School-based training was the newly introduced programme and the most dominant type, with 45% of total trainees in short courses (Table 13). In the same year, the share of female trainees was generally higher than that of male trainees in all types of intervention, except for recognition of prior learning. Overall, almost 53% of all trainees were female.

Table 13: Trainees of TVET short courses by type of intervention

Interventions / Year	2016/17	2017/18	2018/19	2020/21	2021/22 + % F
Total number of trainees	17 486	9 650	9 932	8 561	35 876
% of Males	79.8%	45.6%	65.8%	69.0%	47.1%
% of Females	20.2%	54.4%	34.2%	31.0%	52.9%
• *School-based training*	-	-	-	-	*15 354 (65.4%)*
• *Recognition of prior learning*	*10 283*	*347*	*1 044*	*5 029*	*6 384 (18.3%)*

• *Industrial-based training*	*1 448*	*386*	*58*	*769*	***7 580** (51.7%)*
• *Massive vocation training*	*3 973*	*1 942*	*886*	*662*	***3 063** (63.4%)*
• *Rapid response training*	*1 300*	*1 250*	*300*	*2 101*	***1 722** (60.0%)*
• *Other programmes*	*482*	*5 725*	*7644*	*-*	***1 773** (49.2%)*

Source: NISR, 2021/22 ESY, 2023.

Information is not available regarding the impact of these short-term TVET training on participants, or on if and how they were subsidised and delivered. International experience confirms greater success when training goes beyond technical skills and combines general and specific vocational skills, community-based training and on-the-job training (EN RLMM, 2019). Basic life skills, such as numeracy, literacy, problem-solving, management, communication and negotiation skills, improve confidence and facilitate the capacity to explore and try new income-earning opportunities. Soft skills training also proved to be particularly important in the informal economy, due to the needs of women – to acquire skills that empower them, such as self-confidence, negotiation and organisational skills. The training delivery format is also important: attention to duration (better if in short and competency-based modules) and to logistics (convenient hours and locations) is also essential in raising trainees' interest. Training outreach could be expanded with community-based training, distance learning and mobile training.

The second level is Technical Secondary Schools (Level 3-5), managed by the RTB. This category accepts students after 9th grade for up to 3 years of technical and vocational education. Around 366 TVET schools are at this upper secondary level, and 219 of these schools are fully privately owned. Within the 12-year compulsory education in Rwanda, students in the 9th grade can choose between TVET and general education for the last 3 years of their education. TVET education is not free; students must pay a school fee. According to the recent decision by the MINEDUC, secondary school students will pay RWF 19 500 ($20) for day scholars and RWF 85 000 ($85) for boarding. This means RWF 765 000 to be paid for 3 years of a TVET diploma programme (RWF 85 000 per term x 3= 255 000 annual x 3 years = 765 000). All TVET schools have mixed gender classrooms and dormitories as the accommodation cost is an important obstacle for many students from rural areas.

As shown in Table 12, there were 70 162 students registered in TVET L3-L5 during the 2021/22 school year, an almost 6% increase from 2017. In total, 39.6% of these students were female. The Government aimed to increase the share of TVET education to 60% after 9th grade by 2024, but the share of TVET L3-L5 students remained at 27% of the total number of upper secondary students in 2022. Based on the new information provided by the RTB, the total number of L3-L5 students registered for the 2022/23 school year has increased to 87 172 students. This shows a significant (positive) increase from one year to another (over 24%), increasing the share of TVET students to almost one-third of the total number of upper secondary students. The increase can be attributed to several factors, such as increased awareness of the benefits of TVET, improved access to TVET institutions, and evolving industry demands.

Specifically, in the 'agriculture and food processing' sector, there are training programmes for seven trades: agriculture / crop production, animal health, food processing, forestry, wood technology, water and irrigation and leather technology. Most of these students are registered in four trades: agriculture, animal health, food processing, and wood technology, all of which have more female students than males except wood technology (vice versa). More detailed numbers on students in six agricultural trades (agriculture, crop production, animal health, food processing, forestry, wood technology) by L3-L5 in secondary TVET schools is provided in a table in Annex 2 (at the end of report).

There are 43 Secondary TVET Schools which provide L3-L5 courses with those six agriculture-related trades (crop production, agriculture, animal health, food processing, forestry, wood processing). Eighteen of these schools are specialised in agriculture and provide training only for agriculture-related trades, while others provide training both in agriculture and other trades. The total number of

students at this level is 8 061 in agriculture-related trades, although some of these schools also provide short-term courses in agriculture at L1 and L2. The course programmes in agriculture and crop production are similar, but the content of the former is broader than the latter[43]. Training in water and irrigation, wood technology and leather technology are provided only at the polytechnics at levels 6-7.

The third level is **Polytechnics (Level 6-8),** *managed by Rwanda Polytechnics (RP).* Polytechnics consist of eight colleges in total, seven public and one private college. These are called Integrated Polytechnic Regional Colleges (IPRCs) and were created to respond to the need for higher level technicians with an advanced diploma. They provide 2/3/4 years of education at Levels 6-7. Application is open to all graduates of general and TVET secondary schools, but the majority of students come from TVET schools. However, not all colleges are at the same level, as some colleges provide much higher quality and others are of low quality. Some of these colleges were transformed from an old TVET school to a Polytechnic, so their quality reflects this.

As shown in Table 12, there were 13 393 students in the Polytechnics in the 2021/22 school year, 25.6% of whom were female. In 2023, the female share of total students reached 29%. The RP had over 4 000 students enrolled in 2023, while there were 886 students in 2023 in all courses under the Agricultural Engineering Dept, plus 138 students in the veterinary programme. To attract more students, recently RP developed a 1+ year Bachelor of Technology (BT) degree in Food Processing and Agricultural Mechanisation courses. Corresponding to L8, in this way, students can complete one more year after 3 years of education, to get their more prestigious BT. Looking at RP graduates over 2018-2023, Figure 15 below shows a continuous increase of graduates over recent years (RP, 2023).

Figure 15: Number of graduates from Rwanda Polytechnics, 2018-2023
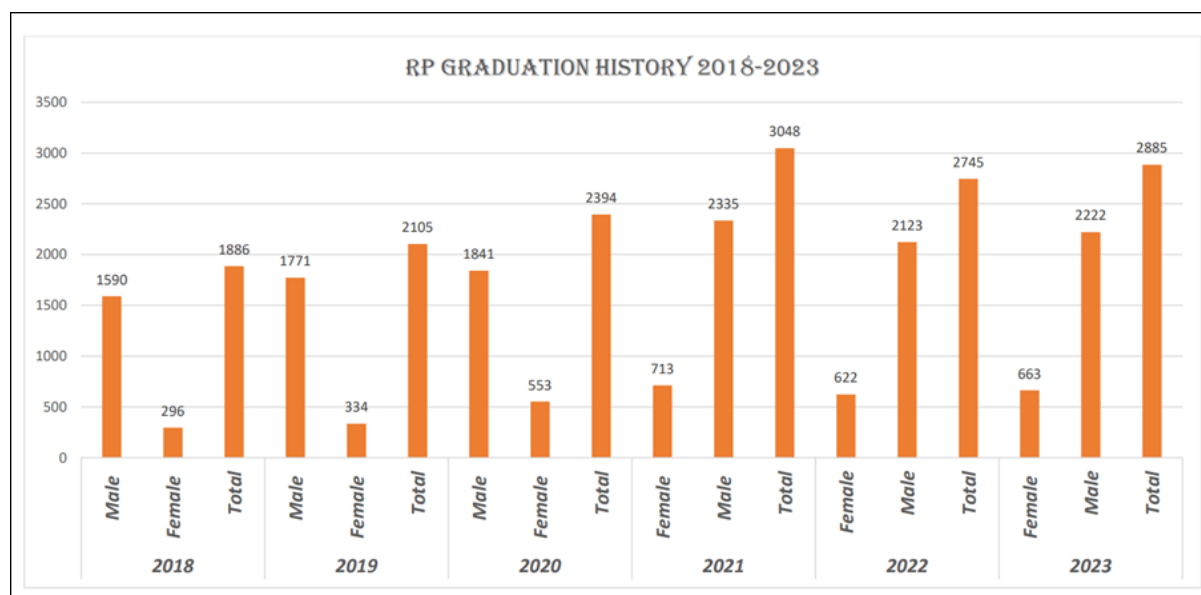
Source: RP, 2023, index.php (rp.ac.rw).

Similar to TVET schools, all IPRC colleges charge tuition fees. Students can apply for student loans from the state to cover these (on average, almost 75% of students are granted the student loan). The tuition fees seem to be a significant barrier for many in accessing TVET, polytechnics and higher education in general. According to anecdotal evidence, most of the scholarships offered to girls are for higher learning institutions and very few for secondary TVET studies.

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[43] In the recent review of curricula, the 'crop production' trade was changed to agriculture. The 'agriculture' curriculum has most of the content from crop production, plus agriculture-mechanisation-related content. The agriculture curriculum also started to be implemented last year at level 3 and level 4 will start this year, while crop production is now being phased out and exists at levels 4 and 5.

It is important to clarify that RP is formally included within the higher education institutions (HEIs), so the numbers of student enrolments and graduates given for the HEIs include students and graduates of the RP system. In addition to the eight RP colleges, there were two public and 29 private general higher education Institutions in Rwanda in the school year 2021/22. Table 14 below shows the total number of students (and gender share) enrolled in higher education institutions by field of education, which also includes RP students. As seen in the row 'Agriculture, forestry, fisheries and veterinary' field, the number of students enrolled was 4 741 students in the 2021/22 school year, 41.6% of whom were females. These agriculture-related fields represent almost 5% of the total number of higher education students (Table 14).

Table 14: Higher education students enrolled by field of education*

Field of education/ Year	2016/17 + Female share	% of total students 2017	2021/22 + Female share	% of total students 2022
Education	10 906 (36.8%)	12%	20 276 (43.2%)	21.2%
Arts and humanities	2741 (73.1%)	3.0%	5773 (39.8%)	6.0%
Social sciences, journalism	4309 (52.1%)	4.7%	2129 (45.3%)	2.2%
Business, admin. and law	30 360 (57.2%)	33.3%	22 459 (58.1%)	23.4%
Natural science, maths, stats	3977 (34.3%)	4.4%	5802 (46.3%)	6.1%
Information/comm. technology	9309 (35.7%)	10.2%	10 168 (35.8%)	10.6%
Engineering, manufacturing, construction	11 228 (17.2%)	12.3%	13 105 (21.4%)	13.7%
Agriculture, forestry, fisheries and veterinary	**4 302 (39.6%)**	**4.7%**	**4741 (41.6%)**	**4.9%**
Health and welfare	7230 (51%)	7.9%	7625 (48.7%)	8.0%
Services	6831 (53.4%)	7.5%	3785 (58.4%)	3.9%
Total numbers	**91 193**	**100%**	**95 863 (32.2%)**	**100%**

Source: NISR, 2021/22 ESY, 2023. Notes: *Higher education includes both polytechnics and universities.

On the other hand, the number of graduates has been much lower in higher education compared to the number of enrolments. As seen in Table 15, on average, around 23 000 students graduated from higher education in each respective year of 2020 and 2021, between 55 to 60% of whom were males. Graduates of agriculture and veterinary fields constituted 3.5% of all graduates in 2021, this number slightly decreasing from 862 in 2020 to 818 in 2021. Almost 66% of all agriculture graduates were men in 2021, albeit down from 69% the previous year. Between these two years, an increasing number of graduates is observed in the arts, humanities, social sciences, ICT and health fields, while there was a drop in graduates in education, business, natural sciences, engineering and manufacturing.

Table 15: Higher education graduates by field of education*

Field of education/ Year	2019/ 2020			2020/ 2021		
	Male	**Female**	**Total**	**Male**	**Female**	**Total**
Education	2183	1584	3767	1943	1235	3178
Arts and humanities	386	372	758	618	511	1129

Social sciences, journalism	507	391	898	761	603	1364
Business, admin. and law	2455	3437	5892	2044	3472	5516
Natural science, maths, stats	879	583	1462	668	496	1164
Information communication tech.	1055	823	1878	1551	1000	2551
Engineering, manufacturing, construction	3253	870	4123	2771	762	3533
Agriculture, forestry, fisheries and veterinary	**596**	**266**	**862**	**537**	**281**	**818**
Health and welfare	960	811	1771	917	1191	2108
Services	769	1066	1835	1087	907	1994
Total numbers	**13 043**	**10 203**	**23 246**	**12 897**	**10 458**	**23 355**

Source: NISR, 2023. Notes: *Higher education includes both polytechnics and universities.

Here is the list of all higher learning institutions with agriculture trades, all public except the last one in the list which is private:

- IPRC Musanze located in the Northern province, Musanze District, Nyakinanama sector with one agriculture related department 'agriculture engineering'.

- IPRC Kitabi located in the Southern province, Nyamagabe district, Kitabi sector with nature conservation and forestry departments.

- IPRC Huye, located in the Southern province, Huye district, Ngoma sector with crop production and mechanical engineering departments.

- IPRC Gishari, located in the Eastern province, Rwamagana district, Gishari sector with agriculture engineering and mechanisation engineering departments.

- University of Rwanda, college of agriculture, animal science and veterinary medicine located in the Northern province, Musanze District, Busogo sector, which has four schools: School of Agriculture Engineering, School of Agriculture and Food Sciences, School of Veterinary Medicine, and School of Biodiversity Conservation.

- Rwanda Institute for Conservation Agriculture RICA) located in the Eastern province, Bugesera district, Gako sector.

There are also some TVET agricultural schools par excellence – for example, the Horticulture Centre of Excellence (HCoE) in Mulindi, in Gasabo District, in cooperation with Israel. It functions under the RAB and delivers training specifically to cooperatives and large farmers in horticulture. The Centre of Excellence in Biodiversity and Natural Resource Management under the University of Rwanda is another example at university level, as is the higher education institution privately-owned by an American philanthropist, the RICA-Rwanda Institute for Conservation Agriculture. African *Livestock Centre of Excellence,* also hosted by the University of Rwanda is another impressive example.

5.3. Access, quality and gender equality in TVET supply

There are only a few studies on access, quality and gender equality issues in the TVET system in Rwanda. A study from 2020 on the socio-cultural barriers young females faced in accessing TVET education revealed that there is a belief that men have a greater innate technical capacity than women and are thus predisposed to excel at programmes with sciences and maths (Nshimirimana and Kitula, 2020). The idea that male heirs should be invested in for the continuity of the family, parents' belief

that girls are inept at TVET, such subjects being labelled as male-reserved areas, the physical distance from students' homes to training centres and the conditions at female boarding facilities are additional factors. The study also showed the lack of information and underestimation of the value of TVET. Nevertheless, more access to information for young women and parents led to an increasing number of girls enrolling at TVET schools (Nshimirimana and Kitula, 2020).

Another study made on the training schemes provided within the agriculture extension services (Twigire Muhinzi system of farmer-to-farmer approach) found the Farmer Field Schools (FFS) useful, and, overall, they have improved farmers' skills, knowledge and empowerment (Neza et.al., 2021)[44]. However, the FFS system remains isolated, with no connection to the agricultural education programmes in secondary TVET schools, polytechnics or universities. Moreover, most beneficiaries of such programmes tended to be men (Neza et.al., 2021). This poor representation of women in all aspects of agriculture extension services was also confirmed by another recent study: only 16% of farmer promoters were women, versus 84% men; only 18% of sector-level agronomists were women, versus 82% men; and 34.3% of Farmer Field Schools facilitators were women versus 65.7% men (USAID/RTI, 2023).

The information lacking was partially addressed by *the semi-structured interviews and focus groups held within seven selected schools in the framework of this study* (see section 1.2). Focused on the training institutions providing courses in agriculture-related trades, our study collected the opinions of school managers through interviews, and the opinions of students through focus groups, in October 2023. Being in limited number, the results are not representative of all training institutions and students, but they provide a good indication of the main challenges faced, which are summarised in the paragraphs below (Ntakirutimana, 2023)[45].

Location of school and availability of free education: access to TVET, particularly for girls, is hindered by the physical distance from home to school, especially in rural areas. If pupils need to travel to go to school (even a short time), safe transport and/or a safe boarding facility at the school becomes imperative. The school's security conditions (e.g. having a fence around the school, being in a populated and safe environment) were also mentioned as factors influencing the decisions of families to send their daughters to school (Ntakirutimana, 2023). Another hindrance to access for both boys and girls is school fees (even higher in private schools than in public schools of the same quality), which prevent families from a poor socioeconomic background from enrolling their children. In fact, several students mentioned in the focus groups that the reason they were attending a particular school was that it was free of charge, or they had received a scholarship.

School infrastructure and availability of dormitories: several schools confirmed a shortage and/or poor quality of infrastructure such as boarding facilities, canteens, toilets and sport facilities, these factors limiting the number of students admitted. *'We are receiving few girls due to few places in the dormitory, even the existing facilities are very old',* said one school manager interviewed. The number of girls in boarding schools is also lower than the number of boys because of the conditions in female boarding facilities – girls often need more boarding materials than boys. Limited accommodation and eating facilities (boarding), limited toilets separated by gender, water and power cuts in schools (with no water storage or electric generator) were often mentioned by students. The lack of training materials (or animals), lack of laboratories or workshops, limited internet connectivity and/or IT facilities were other things students did not like at their school. Moreover, schools which provide courses/trades mostly preferred by girls (e.g. tailoring, hair dressing, culinary arts) are often private

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[44] Based on the evaluation study of the FAO and IFPRI on institutionalising Framer Field Schools, the training provided technical skills (livestock nutrition and management and cropping systems); social skills (gender, women empowerment, market and value chains and collective action); functional skills (savings and credit and market analysis); and empowerment (critical thinking, experimentation, innovation, group or community empowerment and mindset change) (Neza et.al., 2021).

[45] The statements given in italics between quotation marks are the words used by respondents during the interviews.

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schools which are more expensive and/or they only offer short courses at day schools (without a boarding facility).

Varying quality of teachers: firstly, the share of female teachers and staff in secondary TVET and polytechnics has always been low (below 30%). This in itself could be an impediment to school management adopting a more gender-sensitive approach in schools and to addressing girl-specific problems. More importantly, a shortage of experienced and qualified teachers remains a significant challenge, as mentioned by interviewees. Teachers are trained in pedagogical skills through the RTTI, but with the constantly updated curricula and changes in technology, teachers also need technical training and upskilling. In one student's words, *'incompetent trainers were one of the reasons why we have limited skills in automated irrigation or other mechanics, plant and soil laboratory analyses, artificial insemination, food quality control, deep maintenance of machines, etc...'*.

*Inadequate funding and resources, particularly for practical learning***:** insufficient funding and resources allocated to agriculture-related courses hinder their growth and effectiveness. Few agricultural schools implement dual training and short-term courses due to limited funds. Exceptions are always linked to the availability of donor-funded projects. Some schools have established production units related to agriculture, encompassing areas such as crop production, animal health and food processing. The degree of operationalisation and management approaches varies from one school to another, but their primary aim is to support students in teaching practical skills (not profit-driven) and provide affordable access to necessary products for both school staff and students (Ntakirutimana, 2023).

The 'industrial attachment' is an important element of work-based learning implemented in the TVET teaching and learning system and plays a crucial role in providing a real-life organisational context and hands-on skills relevant to the labour market. However, *its implementation quality was considered to be from medium to low, with some exceptions.* Firstly, a 1-month internship period is considered *'not enough'* by many students and teachers, who mentioned the need for at least 3 months (if not 6 months in some trades). Despite the existing regulatory framework for industrial attachments and internships, *implementation practices seem to vary, mainly due to inadequate funding and resources, both from the school side as well as from the student side.* The lack of financial means to support interns during the industrial attachment programme (e.g. lack of grants) is another core problem, so no direct support/intermediation is provided to students in finding companies/workplaces – except sharing a list of potential companies or workplaces.

Living in a rural area and coming from a poor socioeconomic background prevent students from finding a good-quality internship as they are left alone without any support mechanisms. Given the lack of financial resources, these students tend to choose the closest workplace to home, but that might not be the best workplace to learn from. The format of internships could also be improved by including skills related to real workplaces (e.g. using the language/perspective of employers, not only that of educators). School trainers visit students only once during their internship, but even then, they cannot solve many of the issues interns face, such as the costs of workplace accidents or broken machinery. To conclude, it is not only some legal/institutional aspects of internships that need further clarification, but also the fact that all the necessary financial/human resources must be allocated for internships to be implemented properly. Otherwise, regulations will remain on paper only.

Internship fees and periods: students also mentioned several companies that charge students high fees for internships, due to the fierce competition to find a good place. There is no standard rule on not charging fees for internships. According to the interviewed students, '*instead of having the same internship period across the whole country, the timing of internship periods could be differentiated or rotated among students or different trades, so that more students could find good workplaces in rotation since companies can accept more students in different time periods'* (Ntakirutimana, 2023)*.* In addition, due to the seasonal nature of crop production, crops are often not available during the internship period, so students miss out on the period of their growth. This is also linked to the limited industry-school collaboration, especially with some agriculture schools in remote areas.

The Government attaches much importance to workplace learning and has already tried to develop some solutions regarding industrial attachments. Besides developing a framework and

guidelines, the *Polytechnics Dual Practice policy* was developed in 2022, for example, to further facilitate and improve the learning environment through collaboration between academia and business (RP, 2022). According to this paper developed by RP, the limited flexibility of legal and regulatory instruments, limited autonomy of schools on resources and teaching staff/hiring, limited coordination and limited expertise on industry are all hindering more flexible responses from schools. An 'industrial attachment programme for trainers' was implemented to address some of these problems (MINEDUC and RP, 2021c).

According to the impact assessment of this programme, industrial attachment improved trainers' skills significantly and increased their levels of competency to carry out practical sessions in schools. However, trainers also observed that the absence of enough work in the host companies was a crucial challenge and that it was necessary to support host companies in obtaining sufficient training materials, consumables and even assurance on unexpected work accidents during training, as well as in strengthening tripartite partnerships between RP, trainers and companies during the industrial attachment preparatory phase (ibid). A particular need to create a self-funding model to facilitate different interventions in skills development was emphasised, including industrial attachments for both trainers and students in TVET Schools and IPRCs (MINEDUC and RP, 2021c).

In conclusion, although the curriculum is consistent across schools, **the extent to which students master the training content varies from one school to another and one trade to another.** These disparities are attributed to the range of factors mentioned above (qualifications of instructors, school infrastructure, training materials, industrial attachment, etc.). Consequently, some agricultural trades experience low student enrolment, as pointed out by students. Agriculture and crop production emerged as popular trades among both girls and boys. This was followed by animal health (mostly boys) and food processing (mostly girls). Forestry appears to be unattractive to both male and female students due to the limited job opportunities and fewer opportunities to pursue higher education. According to a school manager, *"'potential employers prefer graduates from agriculture programmes, expecting them to perform both forestry and agriculture-related tasks'* (Ntakirutimana, 2023).

It must be mentioned that the attractiveness of specific trades is linked to students' post-graduation expectations, and a notable difference exists in the reasons for selecting trades across different education levels. For secondary school students, 80% based their choice on the likelihood of obtaining scholarships for higher studies. Many students mentioned *'we selected this school and trade due to its track record in national exam performance and the numerous graduates securing scholarships for further studies',* while some mentioned *'I did not choose it but NESA placed me in this school'.* Therefore, it is important to keep in mind that pursuing a higher education is the most common objective for secondary TVET graduates, and only a small share of them start working directly after graduation. In students' words, *'to get a well-paid job in agriculture, you need to go for higher learning institutions such as universities, and the chances to get a scholarship are limited due to low number of agriculture faculties in the universities… at least TVET graduates and general science education graduates are eligible to get in the agriculture faculties.'* Conversely, 70% of polytechnic and university students selected trades based on their envisioned future careers.

5.4. Young people's transition from school to work

There are some tracer studies conducted at national level by RP, MINEDUC and MIFOTRA, primarily focusing on the transition of graduates from higher education (including polytechnics) in all educational fields. It was more difficult to find regularly conducted tracer studies by secondary TVET schools. In the few tracer studies available covering all institutions (TVET, polytechnics, universities), the main challenges mentioned by both graduates and employers were a lack of professional experience, a lack of generic and soft skills (e.g. languages, communication, ICT, other complementary fields) and a lack of entrepreneurial and business skills. One study focusing on TVET graduates from all fields listed the following challenges faced by young graduates in finding employment: **insufficient training facilities, short period of industrial attachment programmes, training based on theory rather than practice, untrained trainers** (Haikais and Maniraho, 2022).

In the qualitative interviews and focus groups held with selected schools, this study collected the opinions of students and school managers in agriculture-related trades on labour market expectations and performance. Students' expectations after graduation differ from one trade to another and from secondary to polytechnics and university graduates, but as mentioned in the previous section, 80% of students at secondary TVET level would like to continue to study at IPRCs and/or university. Because '*among all the advertised job opportunities in the agriculture-related occupations, all better-paying jobs are in public institutions and NGOs, compared to the jobs in private sector… and all vacancies of public institutions are looking for university graduates, mostly A0 degree holders.*' (Ntakirutimana, 2023). For polytechnic graduates, only 40% would like to continue their studies to a higher level; 50% would like to get job in their area of study; while the remaining 10% would like to become agro-entrepreneurs (e.g. at a veterinary clinic, agro-input shops).

The observations of the school management confirm the expectations of students summarised above, since around 70% of agriculture graduates from secondary TVET schools continue their education at higher learning institutions, such as IPRCs and universities (Ntakirutimana, 2023). Approximately 20% of them start working as self-employed within the same sector, more often in animal health and food processing. Another 10% are employed in private sector in their field of study or in another unrelated area of work. All respondents asserted that there is no significant difference between male and female graduates concerning their employability status.

The picture is slightly different for graduates of polytechnics (Ntakirutimana, 2023): around 80% of polytechnic graduates in fields such as veterinary technology and crop production find employment in public institutions, primarily at sector level, serving as sector veterinarians or agronomists. Another 10% of graduates get the opportunity to participate in a one-year professional agro-internship in Israel, as part of an agreement between the State of Israel and the Government of Rwanda, initiated in 2012. Many graduates from this programme eventually establish their businesses, often specialising in areas like veterinary clinics. Finally, another 10% work in the private sector in their fields of study.

The results of a national tracer survey for TVET and higher education graduates and employer satisfaction in 2018 showed more promising results but covered all educational fields: the employment rate of graduates within 6 months after graduation was almost 65% in TVET schools, 75% in polytechnics, and 76% in higher education institutions (MINEDUC, 2019). At all three levels, male graduates were more likely to be employed than female graduates. The highest levels of employment were observed for ICT, engineering and manufacturing, construction and education graduates. On the other hand, unemployment and underemployment rates were the highest among TVET graduates and the lowest among higher education graduates. Very often, these unemployed graduates were in the hospitality, agriculture, forestry, fisheries and veterinary services sectors (MINEDUC, 2019).

In a similar RP survey to assess graduates' employability, own job creation and employer satisfaction, 95% of graduates expressed satisfaction with the quality of education acquired, which is higher than the employer satisfaction rates (RP, 2021a). Almost 54% of graduates expressed higher satisfaction with academic-oriented skills (54%), compared to personal skills (42%) and work-oriented skills (41%). Their findings also confirmed that graduates were negatively affected by inadequate parental support, the limited infrastructure of training institutions, and lack of equipment, tools and machinery for practical training. In general, manufacturing, electrics and electronics, car repair, ICT and telecommunication graduates were the most easily employed, while irrigation technology, hospitality and forest resources graduates were the least employable.

Evidence from various surveys (World Bank, 2020 and 2022) also shows that employers overwhelmingly search for employees through their own personal networks and have limited contact with education institutions. They do not use internships and industrial attachments as a source for new recruitments. On the other side, graduates of higher education highlight lack of connections or patronage from an influential person as a reason for unemployment (World Bank, 2022). When employment service centres provide ICT facilities and lab services, coaching and job search assistance, however, jobseekers tend to get better results for work placements.

The RP student satisfaction survey confirmed that most students were satisfied with curricula. There was, however, a significant minority who were not satisfied with the course coverage of relevant topics and standards used in the field of work (RP, 2021b). It was revealed that industrial attachments helped students to gain a work ethic, develop work-based skills and meet different people in their future career path. However, the duration of industrial attachments was regarded as very short, and the support provided by the school system to students in their industrial attachment was very limited. While the overall learning environment in IPRCs was fine for the majority, some students were not satisfied with the lab equipment and materials, internet availability in ICT labs and ICT infrastructure.

Finally, in 2022, another online survey of 2018 university and polytechnic graduates was conducted with the support of MIFOTRA. Overall, 11 307 graduates from all educational fields were reached out to online, of which 57% responded to the survey. 18% of respondents were higher vocational institution graduates. The survey results showed a large variation in employability status among graduates from different education fields, and according to individual characteristics such as gender, place of residence, etc. Indeed, the lowest employment rate (33%) and highest unemployment rate (52%) of all programmes in Rwanda were both found in graduates of agriculture, forestry and fishery programmes (MIFOTRA, 2022a).

All these findings and first-hand experiences of young people lead to an 'unattractive agricultural sector' due to low wages and poor working conditions, low quality of technical and/or soft skills, and in particular a high mismatch between student/graduate expectations and the jobs available on the market. Several programmes were launched and implemented to attract young people into agriculture with the support of development partners, e.g. UN Joint Youth programme (2019–2023), the USAID/Rwanda Hinga Weze youth integration programme (2019–2020), the UNDP YouthConnekt, Rwandan Youth in Agribusiness Forum with FAO support, etc46. However, most youth initiatives focused on the economic dimension of young people's livelihoods, and broader decent work aspects, such as occupational safety and health, working conditions or labour standards, were often neglected (FAO, 2020). More specific actions are needed to create not any (poor) jobs but 'decent' jobs.

The mismatch between the expectations of graduates and the jobs available on the market also indicates weak career guidance and counselling for students before, during, and even after their education. A stakeholder explanation was linked to the fact that 'all the graduates of agriculture trades want desk jobs, not going to the fields for hard work'. Interviews from schools revealed that schools organise 'career fairs' to bring companies and former graduates together with students, often through donor-funded projects, but these are rather sporadic and do not take place regularly due to the limited budget. In reality, vocational guidance and career orientation should start as early as in the lower secondary school system, because it is already too late by the time students select a specific field or occupation to study. Given the higher unemployment rates among graduates of agricultural programmes, graduates also need to be supported in their school-to-work transition, by receiving advice and training on job search methods, how to write a CV, how to present oneself in interviews, work preparedness, etc.

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[46] The Hinga Weze youth integration programme sought to facilitate inclusive agribusiness investments in five agriculture value chain crops that promote and support youth groups and entrepreneurs. YouthConnekt was another major initiative initiated by the government and the UNDP, where 30 young innovators from different parts of the country won cash and in-kind prizes in an awards competition in 2018. The Rwandan Youth in Agribusiness Forum was initiated by MINAGRI and Ministry of Youth with FAO support and involved 1 400 members and more than 12 000 young people through its website and social networks. The Engagement in Agriculture Network (YEAN) (5 000 farmers) is a network of young people in Rwanda, mainly working in agriculture research and development activities.

6. CONCLUSIONS AND RECOMMENDATIONS

The strong economic growth Rwanda has experienced has been rather visible in the last decade, with the *services sector* contributing the most (close to half of GDP), the *agricultural sector* contributing one-quarter and *industry* one-fifth of GDP. Growth was mainly boosted by services and manufacturing (including food and beverages). Nevertheless, the economy has remained in a *'low-skilled equilibrium'*, with a shortage of medium-skilled workers and a small pool of highly-skilled graduates, primarily employed in the public sector. Notwithstanding the limited capacity of the private sector to absorb graduates with a medium or high skill set, certain dynamic sub-sectors, such as the agrifood/agrobusiness system show higher potential for skilled labour. However, this potential can be tapped into only by increasing the forward-backward linkages of agriculture with business.

The conclusions in this chapter focus on the evolving features of employment and skills levels in different agriculture-related sectors, the respective skill shortages, skill supply trends and training-related issues, and the challenges of transition from school to work. The recommendations are divided into two parts. The first set of recommendations aims to support the growth of agriculture-related businesses, by providing a list of coordinated and coherent action points in three policy areas: labour market policies, sector-specific economic policies, education & training policies. The second set of recommendations focuses on improving the delivery of agriculture-related TVET provision. Besides increasing access to TVET, especially for vulnerable groups in rural areas, most recommendations are connected with improving the quality of training offer for different target groups.

6.1. Main conclusions for the Rwandan agricultural sector

Agricultural transformation remains at the core of the Rwandan long-term development vision, supported by several sector policies. The main drivers of change in the sector are: population growth, poverty and food security; climate change and environmental sustainability; and technological advances and digitalisation. Population growth, with further land fragmentation and urbanisation, comes with the risk of poverty and food insecurity. On the other hand, the uptake of technology and digitalisation has remained slow so far. There is an increasing push for change with high competition for international exports, the need to produce higher quality and upgraded products in the global value chains, and changing consumer demands. As a result, business operations, workers and farmers in the sector are being affected, changing the job content and skill needs in the sector.

Continuing dominance of agriculture in employment. Despite a continuous shrinkage of agricultural activities, employment is highest in the market-oriented agricultural sector (~47% in 2022). It reaches two-thirds of all employment if both market-oriented and subsistence agriculture workers are taken together. The services sector accounted for almost 36% of total employment, while smaller industrial employment remained stable (17%). The highest employment numbers after agriculture are found in the wholesale/retail trade and the construction sector (each with around 10% of employment). Then follows transportation and storage (6%), manufacturing (5%), and the education & training sector (4%). This picture highlights Rwanda's main employment challenges in order of importance: working poverty, underemployment and unemployment.

Workers in the primary agriculture sector. The huge number of people employed in market-oriented and subsistence agriculture together, in very small production units and with a relatively low GDP contribution, all point to very low productivity and earnings. Crops and livestock had by far the largest number of workers, with 98% in 2022, while the very limited employment in forestry and fishing remained similar, with respective numbers of around 21 000 and 6 000 workers. Almost 53% of all workers were women in 2022, while forestry and fishing are dominated by men.

The recurrently lowest earnings in agriculture have been a significant feature for a long time as jobs in services pay over five times more than agricultural jobs. The average monthly earning in

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agriculture remained at around RWF 22 000, while it was RWF 75 000 in industry and RWF 122 000 in services in 2022.

Low and decreasing education levels in primary agriculture. A comparison of workers' education levels between 2017 and 2022 reveals increasing numbers with basic education but decreasing numbers with upper secondary and higher education in the sector. A decrease in the share of workers with no education and an increase in the share of primary graduates are visible over the five years, due to increasing educational attendance both among men and women. However, educational improvement stops at upper secondary level, with even a decrease in the share of university graduates. This trend indicates *a self-selected exit from agriculture by more educated people.* As soon as people get more education and skills at upper secondary and tertiary level, they tend to leave agriculture and move to other sectors; this happens more often with men.

Low skills base of occupations in agriculture. In 2022, almost 89% of all agriculture workers performed elementary jobs. The second biggest occupation was 'skilled agricultural workers' (11%), followed by 'service and sales workers' (0.2%) and 'professionals' (0.1%) – all have decreased their shares since 2017. In contrast, workers with other medium-skilled or highly skilled occupations (however small this number is) seem to have left the sector in the same period, indicating a lack of managers, professionals, technicians and other medium-skilled roles. Women were the majority in elementary jobs in agriculture, while men were the majority in other occupations. This is another *confirmation of the skills exodus from agriculture,* with more specialised workers moving to perform their occupations in other sectors.

Workers in the agro-processing sector. This is a very small sector, in its nascent phase. It is part of the manufacturing sector, with ~5% of total employment in 2022. This study defined the agro-processing sector as six sub-sectors together: manufacturing of food products, beverages, tobacco, leather, wood, and paper. All six together constituted over one-third of total employment in manufacturing, representing 1.9% of total employment in 2022. This amounts to around 68 000 workers, with over 40 000 workers employed in the first three sub-sectors. Almost three-quarters of workers in the sector were men, but the share of women was relatively higher in the food and beverage processing sub-sectors. Recently the sector has hired increasingly young workers with a more balanced gender share.

Moderate and increasing education levels in agro-processing. Despite the small number of workers, their education levels have been relatively higher and are constantly increasing. Some clear trends visible between 2017 and 2022 are a decreasing share of workers with no education or no primary education and an increasing share of workers with a secondary and higher education. Both genders improved their education levels, but the steep educational increase of women workers is astonishing, especially at upper secondary and tertiary education level. The sector is still dominated by more low-skilled and male workers, but the share of women workers with an upper secondary education or tertiary education exceeded men's in 2022. This confirms the *increasing skills needs in the agro-processing sector, gradually attracting more educated workers*.

Medium skills base of occupations in agro-processing. Between 2017 and 2022 there was a slight increase in the small shares of managers and professionals (3.7% and 2.8% respectively), as there was for 'plant and machine operators and assemblers' and 'clerical support workers'. But a sizeable decrease was noticed in the shares of 'technicians and associate professionals', 'service and sales workers' and 'craft and related trades workers'. Still, 53% of all occupations were elementary jobs in 2022, followed by 'service and sales workers' (~19%), 'plant and machine operators and assemblers' (~11%), and 'craft and related trades workers' (8%). Almost all occupations are male-dominated, but women are better represented in clerical workers, professionals, elementary jobs, and service and sales workers. *This confirms the strong potential of the sector to absorb more medium-skilled and highly-skilled workers of both genders.*

Food and beverage services is another agriculture-related sector with increasing employment numbers. In 2022 the sector had 1.7% of total employment, with almost 60 000 workers and a more balanced gender share. *Veterinary services* are also an important sub-sector of agriculture and scientific services, in which employment is still extremely small. The employment number was less

than 3 000 people in total in 2022, around two-thirds of them being men. Given the importance of primary agriculture, the number of veterinary professionals seems very low, with a potential to expand substantially. Other relevant sub-sectors are *the wholesale and retail trade of agricultural food and non-food products, land and air transportation of the same products, and warehousing for the storage of those product*s. Estimating the employment size in all these subsectors is more difficult but numbers are expected to be quite high and growing.

The overall picture of the study is ***shrinking primary agriculture with a sharp skills exodus of educated people,*** against ***the dynamic and growing agriculture-related businesses, gradually absorbing more and more medium-skilled and highly-skilled workers*** despite their nascent status. This is an expected development, but these businesses need to grow faster since primary agriculture is predominantly composed of small farming households with very little backward-forward linkages with business. However, accelerating the growth of agriculture-related businesses – varying from agro-processing, food and beverage services to marketing and sales, transport and storage, agricultural and scientific services – calls for several policy actions to address the main business constraints.

Business in agriculture-related sectors has both opportunities and constraints. The interviews revealed a cautious optimism among businesses, which was visible in the sizeable number of short-term hires by companies. The majority of the new recruits were young workers with an upper secondary and university education, and there were slightly more men than women. This suggests a growing demand for skilled workers in the sector, including more female workers. At the same time, the key constraints for business growth remained the same: *limited access to finance, inadequate infrastructure, skilled labour shortage, escalating input costs, import competition, and climate change impact.* Unlocking the potential of these 'agriculture-related' businesses to grow and create more skilled jobs requires comprehensive policy measures to address those constraints simultaneously.

Labour and skills shortages due to increasing skills demand. Companies reported high labour costs due to the limited number of Rwandan specialists and consequently imported expatriate experts. They also confirmed several challenges in attracting and retaining professional workers, listing several hard-to-fill occupations at medium-skilled and highly-skilled positions. A key finding is the equal need for (i) higher quality technical skills in several agricultural areas, and (ii) other technical/business skills from many non-agriculture areas. Producing and attracting a critical mass of these skills is key for business creation and expansion in the country. Overall, the professions and skill needs most in demand as reported by the companies can be classified under three groups.

- ***Agriculture-related technical skills,*** including agronomists, agricultural engineers/technicians, veterinary doctors, animal health technicians, farm managers/technicians, crop production technicians, post-harvest treatment, processing, safe packaging and distribution, horticulturist and environmental engineers, agro-scientists, food engineers/technicians, microbiologists, laboratory workers, culinary experts, food safety/quality control inspectors, etc.

- ***Non-agricultural technical and business skills,*** including electric/electronic engineers and technicians, other engineers, machine operators and assemblers, maintenance/repair of machinery, craft designers, spatial analysts and technicians, energy experts, data analysts, managers for production, HR, procurement, marketing, and branding, financial experts, accountants, etc.

- ***Core competences and soft skills,*** including a good level of literacy and numeracy, foreign languages, ICT and computer skills, interpersonal/ communication skills, teamwork, problem-solving, critical thinking, creativity, management and leadership skills, customer care, dependability, adaptability, resilience, etc.

Besides the three groups above, national stakeholders and donors added two other skillsets to this list.

- **E*ntrepreneurial skills.*** Entrepreneurship is seen as the only way to encourage the creation of new businesses. It requires a combination of technical, management and personal skills. Often, there is a special emphasis on business orientation skills (business plan, financial skills, etc.).

- ***Skills for sustainability*** are also raised as a combination of knowledge, values and attitudes for environmental protection and biodiversity, reducing energy, materials and water consumption, technical skills on green technologies, sewage treatment, waste management, and the circular economy and recycling.

- ***Missing practical skills and work-based learning.*** This is a transversal deficit observed in all technical, business and core competences. Both companies and national stakeholders strongly agree on the need for more practical skills at all levels of education (secondary TVET, polytechnics, higher education).

An expanding education system. Two-thirds of the Rwandan population is under 30 years old. Due to the state's commitment to expand free and compulsory education to the age of 12, the numbers of schools, classrooms, teachers and learners have expanded in the last decade. As a result, the country reached full enrolment in primary education, while enrolment rates in lower and upper secondary education remain low. The total number of students in lower and upper secondary education constitute only one-third of the total number of primary school students. This indicates ***many dropouts (early school leavers) at the end of primary education and significant education losses*** (e.g. students repeating years, poor learning outcomes).

This ***leakage at the end of primary education*** creates a continual pressure on the training needs of adults with a low level of education, especially in rural areas. Training for this cohort is not an easy task as they are less trainable, meaning higher training costs and lower effectiveness. Moreover, education losses in primary and lower secondary education may compromise the quality of TVET, because a firm foundation of basic skills in elementary education is often seen as a precondition for TVET's success. There is a direct relationship between the quality of elementary education and the quality of TVET, due to the learning levels of students coming into the TVET system.

A growing provision of technical and vocational training at three levels (short-term, upper secondary and polytechnics). With over 366 schools, secondary TVET has shown a promising increase over the years – the number of students increased from around 70 000 in 2021 to 87 000 in 2023 (with around 40% females). The Government's aim is for 60% of secondary school students to enter TVET by 2024, but currently around 30% of 9th grade students choose TVET for their last 3 years of education. The TVET provision is not free but scholarships are available. Overall, ***girls are a majority at primary, lower and upper secondary levels, while boys have higher enrolment rates for TVET and higher education institutions***.

Training programmes exist for seven agriculture trades: agriculture/crop production, animal health, food processing, forestry, wood technology, water & irrigation, and leather technology. However, most students are registered in four trades: agriculture, animal health, food processing, and wood technology, with more female students than males, except for wood technology. Students in agriculture-related trades constitute around 10% of all secondary TVET students, with an equal share of female students. In agriculture-related higher education (including polytechnics), however, only less than 5% of the 96 000 students are in the 'agriculture, forestry, fisheries and veterinary' fields – with over 40% female students.

Challenges of access, quality and gender equality in TVET. There are physical, economic and socio-cultural barriers in access to TVET, especially for girls. The physical distance from home to school is the first deterrent, so having a safe boarding facility or safe transport remains vital. School fees and living costs are barriers for families from a poor and rural background. A shortage and/or low quality of school infrastructure such as boarding facilities, canteens, toilets, water, as well as power cuts, lack of training materials, laboratories or workshops, and limited internet connectivity are often mentioned. Schools which provide courses mostly preferred by girls (e.g. tailoring, hairdressing, culinary arts) are often private schools that are more expensive or offer only short courses in day-schools.

The varying quality of training due to inadequate resources. The shortage of qualified and experienced teachers is a challenge, while the low share of female teachers in TVET could be an impediment for a more gender-sensitive approach in schools. The limited resources allocated to agriculture-related courses reduce the effectiveness of 'industrial attachment' programmes. A 1-month internship period is not considered enough, while the lack of student grants is a core problem. Several companies charge high fees from students for internships, while the same internship periods implemented across the country make it more difficult for students to find workplaces.

Difficult transition for young people from school to work. Tracer studies show a lack of sufficient professional experience, and of generic and soft skills (e.g. languages, communication, ICT) and entrepreneurial and business skills among graduates. But a large variation of employability is found among graduates from different fields, and employability is also affected by gender and where graduates live – women and rural residents have fewer opportunities. Although the overall employment rates of graduates seem reasonable, they vary from one educational field to another. The lowest employment rates and highest unemployment rates were often found among (TVET) graduates in the agriculture, irrigation, forestry, fisheries and veterinary services sectors.

A complicated job market in agriculture-related fields. The findings show that over two-thirds of secondary TVET graduates continue studying at higher learning institutions, while a small share start working as self-employed, often in animal health and food processing. The main reason to continue studying is the fact that *'all better-paying agricultural jobs are in public institutions which look for university graduates.'* This is demonstrated by the fact that over three-quarters of polytechnic graduates in veterinary technology and crop production found employment in public institutions as sector veterinarians or agronomists. **This information confirms that young people do not accept low-paid agriculture jobs with difficult working conditions unless they have no other option.**

6.2   Recommendations for encouraging the growth of agriculture-related business

The conclusions summarised above show the complexity of interactions across the different agriculture-related areas from an employment and skills perspective. **The skills ecosystem is wider than just education and business stakeholders, and policies cannot underestimate the power of 'individual agency'.** We clearly see the preferences of young people in their unwillingness to work in agriculture and the continual skills exodus from the sector. Everyone makes their own strategic decisions on which area of education/training to invest in, which sector to work in, and what kinds of jobs/occupations to perform within the constraints and opportunities of each personal context. Thus, multiple incentives must be created for people to choose an agriculture-related business over other sectors.

Any solution to increase agriculture-related business would involve a mix of three policy areas: labour market policies, sector-specific economic policies, and education & training policies. Based on the main business constraints mentioned before, coordinated and coherent policy actions across these three areas seem crucial to ensure the contribution of human capital to economic growth. Investment in education and training needs to be complemented by creating and increasing decent employment opportunities, which in return requires supporting SMEs in creating 'decent' jobs. The huge number of informal workers facing low pay, poor working conditions and increasing unemployment calls for comprehensive and simultaneous policy measures on several fronts.

<u>*Labour market policies.*</u> Employment is a serious economic and social challenge, particularly in the context of large informal economic activities in the Rwandan agriculture. Informality means vulnerable employment with low earnings, difficult working conditions, few opportunities for career progression, and no access to health and social protection. Hence several employment policy tools could be used to increase the attractiveness of jobs in agriculture-related sectors. *Improving job quality for educated people is key for the growth of different sectors.*

The most important employment policy tools are: *labour legislation and its implementation, wage policies across sectors, including increasing the minimum wage to boost earnings in agriculture,* and *enlarging health and social protection coverage*. Standardising hiring practices and working conditions between the public and private sector, transparent labour market information, increasing the outreach of job intermediation, career guidance and counselling and implementing wide-scale active and passive labour market programmes[47] are also very important. Incentives must be developed for companies to formalise existing informal jobs and adopt gender-neutral hiring practices. The RDB is already working on some of these policies, such as labour market information, job intermediation, employment services and activation measures. Here is the detailed list of potential actions:

- reviewing and streamlining all hiring and recruitment practices in public, private and NGO sectors regarding the criteria for gender and education levels/ types;

- firmly implementing a reasonable level of labour regulations across all sectors, and streamlining working conditions between the public and private sector and in sectors like agriculture;

- encouraging companies to adopt gender-neutral hiring practices and providing training programmes aimed at breaking traditional gender stereotypes in the workplace;

- improving gender-sensitive career guidance and counselling for more jobseekers, and increasing the outreach of employment services, activation and training programmes for young people and women;

- increasing entrepreneurship funds and creating stronger mentorship support to promising business projects for the creation of new start-ups, with specific attention to women entrepreneurs;

- launching 'young professionals programmes' in agriculture-related businesses, as well as initiatives to promote gender inclusion, particularly in managerial, technical and ICT-related roles;

- monitoring sectoral wages and earnings in relation to productivity, increasing the minimum wage to support earnings in agriculture-related areas;

- developing feasible options for more people to be included in health and social protection schemes in agriculture.

Sector-specific economic policies. A strong private sector is key for the creation of decent (skilled) jobs in the economy. Given the need for much more investment in agriculture-related sectors, *increasing access to low-cost financing for micro and small enterprises,* start-up capital for aspiring entrepreneurs and, in particular, access to business advisory services, is vital. As limited financial flows are the main reason for weak forward/ backward linkages between agriculture and other businesses, affordable financial products tailored to the sector's needs must be developed. Direct support must be prioritised for SMEs to grow/ formalise their business, as well as a full support package for the creation of new start-ups, ideally in a business environment where everyone has a level playing field. Exceptional schemes for SMEs could be launched for *conditional access to public grants for investments* in rural areas/regions, linking with farmers, prioritising certain sub-sectors, and creating formal jobs[48].

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[47] Active Labour Market Policies/ Programmes (ALMPs) cover job search support, career guidance/counselling, training/retraining, employment subsidies, public work schemes, self-employment and entrepreneurship programmes. For more info, see ETF (2014), Active labour market policies with a focus on youth, http://www.etf.europa.eu/web.nsf/pages/ALMPs_youth. Passive labour market programmes provide temporary support for loss of earnings, such as unemployment insurance and social assistance.

[48] There are several successful schemes on business grants and loans in agriculture. One of these is "1+1 scheme", where the state gives RWF 1 from public funds for every RWF 1 invested by individuals, under viable business investment plans.

The current status of agricultural products in Rwanda[49] provides a good balance between the needs of the domestic market and the international market. Hence, the priority sub-sectors must keep this balance for the growth of the sector. Choosing one specific value chain has trade-offs due to the different impacts of each value chain – for example, some benefit business and some large masses. *A realistic strategy for Rwanda is to keep several priority products that complement each other towards the development goals of the country.* In terms of specific processing sub-sectors, food processing (especially dairy, poultry, meat, horticulture), food preparation/services, agro-science and/or agro-technology, the pharma and beauty sector (production of pharmaceuticals, para-pharmaceuticals, and cosmetics), agro-forestry, including the wood value chain, and forest products could be promising. Tax and social security incentives must be aligned with those priority sub-sectors for investors, as must import costs of agricultural inputs and processed foods.

Finally, *improving the country's infrastructure, especially in the regions and rural areas, seems imperative for the business*, e.g. road transport to connect producers to consumers at low cost, access to a stable electricity and water supply, irrigation and machinery to increase mechanised farming and use of technology. The lives of farmers could dramatically improve with affordable modes of transport for their agricultural products, as most carry them by themselves or with bicycles. Investment in infrastructure such as feeder roads, communication, electricity, water in special processing zones or SEZs, have the potential to spur more investments and job creation from international companies. This would also require a scaling up of agricultural extension services and providing cold chain storage at production spots for the collective use of farmers and cooperatives.

Education and training policies. A key policy objective is to increase enrolment and completion rates in lower and upper secondary education, while reducing dropouts and repetition rates and ensuring better learning outcomes in basic education. As said before, no TVET system could be successful without a strong foundation of core competences in basic education. This means *making a '12-year education' a reality for all* with further investment in accessible and affordable provision of a good quality education. In addition, the content and delivery of basic education must be adapted to instil in students higher level of digital skills, green competences/attitudes, and other generic and soft skills. This must go in hand with alignment between recruitment policies in the public and private sector.

Another policy option could be to *create more and diverse tertiary education programmes as the 'polytechnic pole' of agricultural higher education* and connect this with agricultural research centres. Those occupations which require solid specialised training at tertiary level can be popularised with higher-level programmes in the areas of *agro-food, agro-tech, agro-science, agro-forestry* **and** the *pharma & beauty* **sector**. For example, creating and popularising specialised programmes for agro-food professions will attract more students to relevant tertiary education with better job prospects[50]. Girls must be systematically encouraged from secondary to higher education to choose technical, managerial and ITC-related education fields.

Finally, developing a *more accessible and affordable adult learning system for skills upgrading* is needed for adults with a low level of education or no education at all, especially vulnerable women in rural areas. Due to the high number of school dropouts, the number of poorly educated adults who need training does not look set to decrease anytime soon in rural areas. The limited absorption capacity of learning among these adult groups requires more customised training according to specific needs, e.g. training on both core competences and vocational skills, more flexible short-term courses, preferably in the areas where they live and at convenient times. This is further elaborated on in the next section on TVET.

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[49]Maize, bean, sweet potato, cassava, banana, sorghum and potato, growing horticulture products (vegetables, fruits, nuts and flowers), coffee, tea and pyrethrum are the main cash crops. These can be complemented by horticulture, livestock, cereals and other crops (essential oils, stevia, fish).

[50] Particularly promising programmes could be created on food processing (especially dairy, poultry, meat, horticulture), food preparation/services, agro-science and/or agro-technology, the pharma & beauty sector (production of pharmaceuticals, para-pharmaceuticals and cosmetics), agro-forestry, including the wood value chain and forest products.

6.3 Recommendations for improving agriculture related TVET provision

The structure and regulatory framework of the TVET system are fairly well organised in Rwanda, as several secondary TVET schools, polytechnics and universities offer programmes and courses in agriculture-related trades. Practical skills are taught through internships and industrial attachments, a few donor-supported dual-education practices, and the production units created in some TVET schools. Nevertheless, this study points to some areas of improvement in the delivery of agriculture-related TVET provision, so the recommendations here focus on that. Besides increasing access to TVET, especially for vulnerable groups in rural areas, the recommendations aim to improve the quality of training provision for different target groups.

Increasing access to TVET provision. Measures are needed for vulnerable groups in rural areas to overcome poor socioeconomic status, distance to schools, school fees and the cost of living. Given the amount of school dropouts at the end of primary education, the TVET system could be a natural home to absorb thousands more students. However, this requires continuous investment in school dormitories (safe boarding), safe transport to/from schools, and more student scholarships in both public and private schools. Special campaigns could be launched to promote the enrolment of girls in technical and mechanical fields that are traditionally considered for boys. Given the planned creation of CoVEs, special attention must be given to these aspects in addition to excellence in learning and teaching.

Improving the implementation of work-based learning. The findings point to some measures that would improve the implementation of internships and industrial attachments. The length, implementation period and format of internships should be revisited thoroughly – for example, the length of industrial attachments could be increased to 3 months, they could be implemented throughout the year (not all at the same time for all students), grants could be provided to students for living costs, the standard checklist could be updated from the workplace practices' point of view, there could be closer cooperation and exchange mechanisms between schools and companies, and grey areas surrounding liability in the case of accidents need clarifying. Internships could be regulated and charging students fees banned. The creation of CoVEs could be used to test these suggestions.[51] To address inadequate funding, a National Skills Training Fund could be another step in directing more resources into practical learning.

Improving the functions of production units and community outreach programmes. There are production units in TVET schools (e.g. crop production, animal health and food processing) primarily to support students' learning. The CoVEs approach could be useful to improve the effectiveness of these production units, teaching not only the practical skills of primary production, but also the practical skills of business management functions (marketing, processing and selling products). Given the current poor links between agriculture and business, it is essential to incorporate business management functions in the system. One idea could be to recruit finance and economy graduates under a 'young professionals' scheme', to work in the production units for at least 6 months or a year.

The community outreach programme is another interesting concept to be developed further. The idea is to give to students 'project assignments' so that they are exposed to real-life problems in primary production, harvesting, post-harvest activities, marketing and trade on existing farms. In an interinstitutional cooperation between the RTB and RAB, these programmes could be designed to complement existing work-based learning in schools, also mirroring the agriculture extension services for learning at school level.

Instilling entrepreneurial skills in all programmes. Entrepreneurship education is seen as crucial for development by all, but very difficult to realise. Besides training, students must experience

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[51] For incorporating monitoring and evaluation methods in the existing work-based learning schemes, see ETF (2021c), Monitoring and evaluating work-based learning in vocational education and training: A handbook for policy makers and social partners, Monitoring and evaluating work-based learning in vocational education and training | ETF (europa.eu)

business development and the start-up process first hand in production units and incubation centres in schools. The implementation and funding of business support services could be improved through public-private partnerships, where companies are directly involved in these programmes as providers or mentors. Resources could be made available from a National Skill Training Fund to subsidise business start-up grants and loans. One idea is CoVEs in the form of a public-private partnership, where companies take roles in school management and provide guidance on business. They could bring all players together (e.g. university, TVET schools, polytechnics, RAB, companies) in the given district to achieve a common objective.

Improving school infrastructure for learning and living. Schools need to provide a decent and safe learning and living environment for students. This includes not only laboratories, workshops, training materials, IT rooms and full internet connectivity, but also decent/ safe accommodation and eating facilities, toilets, continuous water and electricity supply, etc. The planned creation of CoVEs could exemplify these aspects. A holistic approach is needed in infrastructural improvements, because having an excellent laboratory does not guarantee good learning if students do not have a good bed or breakfast.

Improving the quality of teachers. The shortage of experienced and qualified teachers requires urgent upskilling including in pedagogical/competency-based skills and technical/technology skills, and this must be taken into account in newly created CoVEs. However, a comprehensive policy package is needed for the long-term sustainability of teachers, covering the attractiveness of teaching as a profession, the importance of an initial professional education, continuous professional development for teachers and career progression.

Increasing the female share of TVET teachers and headmistresses. Women are less represented in TVET education/training supply both in secondary TVET and polytechnics. The same situation is also valid in the provision of agriculture extension services, selection of farmer promotors and facilitators. A higher female share of teachers and staff could help to provide more gender-sensitive services and a better understanding of the challenges faced by girls/women in training programmes and workplaces. This could be considered in the newly created CoVEs, while public institutions could give priority to women in future hirings of new teachers and employees in both systems.

More systematic career guidance and counselling. Students, parents and adults must have continuous access to fully transparent labour market information on jobs, occupations and sectors in order to make informed decisions on education and job choices (e.g. visits to companies in different sectors, working conditions, requirements of different occupations, comparison of wages, availability of vacancies, hiring criteria/practices). This must start early on, from lower secondary education till the end of university and in employment services for jobseekers. Having this information requires constant data collection and analysis to provide accurate and timely information on labour market trends, skills demand and sectoral performance. The results must be also communicated in a user-friendly way to main target groups. Given the transitional challenges faced by young graduates of agricultural programmes, as part of the curriculum they should receive advice and training on job search methods, how to write a CV, how to present oneself in interviews, work preparedness, etc.

Direct involvement of business in TVET in selected subsectors. Besides activating a fully functional body, 'SSC Agriculture', to represent the sector nationally, some subsectors could be used as an entry point for direct business involvement in TVET, possibly in the form of public-private partnerships. Such promising sectors are agro-science, agro-tech, agro-food, agro-forestry (including the wood value chain and forestry products), the pharma & beauty sector (pharmaceuticals, para-pharmaceuticals and cosmetics). For example, agro-tech and agro-science could offer specialised programmes embracing aspects of the digital and green transitions in agriculture[52]. Agro-food could

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[52] For the role of CoVEs in the digital and green transitions, see ETF (2023a), Building evidence to support vocational excellence for the digital and green transitions: the role of CoVEs in digital transition, https://www.etf.europa.eu/en/publications-and-resources/publications/building-evidence-support-vocational-excellence-digital-and; and ETF (2023b), Building evidence to support vocational excellence for the digital and green transitions: the role of CoVEs in green transition, https://www.etf.europa.eu/en/publications-and-resources/publications/building-evidence-support-vocational-excellence-digital-0

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cover the processing of dairy, poultry, meat and horticulture products, but also food preparation and services, and food safety standards. With a lack of experts in applied microbiology, food science and technology experts in dairy and meat production, the HACCP system, but also professional staff such as gastronomists, chefs and sommeliers, a sectoral partnership could provide highly specialised skills in food processing and food preparation. In creating CoVEs, it is advisable to choose some sub-sectors as an entry point for direct business involvement[53]. The programmes could be both at upper secondary and tertiary levels with more and diverse options for students.

Providing extensive adult training in the informal sector. There is a clear need for subsidised training for vulnerable groups, particularly women farmers and NEETs, in rural areas. For a visible impact, the training must be provided at large scale, delivered in their work context, e.g. mobile training units combined with extension services. These off-school skills development programmes would be in the form of short-term courses and for certification of informal skills (or validation of non-formal and informal skills). The courses offered must combine vocational skills with the necessary foundational and life skills (e.g. literacy, numeracy, self-presentation). Gender-specific topics could be included such as child protection, women's protection, household protection, understanding women's rights, legal framework, etc.

A closer collaboration between TVET and agriculture extension services. Agricultural TVET institutions need to collaborate more closely at all levels with the agriculture extension services, given their mandate and large organisational network in rural areas. This is particularly important in the regions and rural areas and in adult training provision. The current extension system does not seem to have strong connection and coordination with secondary TVET, polytechnics or universities in agricultural fields. The planned CoVEs could bring together all these players in the selected districts. The constraints of public extension services (limited staffing, insufficient resources, centralised top-down approach, outdated equipment) can be overcome by shifting from a single public extension system towards a pluralistic system, in which different stakeholders provide diverse services (e.g. private sector, NGOs, farmer organisations).

Implementing these recommendations will require a coordinated effort from many diverse stakeholders, including government agencies, education institutions, business players, financial institutions, and development partners. By addressing the challenges identified and leveraging the opportunities, Rwanda can enhance the competitiveness, sustainability and inclusivity of its agricultural sector, thereby contributing to economic growth and improved livelihoods for its population.

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[53] For more discussion on business involvement, see https://www.etf.europa.eu/en/what-we-do/vocational-excellence

ANNEX 1 – List of all consultations conducted for this study

National institutions and donors consulted through bilateral meetings

- Ministry of Education (MINEDUC)
- Rwanda TVET Board (RTB)
- Rwanda Polytechnic (RP)
- Ministry of Public Service and Labour (MIFOTRA)
- Rwanda Development Board (RDB)
- National Institute of Statistics of Rwanda (NISR)
- Ministry of Agriculture (MINAGRI)
- Rwanda Agriculture and Animal Resources Board (RAB)
- National Agricultural Export Development Board (NAEB)
- Private Sector Federation (PSF)
- Rwanda Youth in Agribusiness Forum (RYAF)
- The EU Delegation to Rwanda
- Donors: GIZ, USAID, Expertise France, AFD, LUXDEV, Enabel, KOICA, Mastercard Foundation

Companies and organisations consulted through semi-structured interviews

- Inyange Industries (food processing and sale of agricultural products)
- AIF African Improved Food Ltd (food processing and sale of agricultural products)
- SOSOMA Industries (food processing and sale of agricultural products)
- SINA GERARD Ese Urwibutso (food processing and sale of agricultural products)
- German Butchery company (meat processing and sale of meat products)
- Uzima Chicken Rwanda (production and sale of poultry products)
- Garden Fresh Rwanda (production, storage and export of fresh horticulture products)
- COVAFGA Buranga Cooperative (production and processing of horticulture products cooperative)
- Cooproriz Ntende Cooperative (production and processing of rice cooperative)
- SOUK IG Farms (production, aggregation, packaging and export of horticulture products)
- Proxy Fresh Proxy Fresh (import and export of food products)
- HORECO Horticulture in Reality Corporation Ltd (export of unprocessed and processed foods)
- Hollanda Green Tech (design, packaging, sales of horticulture products)
- Frulep supermarket (sale of foodstuff and exports of food products)
- YDH Agro limited (exports of the unprocessed food products)
- Star Leather (manufacture and sale of leather and related products)
- Wood Habitat (manufacture of wood and wood products)
- IZERE Service and Trading Company Limited (wholesale/ retail sale of agricultural raw materials)
- ICRAF International Centre for Research in Agroforestry (agro-forestry NGO for soil protection)
- Abuhizi Rwangingo water users' organisation (services for access and efficient use of water)
- Control Union Rwanda (accreditation and certification of food safety and hygiene)
- Sawa Citi (retail trade of food products)
- KFC fast food restaurant chain (marketing and sale of food products)
- ABDC Api Business Development Company Ltd (sale of agricultural live animal/bee products)
- EA Agro Rwanda Limited (agribusiness for extension services and warehousing& support)
- SEMAGRO (retail sale of agricultural inputs such as seeds and other products)
- Yalla Group Limited (agriculture extension services and agricultural machinery)
- Agrogo Limited (provision of agri-tech services to farmers)
- Agrotech Limited (sales of agricultural products, research, development and testing services)
- Viamo IT company (provision of digital agri extension services to farmers)

Education institutions consulted through semi-structured interviews and focus groups

- Kabutare Technical Secondary School
- Nyabihu TVET School
- Apejerwa School
- College Fondation Sina Gerard
- GS Gaseke / Technical Secondary School
- IPRC Huye Polytechnics
- Rwanda Institute for Conservation Agriculture (RICA)

Annex 2 - Detailed courses and number of students in agriculture-related trades in Rwandan secondary TVET schools in 2023

School Name and Status	District / Sector	Trade / Level	N. of students
BUMBOGO TECHNICAL SECONDARY SCHOOL (TSS) (Public)	Gasabo/ Bumbogo	Food processing L3	20
		Food processing L4	21
		Food processing L5	7
GACURIRO TSS (Public)	Gasabo / Kinyinya	Agriculture L3	3
		Food processing L3	36
		Wood technology L3	12
		Food processing L4	17
BUSASAMANA TSS (Public)	Nyanza / Busasamana	Wood technology L3	12
NYANZA TVET SCHOOL (Public)	Nyanza / Kigoma	Wood technology L3	15
KIGEMBE TSS (Public)	Gisagara / Kigembe	Wood technology L3	7
ST KIZITO SAVE TVET SCHOOL (Government-aided)1	Gisagara / Save	Wood technology L3	13
KIBEHO TSS (Public) / GS: Groupe Scolaire	Nyaruguru / Kibeho	Wood technology L3	16
GS LIBA TSS (Public) / GS: Groupe Scolaire	Nyaruguru / Ngera	Agriculture L3	9
		Crop production L3	8
GS NYABIMATA / TSS (Government-aided)	Nyaruguru / Nyabimata	Wood technology L3	6
GS NYUMBA / TSS (Government-aided)	Huye / Gishamvu	Wood technology L3	20
GS KARAMA / TSS (Government-aided)	Huye / Karama	Wood technology L3	17
RWABUYE TVET SCHOOL (Public)	Huye / Ngoma	Wood technology L3	17
KABUTARE TSS (Public) *TVET school with only agriculture-related trades	**Huye / Ngoma**	Agriculture L3	55
		Animal Health L3	84
		Food processing L3	81
		Forestry L3	34
		Animal Health L4	78
		Crop production L4	43

		Food processing L4	79
		Forestry L4	15
		Animal Health L5	65
		Crop production L5	54
		Food processing L5	85
		Forestry L5	21
GSNDP CYANIKA (Government-aided)	Nyamagabe / Cyanika	Wood technology L3	18
CYANIKA TSS (Public)	Nyamagabe / Cyanika	Food processing L3	13
		Food processing L4	11
		Food processing L5	34
DON BOSCO NTSS (Government-aided)	Nyamagabe / Gasaka	Wood technology L3	10
GROUPE SCOLAIRE GATARE (Government-aided)	Nyamagabe / Gatare	Agriculture L3	25
		Animal health L3	15
MWOGO TSS (Public)	Nyamagabe / Kamegeri	Wood technology L3	8
MPANDA TVET SCHOOL (Public)	Ruhango / Byimana	Wood technology L3	23
ES KINAZI (Public) ES: Ecole Secondaire	Ruhango / Kinazi	Agriculture L3	56
		Animal health L3	157
		Animal health L4	135
		Crop production L4	42
		Animal health L5	158
		Crop production L5	81
KINAZI VTC (Public)	Ruhango / Kinazi	Wood technology L3	16
VUNGA TVET (Private)	Ruhango / Mbuye	Wood technology L3	41
MUTARA TSS (Public)	Ruhango / Mwendo	Wood technology L3	5
NYABIKENKE TVET SCHOOL (Government-aided) *TVET school with only agriculture-related trades	**Muhanga / Kiyumba**	Crop production L3	27
		Animal health L3	56
		Food processing L3	39
		Forestry L3	18
		Animal health L4	50
		Crop production L4	35

		Forestry L4	11
		Animal health L5	37
		Crop production L5	27
		Forestry L5	19
KIYUMBA TVET School (Public)	Muhanga / Kiyumba	Wood technology L3	17
GS GASOVU / TSS (Government-aided) GS: Groupe Scolaire	Muhanga / Rugendabari	Agriculture L3	5
		Animal health L3	6
KAYENZI TVET SCHOOL (Public)	Kamonyi / Kayenzi	Wood technology L3	12
FR RAMON KABUGA TVET (Government-aided)	Kamonyi / Ngamba	Wood technology L3	9
LESPERANCE (Private)	Karongi / Gishyita	Agriculture L3	56
		Agriculture L4	76
		Agriculture L5	66
RUBENGERA TSS (Private)	Karongi / Rubengera	Wood technology L3	10
GS GISOVU (Public) GS: Groupe Scolaire *TVET school with only agriculture-related trades	**Karongi / Twumba**	Agriculture L3	40
		Animal health L3	60
		Forestry L3	24
		Animal health L4	60
		Crop production L4	39
		Forestry L4	20
		Animal health L5	55
		Crop production L5	55
		Forestry L5	22
COLLEGE INDASHYIKIRWA (Public)	Rutsiro / Boneza	Wood technology L3	31
GS KABEZA / TSS (Government-aided) / GS: Groupe Scolaire	Rutsiro / Manihira	Agriculture L3	19
		Crop production L4	28
GS BWIZA / TSS (Government-aided) / GS: Groupe Scolaire	Rutsiro / Murunda	Animal health L3	10
		Wood technology L3	18
		Animal health L4	10

GS BUSASAMANA II / TSS (Government-aided)	Rubavu / Busasamana	Wood technology L3	6
BIGOGWE TSS (Government-aided) *TVET school with only agriculture-related trades	**Nyabihu / Bigogwe**	Agriculture L3	75
		Animal Health L3	74
		Forestry L3	18
		Animal Health L4	83
		Crop production L4	70
		Forestry L4	16
		Animal Health L5	74
		Crop production L5	77
		Forestry L5	20
NYABIHU TVET SCHOOL (Public)	Nyabihu / Mukamira	Food processing L3	25
		Food processing L4	24
		Food processing L5	27
KIBISABO TVET SCHOOL (Public) *TVET school with only agriculture-related trades	**Nyabihu / Rambura**	Agriculture L3	44
		Animal health L3	41
		Forestry L3	26
		Animal health L4	60
		Crop production L4	55
		Forestry L4	44
		Animal health L5	56
		Crop production L5	48
		Forestry L5	23
GS MURAMA / TSS (Government-aided) / GS: Groupe Scolaire	Nyabihu / Rugera	Wood technology L3	8
GS BUNGWE (Public) / GS: Groupe Scolaire	Ngororero / Bwira	Wood technology L3	20
HINDIRO TSS (Public)	Ngororero / Hindiro	Food processing L3	15
		Food processing L4	19
		Food processing L5	16
ES KAVUMU / TSS (Public) / ES: Ecole Secondaire	Ngororero/ Kavumu	Wood technology L3	8

GS KAVUMU B (Public) / GS: Groupe Scolaire	Ngororero / Maytazo	Wood technology L3	2
GS RUNAYU / TSS (Government-aided) / GS: Groupe Scolaire	Ngororero / Muhanda	Wood technology L3	15
MUHORORO TVET School (Public)	Ngororero / Muhororo	Wood technology L3	25
APEJERWA (Government-aided) *TVET school with only agriculture-related trades	**Ngororero / Ngororero**	Agriculture L3	40
		Animal health L3	73
		Animal health L4	36
		Crop production L4	31
		Animal health L5	41
EAV KIVUMU (Government-aided) EAV: Ecole Agri-Veterinaire *TVET school with only agriculture-related trades	**Ngororero / Nyange**	Agriculture L3	31
		Crop production L3	39
		Animal health L3	43
		Animal health L4	37
		Crop production L4	18
		Animal health L5	25
		Crop production L5	11
MUGANZA TVET SCHOOL (Public)	Rusizi / Muganza	Wood technology L3	44
GS YOVE / TSS (Government-aided) / GS: Groupe Scolaire	Nyamasheke / Cyato	Wood technology L3	12
GIHOMBO TSS (Public)	Nyamasheke / Gihombo	Wood technology L3	15
VTC TYAZO (Government-aided)	Nyamasheke / Kanjongo	Wood technology L3	15
MWEZI TVET (Government-aided)	Nyamasheke / Karengera	Wood technology L3	7
KARENGERA TVET SCHOOL (Government-aided)	Nyamasheke / Kirimbi	Wood technology L3	25
GS STE MARIE MERCI MUYANGE / TSS (Government-aided)	Nyamasheke / Nyabitekeri	Wood technology L3	17
EAV NTENDEZI (Public) EAV: Ecole Agri-Veterinaire *TVET school with only agriculture-related trades	**Nyamasheke / Ruharambuga**	Agriculture L3	52
		Animal health L3	56
		Animal health L4	94
		Crop production L4	44
		Animal health L5	74
		Crop production L5	45

COLLEGE FONDATION SINA GERARD (Private) *TVET school with only agriculture-related trades	**Rulindo / Bushoki**	Agriculture L3	14
		Animal health L3	21
		Food processing L3	25
		Food processing L4	1
KINIHIRA TVET (Public)	Rulindo / Kinihira	Wood technology L3	20
		Wood technology L4	7
		Wood technology L5	4
KISARO TVET (Public)	Rulindo / Kisaro	Agriculture L3	79
		Animal health L3	109
		Animal health L4	29
		Crop production L4	12
BUSHOKI TSS (Public)	Rulindo / Tumba	Food processing L3	11
		Food processing L4	16
		Food processing L5	12
GS RWAHI / TSS (Public) / GS: Groupe Scolaire	Gakenke / Coko	Wood technology L3	7
JANJA TVET (Government-aided)	Gakenke / Janja	Wood technology L3	50
		Wood technology L4	3
		Wood technology L5	7
ES BUHUGA (Government-aided) / ES: Ecole Secondaire	Gakenke / Kivuruga	Wood technology L3	21
LCA MATABA-ACEDI (Private) LCA: Lycee Catholique st Allain *TVET school with only agriculture-related trades	**Gakenke / Mataba**	Agriculture L3	24
		Animal health L3	72
		Animal health L4	48
		Crop production L4	10
		Animal health L5	66
		Crop production L5	17
GS MUNYANA / TSS (Government-aided) / GS: Groupe Scolaire	Gakenke / Minazi	Wood technology L3	6
EAV RUSHASHI (Public) EAV: Ecole Agri-Veterinaire *TVET school with only agriculture-related trades	**Gakenke / Rushashi**	Agriculture L3	40
		Animal health L3	75
		Animal health L4	59

		Crop production L4	27
		Animal health L5	75
		Crop production L5	40
ESTB BUSOGO (Government-aided)	Musanze / Gataraga	Food processing L3	49
		Wood technology L3	19
		Food processing L4	54
		Food processing L5	40
GS GIKORO / TSS (Government-aided) / GS: Groupe Scolaire	Musanze / Shingiro	Wood technology L3	5
CYANIKA TSS (Public)	Burera / Cyanika	Wood technology L3	21
ES GAHUNGA (Private) ES: Ecole Secondaire *TVET school with only agriculture-related trades	**Burera / Gahunga**	Agriculture L3	24
		Crop production L4	14
		Crop production L5	19
ST PAUL MURWA TSS (Government-aided)	Burera / Kivuye	Wood technology L3	11
GS RUSHARA / TSS (Public) / GS: Groupe Scolaire	Burera / Nemba	Wood technology L3	6
		Wood technology L4	6
GS GASEKE / TSS (Public) GS: Groupe Scolaire	Burera / Ruhunde	Agriculture L3	2
		Animal health L3	5
		Animal health L4	15
		Crop production L4	4
KABONA TSS (Government-aided)	Burera / Rusarabuye	Wood technology L3	22
ES BUKURE (Public) ES: Ecole Secondaire *TVET school with only agriculture-related trades	**Gicumbi / Bukure**	Agriculture L3	45
		Animal health L3	89
		Animal health L4	57
		Crop production L4	15
		Animal health L5	61
		Crop production L5	32
CYUMBA TSS (Public)	Gicumbi / Cyumba	Wood technology L3	14
COLLEGIO SANTO ANTONIO MARIA ZACCARIA (Government-aided)	Gicumbi / Muko	Wood technology L3	16
ETSK MUSHA (Private)	Rwamagana / Mwulire	Wood technology L3	20

GS CYIMBAZI / TSS (Public) / GS: Groupe Scolaire	Rwamagana	Wood technology L3	28
GS NYAKARIRO / TSS (Public) / GS: Groupe Scolaire	Rwamagana / Nyakaliro	Crop production L3	12
		Crop production L4	6
SHONGA TSS (Public)	Nyagatare / Tabagwe	Wood technology L3	16
EFA NYAGAHANGA TVET SCHOOL (Government-aided) EFA: Ecole Feminine d'Agronomie *TVET school with only agriculture-related trades	**Gatsibo / Gatsibo**	Agriculture L3	40
		Animal health L3	73
		Food processing L3	97
		Animal health L4	44
		Crop production L4	24
		Food processing L4	42
		Animal health L5	31
		Crop production L5	30
		Food processing L5	55
GITUZA TVET (Government-aided)	Gatsibo / Kageyo	Wood technology L3	11
UMUTARA POLYTECHNIC/GAKONI (Public) *TVET school with only agriculture-related trades	**Gatsibo / Kiramuruzi**	Agriculture L3	47
		Animal health L3	55
		Wood technology L3	17
		Animal health L4	24
		Crop production L4	19
		Animal health L5	21
		Crop production L5	18
NGARAMA TVET SCHOOL (Public)	Gatsibo / Ngarama	Wood technology L3	12
BENEBIKIRA TVET SCHOOL (Private)	Gatsibo / Ngarama	Wood technology L3	17
GS BUHABWA / TSS (Public) GS: Groupe Scolaire	Kayonza / Murundi	Agriculture L3	14
		Animal health L3	11
		Animal health L4	7
		Crop production L4	1
NYAMIRAMA TVET SCHOOL (Public)	Kayonza / Nyamirama	Wood technology L3	18
GS GAHARA / TSS (Public) / GS: Groupe Scolaire	Kirehe / Gahara	Wood technology L3	3

KIREHE TSS (Public)	Kirehe / Kigina	Wood technology L3	15
GS MPANGA / TSS (Public) / GS: Groupe Scolaire	Kirehe / Mpanga	Agriculture L3	14
		Crop production L4	9
APENA (Government-aided) *TVET school with only agriculture-related trades	**Kirehe / Nasho**	Agriculture L3	23
		Animal health L3	46
		Animal health L4	12
		Crop production L4	12
		Animal health L5	9
		Crop production L5	12
IPRC NGOMA TSS (Public)	Ngoma / Kibungo	Wood technology L3	23
MUTENDELI TVET SCHOOL (Public) *TVET school with only agriculture-related trades	**Ngoma / Mutenderi**	Forestry L3	30
		Forestry L4	16
		Forestry L5	23
GS GASETSA / TSS (Public) / GS: Groupe Scolaire	Ngoma / Remera	Animal health L3	17
EAV GITWE (Government-aided) EAV: Ecole Agri-Veterinaire *TVET school with only agriculture-related trades	**Ngoma / Rukira**	Agriculture L3	48
		Animal health L3	68
		Animal health L4	41
		Crop production L4	18
		Animal health L5	57
		Crop production L5	47
GS RWINTASHYA (Government-aided) / GS: Groupe Scolaire	Ngoma / Rukumberi	Wood technology L3	14
GS DIHIRO / TSS (Public) GS: Groupe Scolaire	Bugesera / Gashora	Agriculture L3	21
		Animal health L3	29
		Animal health L4	16
		Crop production L4	15
NDAMA TVET (Government-aided)	Bugesera / Kamabuye	Animal health L3	6
		Animal health L4	10
GS MUSENYI / TSS (Public) / GS: Groupe Scolaire	Bugesera / Musenyi	Agriculture L3	17
		Crop production L4	14

NYAMATA TVET SCHOOL (Public)	Bugesera / Nyamata	Wood technology L3	14
ALL WITH L3-L5 PROGRAMMES: 100 SCHOOLS IN TOTAL		**L3-L4-L5 IN 6 TRADES**	**8061 STUDENTS**

Source: Statistics provided by Rwanda TVET Board in July 2023.

Notes: (1) 'Government-aided' means a kind of public-private partnership model, mostly religious schools owned by churches. The schools owned by faith organisations are non-profit and they are registered as civil society institutions. The owners provide the land and the government contributes to building schools' infrastructure, recruiting staff and paying them, providing students learning facilities such as school curricula and books. (2) The number of students in TVET schools with only agriculture-related trades is 3 991, while the number of agriculture-related students in all TVET schools is 6 506 students. (3) Here is an explanation of some abbreviations; TSS: Technical Secondary School; GS: Groupe Scolaire; LCA: Lycee Catholique st Allain; EAV: Ecole Agri-Veterinaire; ES: Ecole Secondaire; EFA: Ecole Feminine d'Agronomie.

ACRONYMS

AfCFTA	African Continental Free Trade Area
AfDB	African Development Bank
ASSC	Agriculture Sector Skills Council
CESB	Capacity Development and Employment Services Board
CoVEs	Centres of Vocational Excellence
CSO	Civil Society Organisations
DRC	Democratic republic of Congo
ETF	European Training Foundation
EU	European Union
FAO	Food and Agriculture Organization
FFS	Farmer Field Schools
GER	Gross Enrolment Rate
GIZ	Gesellschaft fuer Internationale Zusammenarbeit
HDI	Human Development Index
ICT	Information and Communication Technologies
IFPRI	International Food Policy Research Institute
ILO	International Labour Organisation
IPAR	Institute of Policy Analysis and Research
IPRC	Integrated Polytechnic Regional College
LFS	Labour Force Survey
LMIS	Labour Market Information System

MIFOTRA	Ministry of Public Service and Labour
MINAGRI	Ministry of Agriculture
MINEDUC	Ministry of Education
MoU	Memorandum of Understanding
NAEB	National Agricultural Export Development Board
NER	Net Enrolment Rate
NISR	National Institute of Statistics of Rwanda
OECD	Organisation for Economic Cooperation and Development
PSF	Rwanda Private Sector Federation
RAB	Rwanda Agriculture Board
RAS	Rwanda Agricultural Survey
RDB	Rwanda Development Board
REC	Rwanda Establishment Census
RP	Rwanda Polytechnic
RSSB	Rwanda Social Security Board
RTB	Rwanda TVET Board
SDGs	Sustainable development Goals
SSC	Sector Skills Council
TVET	Technical and Vocational Education and Training
UN	United Nations
VET	Vocational Education and Training
WB	World Bank

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