

Joint EU-ILO Government of Rwanda project: Strengthening the impact on employment of sectoral and trade policies

Employment in Export-Oriented Agricultural Value Chain in Rwanda

April 2019
Synthesis report



**This document was produced by the International Labour Office
with the financial assistance of the European Union**



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First published 2019

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ISSN 1999-2939; ISSN 1999-2947 (web pdf)

International Labour Office; Employment Sector.

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Printed by the International Labour Office, Geneva, Switzerland

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Abbreviations

CWS	Coffee Washing Station
EU	European Union
ILO	International Labour Office
ITC	International Trade Centre
MINECOFIN	Ministry of Finance and Economic Planning
NAEB	National Agricultural Export Development Board
NISR	National Institute of Statistics of Rwanda
RWF	Rwandan Franc

Acknowledgements

This summary document was produced in the context of the Strengthen project. The following people contributed to the document: Maikel Lieuw-Kie-Song, Haile Abebe, Faustin Mwambari, Jean Marc Mkundabantu, Jean Paul Gahamanyi and Julien Varlin.

1. Introduction

Agriculture has been at the forefront of Rwanda's development strategy in the past decade, with the share of the national budget allocated growing from 5.1 percent in 2006 to 5.3 percent in 2016/17 (MINECOFIN, 2006 and 2017). Over the same period, growth in agriculture averaged over 5.1 per cent a year.¹ The country is trying to overcome the limitations of land availability and its landlocked situation by increasing yields, developing new export value chains and leveraging regional trade. The agricultural sector contributes considerably to the national economy and poverty reduction. It provides employment for 72 per cent of the population and accounts for 29.5 per cent of the gross national product (GDP) (NISR, 2018). Food crop cultivation for self-consumption and cash is dominant, with farmers' holdings averaging around 0.5ha (Dijkxhoorn et al., 2016).

This synthesis report is based on work done through the Joint EU-ILO Government of Rwanda project: Strengthening the impact on employment of sectoral and trade policies. It synthesizes findings from the 2017 study *Understanding the effects of increased agricultural exports on employment in agricultural value chain in Rwanda*, referred to as the "study". This study estimates the wages and gross profit along the value chains to gauge the potential effects of increased agricultural exports on employment and gross profits in both traditional export value chains (pyrethrum, tea and coffee) and selected value chains developed recently (green beans, cut flowers and essential oils). It also incorporates findings from a baseline study on employment in agricultural value chains, referred to as the "baseline report" (DAI, 2016)², and those from an assessment by the International Trade Centre (ITC, 2017) on the potential of export crops in Rwanda. The objective of the baseline study was to assess how many people are employed in the three traditional agricultural export value chains as well as non-traditional products including green beans, cut flowers and essential oils.

This synthesis first describes the methodology used and then gives a description of each value chain and the split of the export added-value among its various players. Finally, it provides an overview of the employment effects along the different value chains and how these could be impacted by increased production for exports, given that as part of the project it was assessed that for coffee, tea and pyrethrum, there is considerable potential for increasing exports (See Box 2).

¹ National Institute of Statistics of Rwanda

² Technical assistance in the establishment of a baseline of employment in Rwanda's export-oriented agricultural value chains, Final Report, Request for Services No. 2016/373-608, November 2016

2. Methodology

The study used mixed methods. It combined existing data from the National Agricultural Export Development Board (NAEB) and the 2016 Baseline of employment in Rwanda's export-oriented agricultural value chains report (DAI 2016) with quantitative and qualitative primary data collected as part of this study. Data was collected from farmers, cooperative members, and processors. For consistency, whenever possible, the same cooperatives and processors were surveyed as in the Baseline report. Only for the pyrethrum value chain was a more extensive sample of 367 farmers surveyed and the sampling was done at district level.

The data from the study was complemented by a desk review, qualitative data from Key Informant Interviews and Focus Group Discussions. This entailed visiting managers to get complementary information on production data, market process of the products, and the cost of labour for each activity. Other information was related to the views of managers on quality improvement strategies they might have planned. These included appropriate techniques towards quality upgrading. The managers were also asked to provide views on possibilities of value chain upgrading to improve the quality of employment.

These interviews made it possible to gather data on production and exports, and also on prices, production costs, the split between casual and permanent employment, and wages at the different segments of the value chains. This in turn made it possible to estimate revenue, gross profit³, wages and revenue sharing at each segment of the value chain. Given the policy interest in creating off-farm employment, the creation of job in processing is of particular interest.

Total employment is expressed as full-time equivalents (FTEs), which is based on 240 days of work a year⁴. Total casual employment per value chain was given by the available total casual labourers' days worked divided by 240.

The following assumptions were made during the analysis:

1. At the farm level, casual wage labour was included as an input and its cost was estimated based on person days of casual labour reported in the surveys and prevailing daily actual wage rates. The labour inputs by farmers was not estimated, but where required the estimates from the baseline study were used.
2. Where data was available other inputs, such as fertilizer, were also included as an input.
3. At each value chain segment, the production was sold integrally (no self-consumption and no product loss) and that there was no inventory.

³ As defined by revenue minus labour costs and raw material costs.

⁴ 240 days is based on 12 months and 20 working days a month, which would amount to 1 920 hours for an eight-hour working day. It should be noted that the baseline study used a definition of 1 800 hours worked a year. To properly compare figures, these units need to be adjusted. This is done by a multiplier of the baseline report figures with $1\ 800/1\ 920=0.9375$.

4. For the cooperatives and processors, non-labour inputs were typically lumped together but labour inputs for both permanent and casual staff were collected separately.
5. Zero national consumption of the final products was assumed so that total exports were assumed to be equal to total production.
6. Generally a linear relationship between production and the use of inputs, (including raw materials and labour), was assumed at each step of the value chains.

Finally, it should be noted that increasing the volume of exports requires either that a) more land will be dedicated to this crop, but that may have negative employment effects related to other crops. Or b) that the yield (production per ha) of the current land increases, but this would typically also require an increase in other inputs such as fertilizer or better seeds or varieties. The likelihood of either, or a combination of these options will vary from value chain to value chain, and it was not possible to factor this into the analysis.

Box 1: Terminology

Wage employment: all paid employment where workers receive monetary wages.

Total employment in a value chain: includes wage employment as well as labour from self-employed farmers and their households.

Gross farmer profit: total income of farmer minus payments for casual workers and costs of other inputs (if available).

Gross farmer revenue: Total income from sales calculated from farm gate price times total quantity sold.

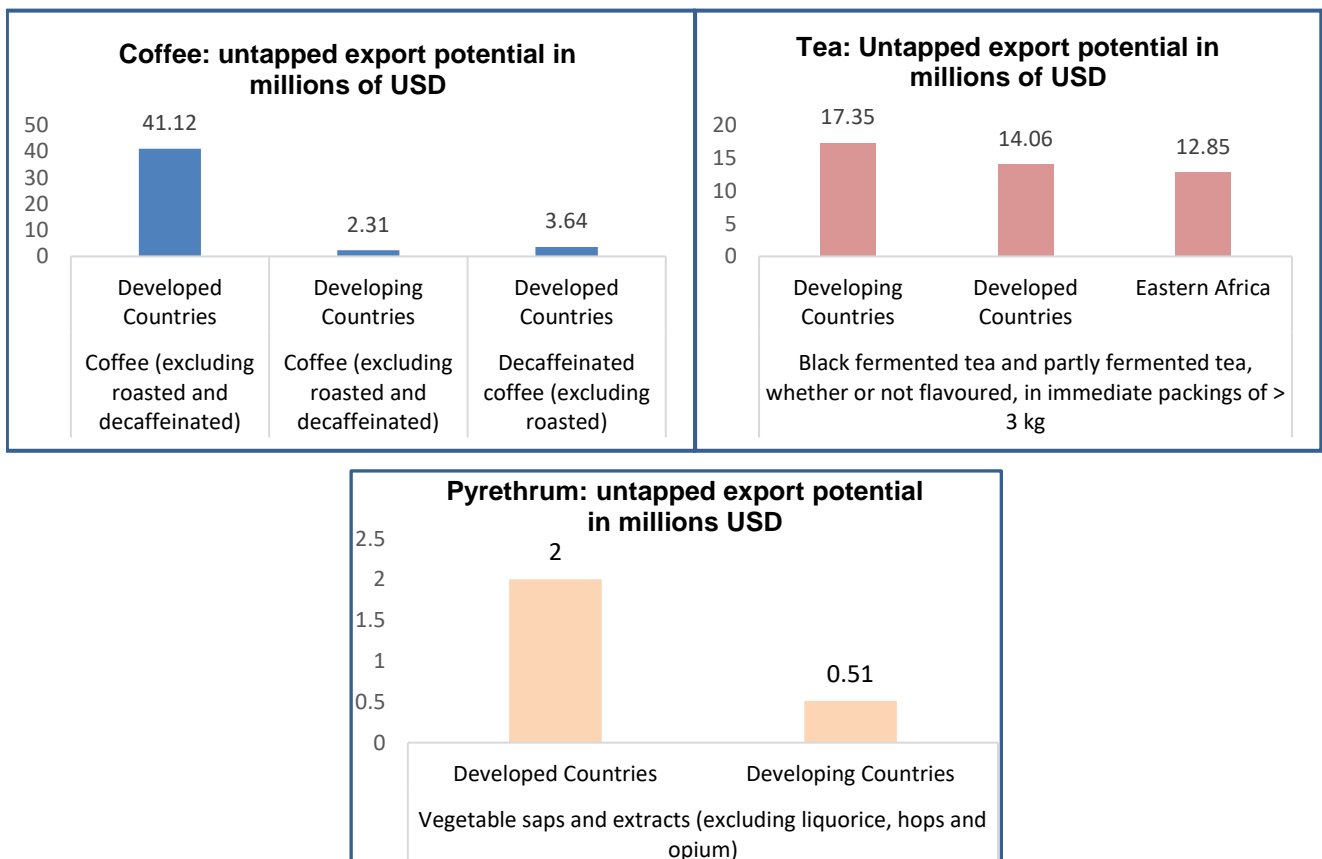
Full-time equivalent (FTE): 240 days of employment generated.

Box 2: Export potential for pyrethrum, tea and coffee

As part of the project, the International Trade Centre (ITC), a United Nations agency that aims to support trade, assessed the export potential of Rwanda's main agricultural exports. The ITC has developed a global model for estimating export potential to support countries with identifying what exports to prioritize. The model includes various variables including past exports and global demand for different products and access to different markets. The model also assesses potential; however, this does not specifically assess the capacity of different countries how to meet this potential. As it is based on historical data, it is also limited in how well it can assess potential for new products that have not been exported yet or for only a short time. Nonetheless it is useful for providing estimates for how much Rwanda's traditional exports can grow based on global demand and indicates in which markets such demand exists.

Key results of potential export markets for Rwandan coffee, tea and pyrethrum are presented in the figure below. These show the untapped export potential of the three traditional crops in millions of USD to different export markets. The value of untapped potential provides an estimate of how much exports can grow. It is clear from these results that for all three of the traditional exports, there is significant room to grow and thus also grow employment in the value chains of these crops. The 2016 exports for coffee were USD 58.5 million and so there is around 80 percent room for growth. Tea exports in 2016 were USD 74.5 million with an increase export potential of 59%. Pyrethrum exports were USD 3.2 million and the potential for growth is 78 percent.

Untapped export potential of traditional exports to developed and developing countries

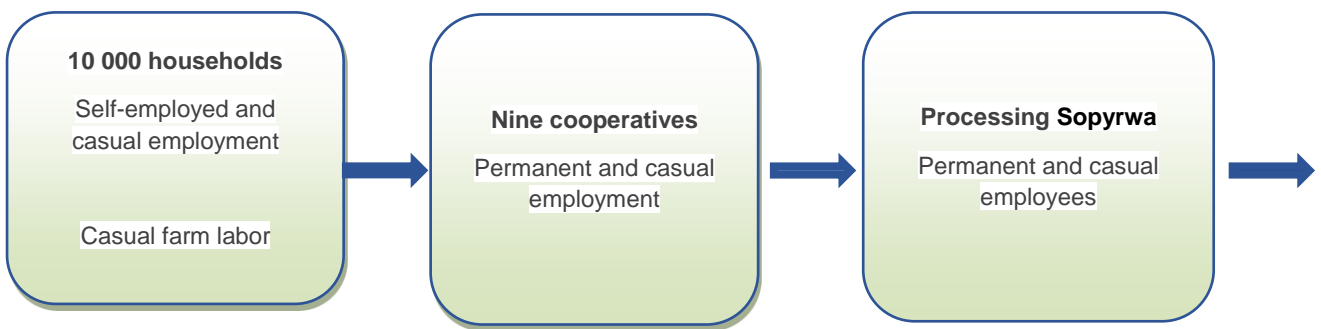


3. Traditional export value chains

3.1. Pyrethrum value chain

The study identified three major value chain segments: about 10 000 independent smallholder farmers who grow pyrethrum in the four districts of Musanze, Burera, Nyabihu and Rubavu, nine cooperatives, and a single processing plant owned by private company Horizon Sopyrwa⁵. The pyrethrum farms mostly use household labour but hire casual labourers at work peaks such as harvest. Farm production is delivered to cooperatives and then sold on to Sopyrwa, which processes it to make pale extract, and exports the production. The main use of the pale extract is as a natural or organic insecticide.

Figure 1: Pyrethrum value chain



Production and revenue

The study gathered information at the farm level, cooperatives and processors on quantities of pyrethrum harvested, supplied, processed and exported to different actors in the value chain. The prices, revenues received, labour used as well as their wages were also identified.

The study showed a fluctuation in the numbers of farmers growing pyrethrum among the 367 farmers in the sample. In 2014, 180 farmers cultivated pyrethrum; in 2015, 200; and in 2016, 174. This would indicate that in a given year only about half of the 10 000 farmers grow pyrethrum. Nevertheless, the reported cultivated area increased by 10 percent from 1 922 acre in 2014 to 2 114 acre in 2016. This increase combined with a yield increase, from 6.9 kg/acre to 9.5 kg/acre, led to a 52 percent production increase among respondents over the same period from 13 266 kgs (2012) to 20 167 kgs (2016).

As the reported farm gate price of pyrethrum stayed constant at 1 080 RWF/kg between 2014 and 2016, the aggregated revenue increase for the respondents was proportional to the production change. By extrapolating the results of the survey, estimates of the national

⁵ The baseline study also included the nurseries that produce seedlings and splits in the value chain and their employment estimates are used when discussing total employment in the value chain.

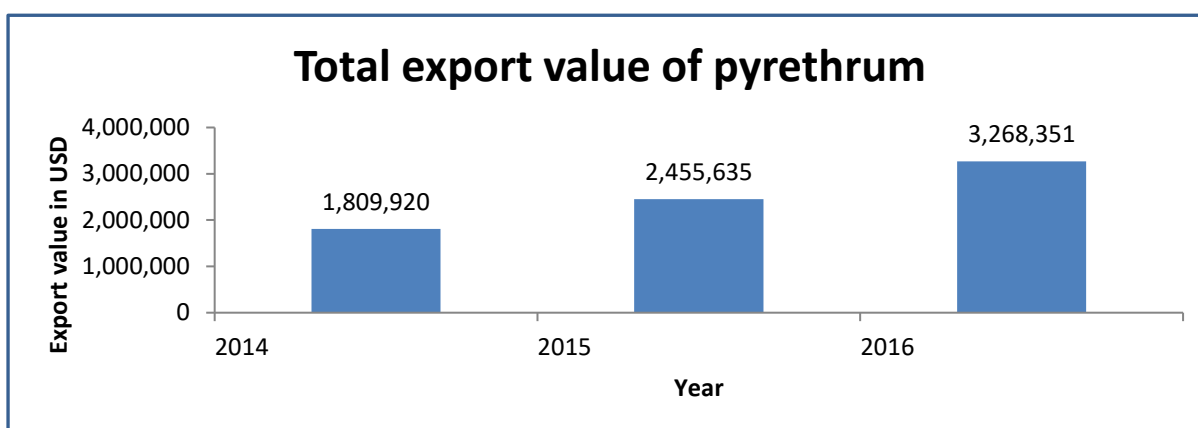
production and farm revenue were made and are presented in Table 1. The total export value of pyrethrum over the three years is presented in Figure 3.

Table 1: Summary of pyrethrum survey

	2014	2015	2016	Change
Sample respondents (sample)	180	200	174	-3%
Maximum cultivated area per person (acre)	145	154	178	23%
Average Cultivated Area (acre)	74	91	116	57%
Total cultivated area (acre)	1,922	2,055	2,114	10%
Quantity of dry flower produced (kg)	13,266	18,131	20,167	52%
Yield (kg/acre)	6.9	8.8	9.5	38%
Farm gate price of dried (RWF)	1,080	1,080	1,080	0%
Farm gate revenue (RWF)	14,327,280	19,581,480	21,780,360	52%
Estimated National Farm revenue (RWF)	795,960,000	979,074,000	1,251,744,828	57%
Estimated National Cooperative Revenue (RWF)	826,914,000	1,017,149,100	1,300,423,793	57%

Source ILO, 2017 Study

Figure 2: Pyrethrum export value (USD)



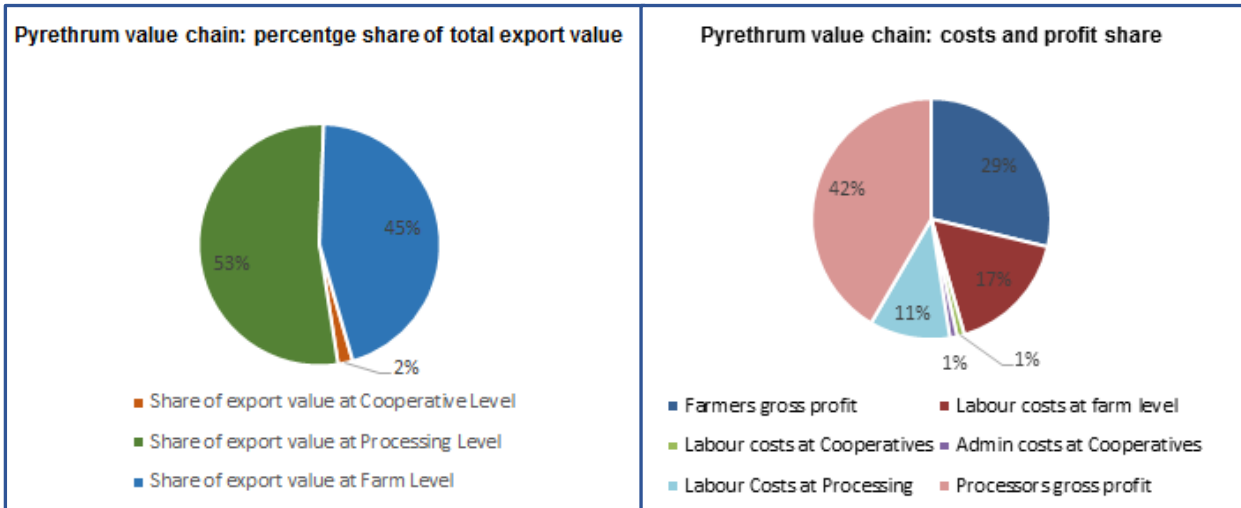
Source ILO, 2017 Study

Employment and wages

The total wage employment of hired farm labour in the pyrethrum value chain increased from 1 358 in 2014 to 2 169 FTEs in 2016. Most of the increase was at farm level with a 68.3 percent increase compared to only 7.1 percent at the processing level. As the total labour inputs in the pyrethrum value chain (excluding nurseries) was estimated to be 8 400 FTE a year, this implies the difference of 6 231 FTE was labour input provided by farmers' households. The labour input in cooperatives did not change. Both permanent and casual workers at the processing level have increased. In 2014, of the 234 FTEs, 78 were permanent and 157 were casual. By 2016 this had increased slightly to 80 permanent workers and 171 casual workers. These findings suggest that increases in export quantity will translate mainly into employment creation at the farm level, not in processing.

At farm level, casual wages were found to be RWF 1000 a day. In contrast at Sopyrwa, the average daily wage of all staff was RWF 4 870 per day, almost five times as high.

Figure 1: Pyrethrum – split of export value along the value chain (2016)



Source ILO, 2017 Study

Figure 2 presents a summary of the financial flows along the value chain and shows what share of total export revenue is paid to the different actors in the value chain. The figure on the left shows that for every USD in export generated, 53 per cent is accrued to processors, 2 per cent to cooperatives and 45 per cent to farmers. The figure on the right, splits these further by showing the share that is paid out to wages in each step. It shows that the 10 000 pyrethrum farmers pay out 17 percent of total export value in wages and retain 29 percent of the total export revenue. Based on this it could be estimated that the average gross profit per farmer was RWF 79 215. However, if as indicated by the survey, only about half of the farmers grow pyrethrum in a given year, then the average gross profit per farmer would roughly double to around RWF 158,000 per farmer per year. Furthermore, about 1 per cent of total export revenue was paid to workers at the cooperatives and 11 per cent of the export value accrued to labour employed at the processors. An important question is whether, through a different pricing mechanism, a larger share of export revenue could accrue to farmers, thus making growing pyrethrum a more attractive option for farmers.

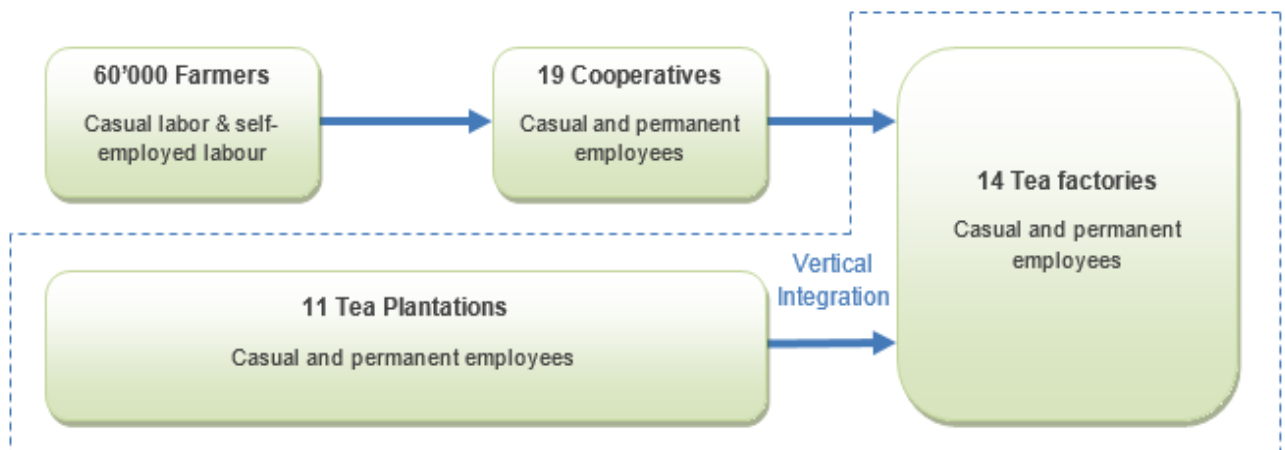
3.2. Tea value chain

Tea, together with coffee, are Rwanda’s most important agricultural export crops. The Rwandan tea processing industry comprises 14 operational factories processing a total of 108 480 metric tonnes of green leaves a year, with two additional factories under construction. Smallholder farmers sell their tea to cooperatives, which in turns sell it to one of the 14 factories. Factory owners typically also own nearby plantations which supply green leaf to tea factories. Processed tea is directly exported by the tea factories.

Thus the tea value chain includes smallholder farmers, plantations, estates, cooperatives and tea factory companies. Smallholder farmers mostly use household labour on their own farms or casual labourers. Plantations and estates use employ a combination of permanent and casual employees. The survey purposefully selected and visited 13 cooperatives and six of the same tea factories surveyed in the baseline report. Interviews with 58 tea growers, from all the 19 tea supplying areas, were also conducted, and key informant interviews with managers were done at the six tea factories and associated plantations.

Figure 2: Tea value chain

Source ILO, 2017 Study



Production and revenue

According to NAEB, between 2012 and 2016 the total tea planted area increased by 27 per cent and the area in production increased by 12 per cent from 15 383 ha to 17 221 ha. Due to a combination of increasing global market prices and the devaluation of the Rwandan Franc, the farm gate price increased by almost 100 per cent in the same period; cooperative gate prices increased by 74 per cent. As a result, farm and cooperatives' revenues increased 129 per cent and 99 per cent respectively in the same period.

The split of green leaf production between small farms and tea estates varies by year, but no detailed annual figures were available. For 2015/2016, 25.5 per cent of green leaf was produced on estates, and the rest on small farms. The estates supply their green leaf directly to the factories, while the small farmers their output is supplied to cooperatives, who aggregate the crops and then supply to the factories.

As presented in Table 2, the national farm revenue in 2016 was RWF 23 214 636 000 of which 17,294,904,000 was income for small farmers. This implies that for the 60,000 small farmers involved in rowing tea, the average income per farmer from tea was RWF 288,000.

Table 2: Green leaf supply and revenue estimates

Production and supply	2012	2013	2014	2015	2016
Total Planted Area (ha)	20,665	22,585	24,043	25,344	26,274
Total cultivated area (ha)	15,383	16,013	17,221	17,221	17,221
Production (Green leaf, kg)					
<i>Small farms</i>				78,990,190	80,817,308
<i>Tea estates</i>				27,036,911	27,662,300
Total National Production green leaf (kg)	94,482,844	93,046,766	104,819,646	106,027,101	108,479,608
Average Farm gate prices (RWF)	107	142	141	155	214
National Farm Revenue (RWF)	10,109,664,308	13,212,640,815	14,779,570,061	16,434,200,593	23,214,636,000

Source ILO, 2017 Study

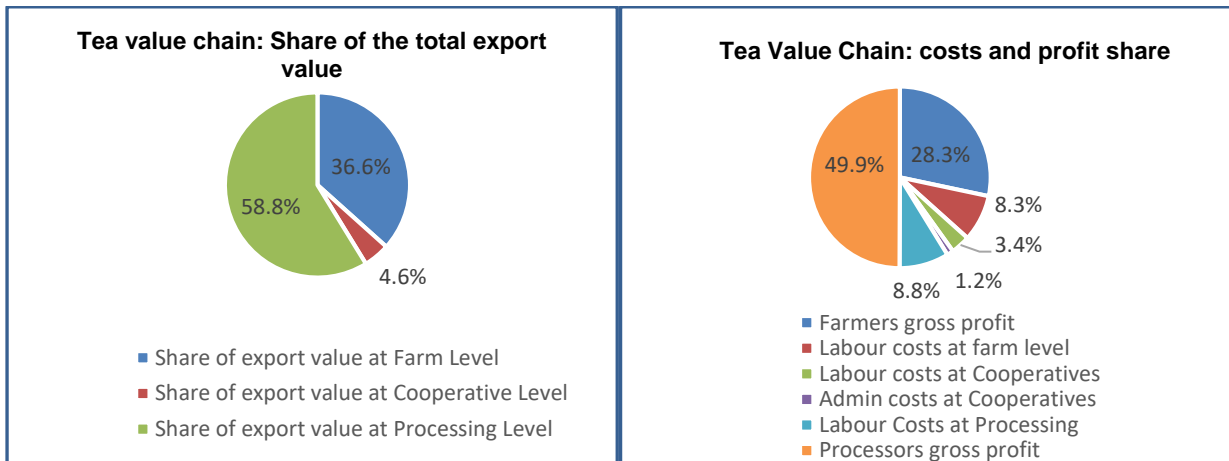
Employment and wages

Total employment in the tea sector was estimated at 65 400 FTE in the baseline study. Total *wage employment* in the sector was estimated to be 41 400 FTEs and this implies the difference is labour inputs from self-employed farmers and their households, which would amount to 24 000 FTE.

For paid labour, the average daily wages were estimated at RWF 1 000 at the farm, 1 154 at the cooperatives and 2 002 at tea processors in 2016. Figure 6 shows that of the total value of tea exports 2016 (RWF 63 447 223 400) 57 per cent went to processors, 37 per cent was paid at the farm level, and six per cent went to the cooperatives. Figure 6 also presents the distribution of cost and profit among different actors in the value chain.

The figure on the right shows how much was paid to labour in each of these steps and shows that at farm level, wage labour earned the equivalent of 8 per cent of the total export income, at cooperatives they earned 3 per cent and in processing 9 per cent. Of the total export value, 20 per cent was thus paid out in wages and 28 per cent accrued to farmers.

Figure 3: Tea – split of export value along the value chain (2016)

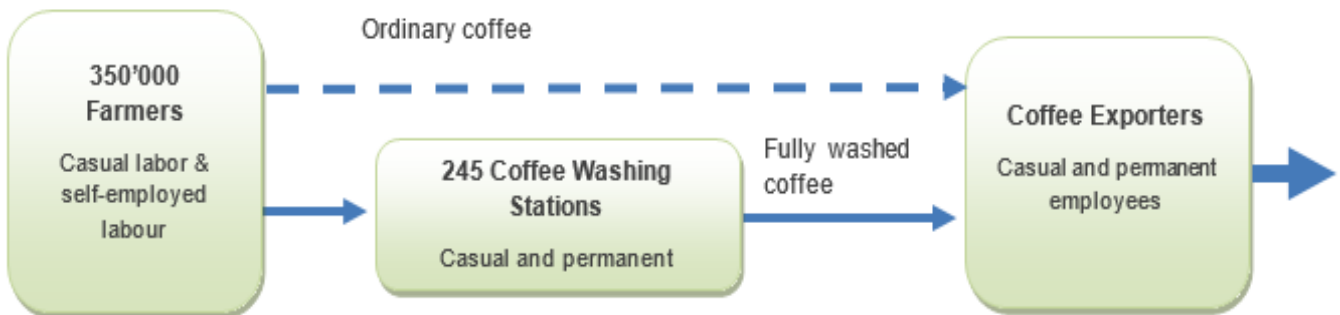


Source ILO, 2017 Study

3.3. Coffee value chain

The identified actors in the coffee value chain are nurseries, farmers, smallholder cooperatives linked to coffee washing stations (CWSs) and coffee exporters. Some coffee farmers are grouped into cooperatives and others not, however, all supply their produce to the CWSs. Household farm labour is dominant in own farms while others use casual labourers or a mix of both. Farmers individually or collectively supply coffee cherries to the CWSs, which supply the coffee parchment to the coffee millers. The millers further process the parchment into green coffee for export.

Figure 4: Simplified coffee value chain



Production and revenue

According to the National Coffee Census (NAEB, 2015), the total cultivated area increased by 6 percent between 2013 and 2016. The quantities of cherries produced increased by 12 percent over the same period. The farm gate price varied but increased by 20 percent overall in the same period. As a result, the farm revenue increased by 30 percent. From 2013 to 2016 Coffee Washing Stations showed increased revenues of 44 percent from coffee parchment. (Note add Total export value?)

Table 3: Production, supply and revenue in the coffee value chain

Production, supply, and revenues	2013	2014	2015	2016	Change
Total cultivated area (ha)	33,826	34,045	35,000	35,891	6%
Farm gate prices (RWF)	145	175	160	175	20%
Total coffee cherries produced (kg)	102,935,455	103,310,563	122,253,975	115,640,263	8%
Total farm revenue (RWF)	14,925,640,975	18,079,348,438	19,560,636,000	20,237,045,938	30%
Qty of parchment coffee produced (kg)	20,587,091	20,662,113	24,450,795	23,128,053	12%
Unit price of parchment coffee (RWF)	900	1,200	1,055	1,150	28%
Total revenue of parchment coffee produced (RWF)	18,528,381,900	24,794,535,600	25,795,588,725	26,597,260,950	44%
Total CWS revenue (RWF)	18,528,381,900	24,794,535,600	25,795,588,725	26,597,260,950	44%

Source ILO, 2017 Study

Employment and wages

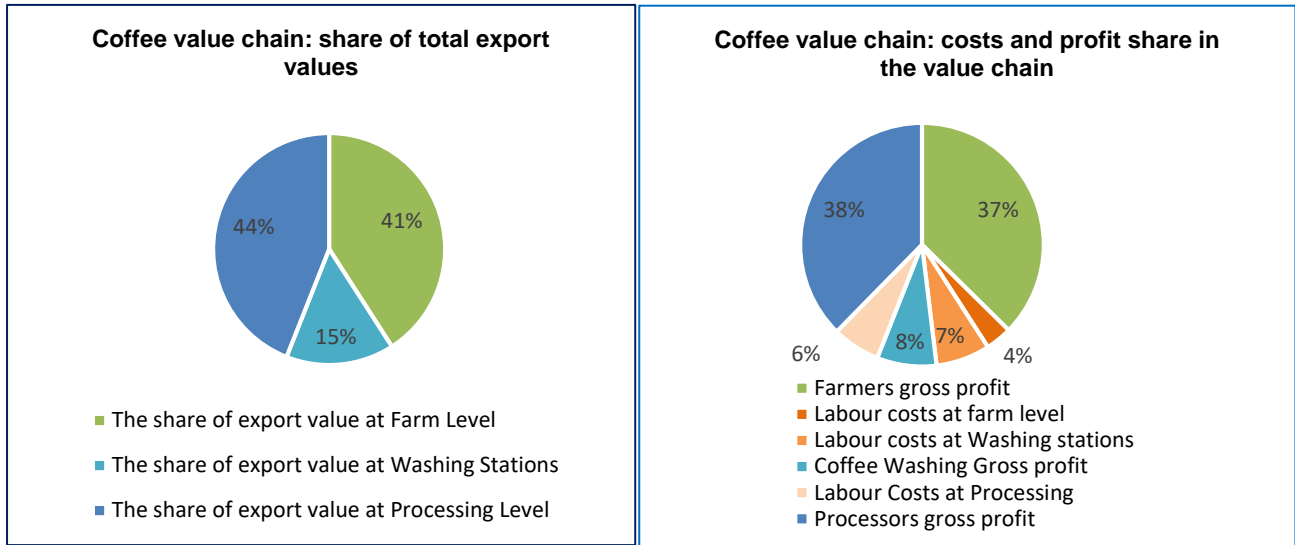
Total wage employment in the coffee value chain was estimated at 18 000 FTE while total employment (paid and unpaid) was estimated at 57 500 FTE in the baseline study. This implies that the coffee farmers and their households provided 39 500 FTE of labour into the value chain.

Overall, casual wage employment on coffee farms decreased from 8 463 in 2013 to 6 951 FTEs in 2016. This is a result of labour inputs not being consistent for perennial crops and less labour required in the years after the planting of the new coffee plants. It probably also reflects a shift from processing coffee on farms to processing at CWSs over the period. This is supported by an increase in employment at CWSs which has increased from 6 783 to 9 822 full-time equivalents as more and more cherries are processed at the CWSs (note add Employment at Exporters).

This is a positive trend as productivity and average wages at the CWSs are generally higher than average wages on farms. In 2016 the average daily wages paid in the value chain were RWF 1 000 at the farm, 2 362 at the CWS, and 9 774 at coffee exporters. It is therefore more beneficial for labourers to be employed at a CWS. Furthermore, given that the CWSs are located in farming areas, they are able to offer wage employment to rural workers.

The pie chart on the left in Figure 8 shows that of the total value of coffee exports 2016, 44 per cent went to processors, 41 per cent was paid at the farm level, and 15 per cent went to the washing stations. The pie chart on the right in Figure 8 presents the distribution of wages and gross profit among different actors in the value chain and shows that at farm level, wage labour earned the equivalent of 4 per cent of the total export income, at CWS they earned 7 per cent and in processing 6 per cent. Of the total export value, 17 per cent was thus paid out in wages and 37 per cent accrued to farmers. Based on these figures the average gross profit per small farmer is $[20,237,045,938 - (6951 \times 1000 \times 240)] / 350\,000 = \text{RWF } 53,000$.

Figure 5: Coffee – split of export value along the value chain (2016)



Source ILO, 2017 Study

4. Non-traditional export value chains

The non-traditional value chains that were considered in the study were essential oils, green beans and cut flowers. This selection was based on both the potential of these value chains, as well as the availability of data and information. However, given the small number of growers and that these firms are in early phases of production, it can be expected that the results from findings would change, as the companies mature, and their productivity increases to match those of other countries in the region like Kenya and Ethiopia. It is important to emphasize, that these crops are non-traditional not only because they are products that have not been traditionally exported, but also that they farming models used are also non-traditional. Most of the farms producing these products are commercial farms, using mostly wage labour and modern farm practices. Because of the much smaller number of actors involved, the approach used for the assessments also differed.

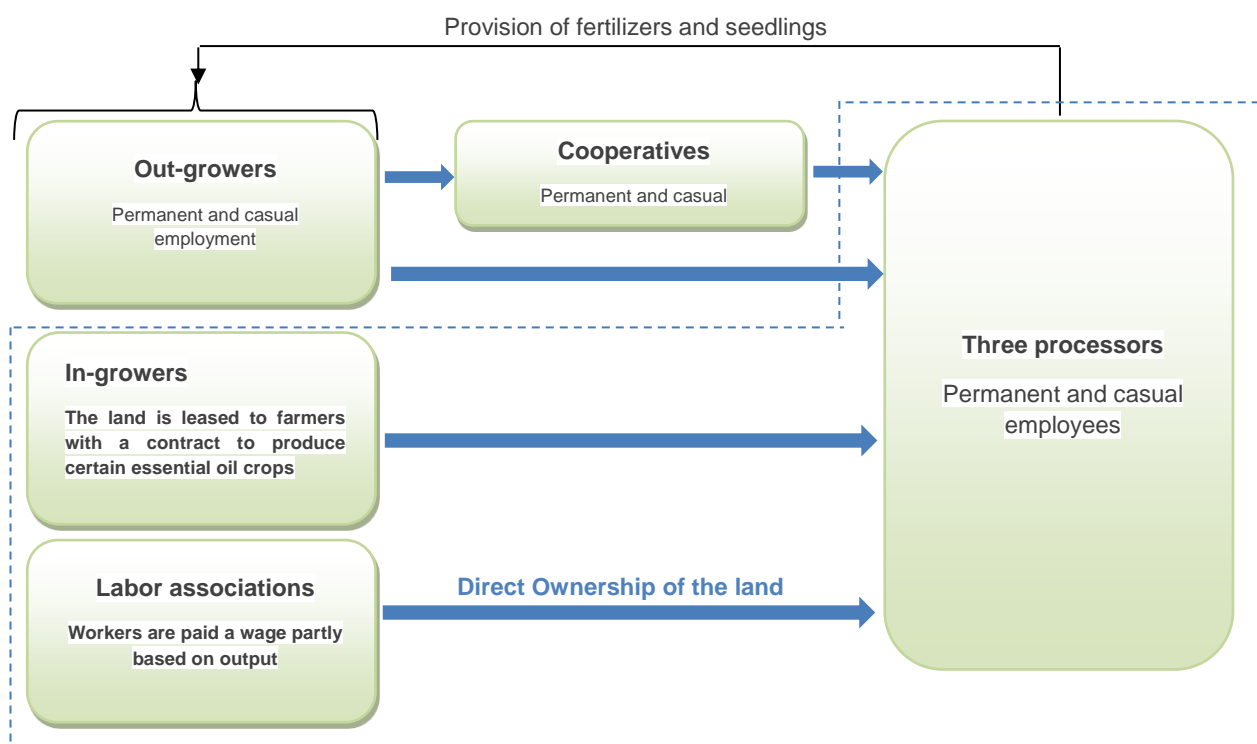
4.1. Essential oils value chain

Essential oils are high value-added oil obtained from processing various essential oil crops. These essential oils are further processed to produce fragrances, pharmaceutical and phytosanitary products. The actors of the Rwandan value chain have focused on high value-added essential oils mainly used in perfumes, such as geranium, patchouli, rose oils or eucalyptus. The essential oils value chain is divided into three segments: growers, labour associations and exporters/marketers with the capacity to do low-volume retail packaging for the domestic market and wholesale packaging for export markets. Essential oils differ from other

crops as processors need strong control over the quality and organic nature of the crop. This leads to a wide variety of contractual relationships, as illustrated in Figure 9.

The cultivated area increased by 20 per cent between 2013 and 2016, while the production and revenues of essential oils green leaves increased by 98 per cent in the same period. The labour inputs on farms increased by around 50 per cent but employment in processing decreased slightly even though outputs increased. The average daily wage was estimated at RWF 1 000 at the farm and RWF 1 473 at the processor in 2016.

Figure 6: Essential oils value chain and contractual relationships between producers and processors



Source ILO, 2017 Study

Table 4: Essential oils, production, price and revenue

	2013	2014	2015	2016
Estimated farm revenues				
Total cultivated area	25	25	30	30
Quantity of green leaves produced (kg)	1,752	2,141	2,650	3,470
Farm gate prices (RWF)	500	500	500	500
Farm gate revenues (RWF)	876,000	1,070,500	1,325,000	1,735,000
Aggregate farm revenues (RWF)	17,520,000	22,536,842	26,500,000	34,700,000
Estimated gross profit in Essential oils				
Total gross profit of around 400 Farmers	13,560,000	18,031,579	21,200,000	28,520,000
Total gross profit at farm level (RWF)	3,960,000	4,505,263	5,300,000	6,180,000

Total gross profit at Essential oil processing company (RWF)	43,259,424	43,259,424	49,307,424	51,827,424
Total gross profit/wage at essential oils value chain	60,779,424	65,796,266	75,807,424	86,527,424

Person-days and average wages				
Total number of person-days at farm	3,960	4,505	5,300	6,180
Average wage for casual labour at farm (RWF/day)	1000	1000	1000	1000
Total number of person-days at processing	1,225	1,468	1,468	1,461
Average wage at processors (RWF/day)	1595	1625	1509	1473
Total person days at essential oils value chain	5555	6130	6809	7641

Source 2017 Study

For essential oils, total employment 31.8 FTE which results in only 1.06 FTE per ha, which seems low compared to other crops. Employment in processing per ha was 0.2 FTE, which does seem reasonable as is it comparable with pyrethrum which undergoes a similar type of processing. It should be noted that even though production increased over the four-year period reviewed, employment in processing declined slightly, indicating there is probably spare capacity at the processors and they can process increased quantities without additional labour inputs. Income per farmer was estimated at RWF 86 750 for 2016, which is also comparable with that of pyrethrum farmers. At a total export value of USD136 200 in 2016, total wage employment was 234 FTE per USD1 million and employment in processing was 45 FTE per USD1 million.

4.2. Green beans

The production of green beans (or French beans as known in Rwanda) is steadily rising due to a year-round demand in destination markets (Europe, Middle East). The crop is exported fresh.

Figure 7: Green bean value chain



A sample of 40 farmers cultivating a total of 27 ha of green beans was surveyed. According to the survey, production increased by 20 per cent between 2014 and 2016. Labour inputs at farm level were higher compared to other non-traditional value chains under study with 82 FTEs, or 3.0 FTE/ha in 2016. Based on the sample surveyed, the export value per ha was USD 50,500 per ha and the employment per USD million of exports was 60.1 FTE.

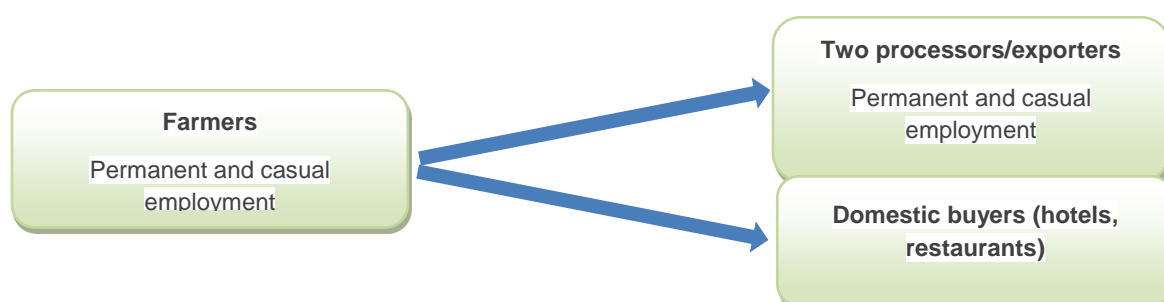
Table 5: Green beans, price and revenue

Production, supply and price	2014	2015	2016
Total respondents, 40 farmers	40	40	40
Total cultivated area (ha)	27	27	27
Quantity of beans produced (kg)	100,000	110,000	120,000
Farm gate prices (RWF)	360	360	360
Farm gate revenues in (RWF)	36,000,000	39,600,000	43,200,000
Aggregate Farm revenues (RWF)	585,000,000	643,500,000	702,000,000
Cooperative gate price (RWF)	560	560	560
Cooperative revenue (RWF)	56,000,000	61,600,000	67,200,000
Aggregate cooperative revenues (RWF)	910,000,000	1,001,000,000	1,092,000,000

Source ILO, 2017 Study

4.3 Cut flowers

The cut flowers sector is among the non-traditional export crops with high export potential for Rwanda. Current flower production is limited to a small number of producers that operate on a small scale and sell on the domestic market (Dijkxhoorn et al., 2016), but increasingly additional export-oriented producers have entered, and exports have increased rapidly in recent months⁶.

Figure 8: Cut flowers value chain

The survey concentrated on producers that focus on exports. The total planted area of cut flowers of the producers surveyed was estimated at 12 ha. They produced about 18 750 kg of cut flowers and generated around RWF 11 250 000 of farm revenues selling to processors/exporting companies, of which two were surveyed. If all these flowers were exported at the price of USD2.3 per kg, then USD 43,125 of export revenue would have been generated.

⁶ Latest export figures have indicated that total exports from July 2017 to March 2017 amounted to USD2.8 million.

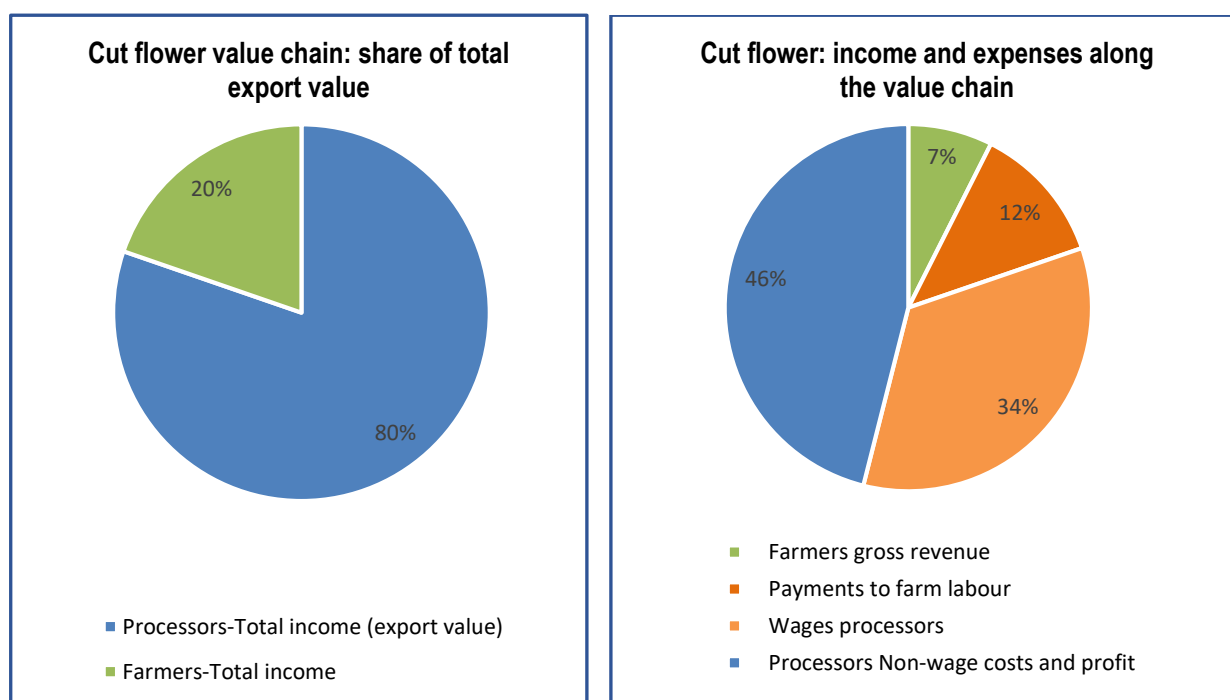
Table 6: Cut flowers production, supply, and price for sample of producers

Production, supply, and price	2016
Total cultivated area (ha)	12
Quantity of cut flowers produced (kg)	18,750
Farm gate prices (RWF)	600
Farm gate revenues in RWF	11,250,000

Source ILO, 2017 Study

As the processors and exporters of the cut flowers under study had only recently started operating only the export values for 2016 were available and the estimates provided are based on a total export value of USD 562 500. Given the early stages of exports and the rapid changes in the sector, care should be taken in interpreting these figures. Based on the total production on the farms surveyed, and the total export of 150 000 kg of flowers in 2016, the total farm wage employment was estimated at 256 FTEs. Employment at the two processors was found to be 510 FTEs, making the total employment in the value chain 766 FTEs. From the survey, the distribution of income along the value chain is presented in Figure 9.

Figure 9: Cut flowers - incomes and expenses along the value chain



Source ILO, 2017 Study

What is worth highlighting about the cut flower sector is the high labour intensity and share of export revenue paid in wages. About 34 per cent of export values are paid in wages during processing and an additional 12 per cent for labour working on farms. The estimated amount of employment created per one million of USD exports was 1 323 FTE, and total employment per ha was 7.7 FTE/ha. Although from a limited sample, the export value generated per ha was

USD 3,593. It should also be noted that all employment in the value chain was wage employment, and the average wage on farms was RWF 1 000 a day, while in processing it was RWF 1 274 a day.

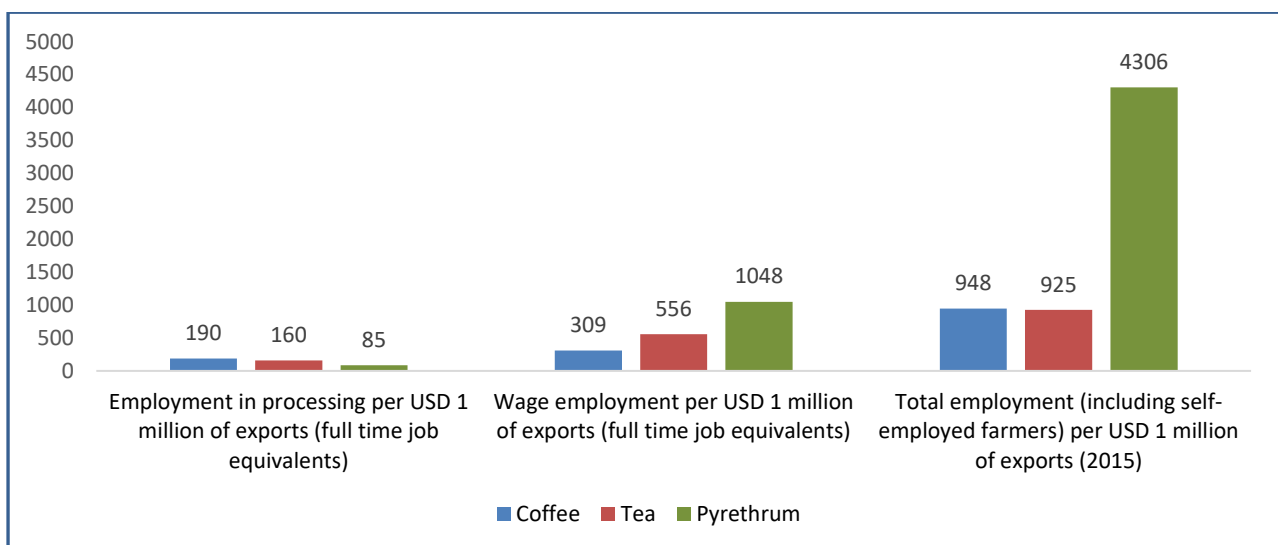
5. Employment implications and projections

For the three traditional export crops, the findings presented on the share of export value that goes to wages showed that Pyrethrum has the highest share, with 29 per cent paid out in wages, followed by tea with 20.5 per cent and coffee at 17 per cent. Concerning the share that goes to farmers (after paying wage costs), for coffee, 37 per cent of export value goes to farmers, while for tea and pyrethrum this value is similar at around 29 per cent. Increasing this share would be an important step for increasing the income of these farmers, thus improving their employment situation if we consider them as self-employed. The average annual income per small farmer were found to be: RWF 158,000 for Pyrethrum, RWF 288,000 for tea and RWF 53,000 for coffee.

To be able to compare the employment effects of the traditional export crops, it is useful to compare common indicators estimated, namely employment per USD 1 million of exports, and employment per ha. From a perspective of land use, it is useful to discuss the value of exports generated per ha.

About employment created per million USD of export value, of particular interest is how much employment is created in processing, as it is clear that the jobs created in processing tend to be more productive and of higher quality in wages, working conditions and formality. The results also allow for such estimations as presented in Figure 11.

Figure 10: Employment per USD 1 million of exports for traditional export crops



Source: Calculated from the study and baseline data results.

The results show important differences in the employment in these value chains. Coffee currently offers the most employment in processing, creating 190 FTEs for every USD1 million of exports. This is followed by tea with 160' and then pyrethrum with 85 FTEs. Tea creates higher demand for wage labour than coffee. This reflects the way the sector is structured, in particular with tea cooperatives involved in growing and harvesting, and estates and factories all offering wage employment. Tea is followed by coffee and then pyrethrum. The high amount of total employment per USD million dollars in pyrethrum is an indication of the high labour intensity of this sector, but at the same time also indication of the low labour productivity in this crop. It should thus be seen as a confirmation that productivity and income in this sector is low and efforts should focus on promoting this. The employment generated in the coffee and tea value chains tends to be similar when calculated in terms of export value.

These values can also be used to do simple linear projections of the quantity of labour inputs required if exports were to increase. The implicit assumption when doing this is that the production methods along the value chain would stay the same, and so any additional quantity of export volume would on average be produced in the same way as is done at present. This assumption can of course be questioned as different farmers may respond to increased demand in different ways. Furthermore, for a crop like pyrethrum that is grown annually it is easier to respond to increased demand, as compared to coffee and tea where new plants take several years to mature before they bear fruit or enough leaves for harvesting.

With processing, many processors are able to increase production without increasing employment at the same rate, as there is spare capacity and/or economies of scale among processors. Pyrethrum processing clearly showed this trend and so using a linear projection for pyrethrum processing results in an overestimation of labour demand. However, in the long term the goal would be to improve production methods to increase both yields and labour productivity, and then linear extrapolations would no longer be reasonable as this would fundamentally change the productivity of the land and of labour.

Table 7: Estimating the employment effects of the untapped export potential

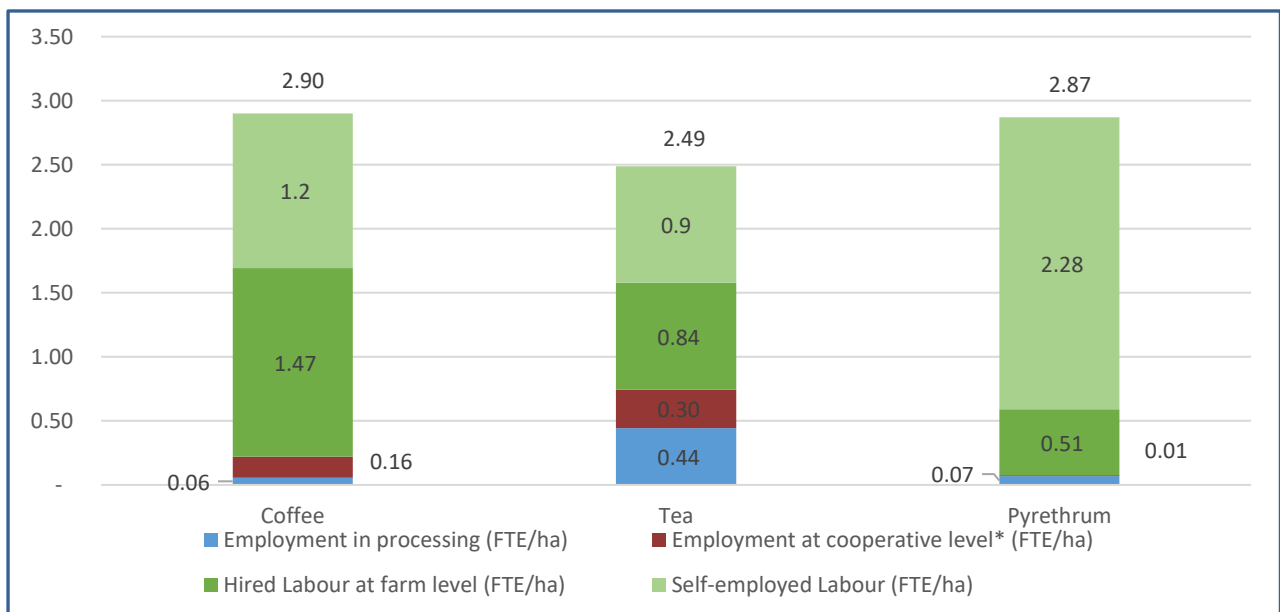
	Untapped Export Potential (millions of USD)	Estimated employment effects of the untapped export potential at processors level (FTEs)	Estimated employment effects of the untapped export potential on wage employment (FTEs)	Total employment effect of the untapped potential (FTEs)
Coffee	47	8 930	14 523	44556
Tea	44	7 040	24 464	40700
Pyrethrum	2.5	10 to 212	2 620	10765
Total (rounded)	93.5	16 000	41 000	96 000

Source: Calculated from the study and baseline data results.

Taking cognisance of these limitations, linear estimates of the additional labour demand of fulfilling export potential as assessed by the ITC results are presented in Table 7. It shows that increasing exports to meet the untapped coffee demand would demand up to 8 930 FTEs jobs at the processing level and 14 523 FTEs at farm level. For tea, if the untapped export potential were to be fully utilised, it is estimated labour demand would increase by 7 040 FTEs at the processors level and 24 464 FTEs at the casual farm labour level. Furthermore, the untapped pyrethrum potential could also generate up to 2 620 FTEs of the wage employment at farm level. Looking at the general picture, the untapped USD 93.5 million in the three traditional export crops could create up to 96 000 FTEs jobs in the value chain of the three crops.

Another useful indicator is to use the processing employment generated on farm in processing created per ha of each crop. This is particularly important if arable land is seen as a scarce resource and the aim is to optimise employment generated per ha. The results for the traditional crops are presented in Figure 11.

Figure 11: Employment generated per ha of traditional export crop grown (2016)

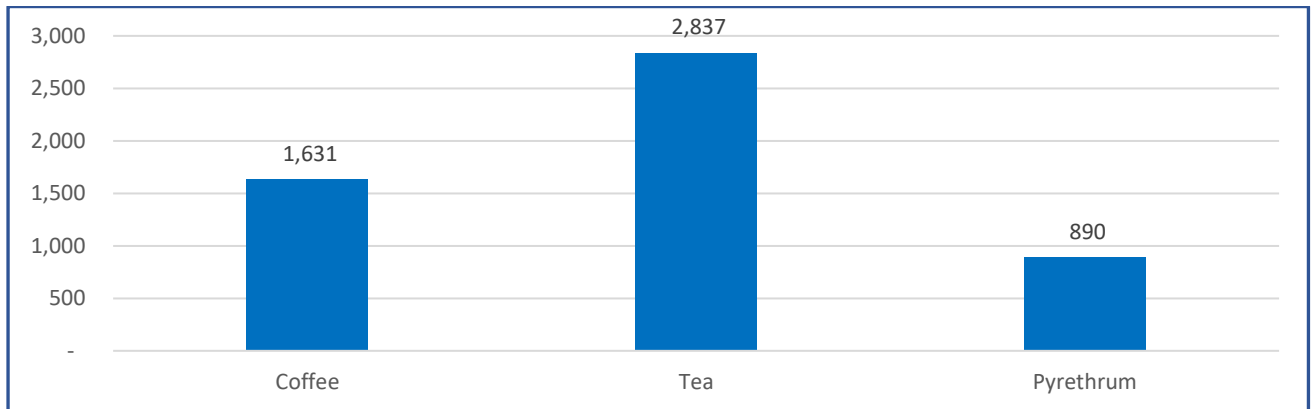


Source: Calculated from the study and baseline data results.

While the total employment per ha for these two crops does not vary that much, there are important differences in where the employment is created. It was found that tea exports generated the most processing employment per ha, followed by coffee and then pyrethrum. Generating employment in processing is more desirable as wages in processing were at least twice as high on average as wages paid on farms. Generally, the further up the value chain, the higher the average wages paid.

Figure 13 shows the export value generated per ha of traditional export crops in 2016. It was found that tea generated the most export value with USD 2837 per ha, followed by coffee which generated USD 1 631.

Figure 12: Export value generated per ha of traditional export crop grown (USD 2016)



Source: Calculated from the study and baseline data results.

For the non-traditional value chains analysed, it is clear that because of the different farm practices in cut flowers and green beans, that are also much more modern and capital intensive, the productivity per ha is much higher and as a result so is the export value per ha. This generates a very different range for some of the indicators. French beans and cut flowers were found to have the highest employment potential and the value of employment created per ha was much higher than for traditional crops. Although the findings are based on a small sample and should thus be taken with caution, cut flowers were found to generate as much as 7.7 FTE per ha of employment, of which more than two thirds was generated in processing. Green beans were found to create up to 3.9 FTE per ha. However, even though it would appear that the export value per ha is much higher for cut flowers and green beans, the wage for farm labour are similar to other crops. This provides an indication that labour is not benefitting from the more modern farming practices used in these crops, as their presumably higher productivity is not translating into higher on farm wages. Furthermore, while the wages in flower processing were higher than for farm labour, they are much lower than wages in other processing in the traditional value chains.

6. Policy implications

Based on the findings and analysis, the following policy implications can be deduced:

- ❖ Processing in the tea and coffee export value chains is important as it creates productive and better paid employment. However the total amount of employment created is still relatively small when compared to on-farm employment. With current production techniques, both the total employment creation potential and the employment potential for better and higher paying jobs in processing varies for different crops.
- ❖ For the traditional export crops, coffee and tea have the highest impact on employment created in processing per USD 1 million of exports, while the coffee value chain has the highest average salaries in the final parts of the value chain.
- ❖ However, when looking at the amount of employment created in processing per ha of land under production, then tea exports generate by far the most employment in processing, more than twice as much as coffee.
- ❖ Based on global demand as assessed by the ITC, there appears to be good potential to grow exports of both tea and coffee, and this would also increase employment creation both on farm and in processing in the value chain.
- ❖ The introduction of CWSs have improved employment in the coffee value chain, generating additional and on-average better paid jobs in rural areas. Similar initiatives to shift processing from farms to regional centres could be encouraged in other export and domestic value chains. Given the scale of the domestic value chains, the employment potential is also likely to be large.
- ❖ For the traditional crops, in order to increase processing related employment it is important that there is further development in the value chains, to include further processing of both tea and coffee.
- ❖ A large share of labour input provided into the value chain is through casual labour, employed for a short-term on a day basis at a relatively low wage (typically RWF 1000 a day). It was not possible from this study to know to what extent this pool of labour is able to find sufficient paid employment on this basis, how many also have access to their own land for farming, and to what extent they are also dependent on other sources of income. However, this is an important question to investigate for a better understanding of the rural labour market.
- ❖ The non-traditional export crops appear to generate much higher levels of employment per ha of crop planted. Therefore, while these crops tend to use modern farming methods and require higher upfront investments, they are beneficial as they also create a higher demand for labour. However, despite this, they do not tend to pay higher wages than farms on traditional crops.

7. Recommendations

The recommendations emerging from these findings can be split up in recommendations about traditional and non-traditional export value chains, as the findings for these value chains are quite different.

For traditional value chains it is recommended that

- ❖ Avenues to increase the exports of traditional crops are explored further as there is good potential for this based on global demand. This can support both on-farm and off-farm employment creation.
- ❖ With regards to on-farm employment, it is recommended that there is a strong focus on increasing both yield (productivity of land) and labour so that exports can be increased without having to increase the area used for these crops in the same proportion. Such increased productivity would also increase income and wages in the sector which remain among the lowest of all sectors in Rwanda.
- ❖ Concerning off-farm employment, the Government of Rwanda should work with stakeholders to improve competitiveness and continue to support the emergence of new activities to increase value added through processing even further. Rwandan industries are exporting the main export crops, coffee and tea, in semi-processed form. Innovation is required to shift, for example, to export roasted coffee and packaged tea, as this will help the country to generate more export revenue and domestic employment.
- ❖ The Ministry of Agriculture and Animal Resources, through NAEB, should continue to strengthen the tea sub-sector given its high employment creation potential in processing per ha. This can include continuing the introduction of improved farming techniques, expanding the land under tea green leaf growing and mobilising more private sector investment for the creation of new tea estates.
- ❖ In general, self-employed farmers in the traditional value chains receive around a third of the total export revenue (28 per cent to 29 per cent for pyrethrum, coffee and tea), even though they contribute the most labour to the production of these crops. This is partly due to their low productivity thus requiring many farmers in the production process, and partly due to the structure of the value chain whereby the farm gate price is significantly lower than the export price. For these crops, measures to increase the farm gate price should be explored as this would enable farmers to benefit more and provide more incentive for increasing their production.

Concerning the non-traditional crops it is recommended that:

- ❖ For non-traditional export crops such as green beans and cut flowers the total employment per ha cultivated is much higher, than for traditional crops, and it thus has higher employment potential and should be further strengthened.

- ❖ As many of the growers of these crops are enterprises, employment in these crops is wage employment that is more easily formalised. It would also appear that labour on these farms is more productive and there would be a possibility to pay higher wages than on other farms, and this is an area to be explored further.
- ❖ These crops also offer higher levels of processing related employment, which in turn tend to be jobs that offer higher average wages.
- ❖ While these non-traditional crops are currently mostly grown by farms that are enterprises, an interesting policy question that should be explored is the extent to which current small family farms could switch to these crops and in the process to much higher productivity and incomes. In particular because of the small size of family farms, switching to these crops that generate much more output per ha would appear an attractive policy option. This would require considerable measures in terms of access to credit, markets and training, but would present an important opportunity for small farmers to enter into a much more productive sub sector, while maximizing the income they can generate from their two primary assets, their land, and their labour.

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