3.4 Rwanda

In Rwanda, after confirming the first infected person in March 2020, the number of infected people increased and decreased repeatedly, lockdown measures were taken several times, and by January 2022, more than 120,000 people were infected and more than 1,000 people died. In the first half of 2020, Rwanda's politics and economy fell into confusion, and government agencies such as MINAGRI and MINICOM and development partners such as FAO and JICA took measures and support such as food distribution, price control, financial support, and seed donation.

The short-term impact on the FVC was input, production, and processing stage. In the first half of 2020, there were negative impacts such as a decrease in input, production, and processing. However, no major turmoil has been seen since the latter half of 2020, when the supply of agricultural materials, processing machinery and equipment was restored, and the movement restrictions and border closures of agricultural personnel were stopped. Though the weak position of farmers, which has continued since before the outbreak of COVID-19, remains unchanged, and it is not possible to obtain appropriate compensation, and producer prices are kept low compared to production cost. On the other hand, distribution, sales, and consumption stage has a long-term impact. Although movement restrictions have been lifted and import / export restrictions have been eased, some are still negatively impacted. At the distribution stage, the distribution volume decreased due to the closure of the Ugandan border, rising distribution costs, and stagnation of transactions by illegal traders. At the sales stage, the sales volume decreased due to the decrease in distribution volume and the decrease in demand. At the consumption stage, the consumption of horticultural crops is declining due to the decline in income and increasing consumer prices, and due to the increase in consumption of staple food crops and changes in the distribution network, the impact of declining consumption of domestic rice continues. By crop, the effects of plantain and coffee were small, the effects of horticultural crops were large, and the effects of cereals were middle.

As a factor of vulnerability, plantain which is domestic distribution type and coffee which is outside regional distribution type are perennial crop had small impact because they do not require initial input each year, plantain have much self-consumption and rural trade so that illegal trade is few, and coffee is an industry that receives generous government support, has a well-established supply chain, and has few illegal trades. Cereals which are type of distribution among corridors are vulnerable to the fact that they are annual crops that require initial input every year, that illegal trade has been carried out, and that they are easy to distribute between corridors because they are crops that can be preserved for a long time. Horticultural crops which are type of distribution within corridor are vulnerable to the fact that they are annual crops, that illegal trade has been carried out, that there was a loss due to disposal by farmers, distributors, and sellers due to poor storage stability, that demand decreased due to lack of knowledge of the importance of nutrition intake, and that farmers originally engaged in a vulnerable business to find buyers after production.

Measures to deal with these are 1) formation of a healthy market, 2) provision of market information, 3) reforming farmers' awareness and promotion of contract farming, 4) strengthening of agricultural

insurance, infrastructure development, 5) strengthening negotiation power of farmers, 6) improving domestic rice production and post-harvest operation techniques, limiting imported rice, 7) spreading smartphones, strengthening information systems, 8) awareness-raising activities for horticultural crop intake, popularizing horticultural crop cooking methods, 9) investigation of methods for strengthening the utilization of VC platform, 10) promotion of organic cultivation and organic certification, etc. can be considered.

Of these, as support measures that JICA should implement, the study team proposes 1) development of adjustment mechanism (building a strong FVC utilizing the VC platform), 2) realization of smart logistics (support of smooth distribution of input materials and crops, and improving illegal trade), 3) farming based on commercial distribution (support to identify market trends, and shift to farming which produce after securing sales destinations), 4) utilization of ICT (development of e-commerce platform, farming app, online training), 5) infrastructure development (especially cold chain distribution network development, creation of a mechanism that does not separate the cold chain when crossing VCs).

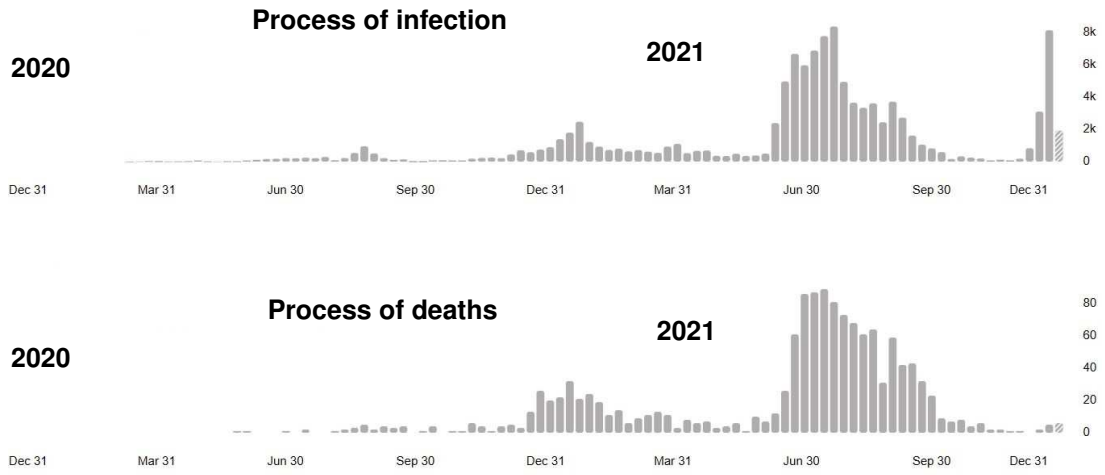
3.4.1 Status of COVID-19 and Development Partners' Initiatives

(1) Status of COVID-19

The total number of infected people was 128,841, the number of deaths was 1,438, and the number of people who completed the second vaccination was 7,081,153 (52.5% of the population) as of January 30, 2022 (Rwanda Biomedical Center transmit data on the number of infected people every day. https://rbc.gov.rw/index.php?id=188). The first infection was confirmed in March 2020. The first wave came in August 2020 and the number of newly infected people exceeded 100 people/day, and the number of deaths was 1-2 people/day. In September 2020, the number of infected people and the number of deaths increased. Then, the second wave arrived in January 2021, and there were some days when the number of newly infected people exceeded 300 people/day, and the number of deaths was around 5 people/day. After that, there was a sign of convergence, and the number of newly infected people by mid-June was about 30% of the peak, and the average number of infected people was 100 per day. However, the third wave arrived in late June 2021, and the number of newly infected people exceeded 3,000 / day in late July. It gradually converged and settled in the double digits in October 2021, but the fourth wave arrived from December, and Omicron Variant have also been confirmed.

The Rwanda government carried out the first lockdown from March 21st to May 1st, 2020, closing borders (other than logistics and returnees), banning international movement (excluding transportation of daily necessities of food and medical services), suspension of commercial flights to/from Rwanda, prohibition of domestic movement, prohibition of businesses other than businesses that provide basic services such as food, medical care, telecommunications, security and banking, restrictions on the transfer of bills (recommendation of mobile money and online banking), bans on meetings at prayers, schools, weddings and sporting events, and bans on going out except for essential travel. After that, it was gradually eased, but from January 4, 2021, movement across prefectures and counties was prohibited, and from January 19, the second lockdown in Kigali city was carried out. Then, on February 8, 2021, the lockdown in Kigali was lifted, and on March 30, intercity movement throughout Rwanda was permitted. After that, the number of infected people had settled down, but the number of infected

people increased sharply from the end of June 2021, and from July 1, strict measures like the lockdown in January were announced. After that, the measures to prevent the spread of the infection were gradually eased, but since the Omicron Variant was confirmed in December, the government announced on December 15 to be more cautious and try to prevent the spread of the infection. In addition to restrictions on going out and commute to work, there are also places where people are required to be vaccinated and have a negative certificate of PCR test. (From Twitter announced by the Rwandan government).



Source: WHO Coronavirus (COVID-19) Dashboard

Figure 3.4.1 Process of infected people and number of deaths

Table 3.4.1 Trend of infection and measures

Time	Spread	Preventive Measures against COVID-19
March 2020	First infection	Lockdown from March 21 to May 1. Border closure (except logistics), land and air import/export restrictions, domestic logistics restrictions, movement restrictions, regulatory measures (gradually liberalized from May 2)
August 2020	First wave	Continuation of border closure (except logistics), movement restrictions, regulatory measures
January 2021	Second wave	Prohibition between cities from January 4 to March 30, lockdown in Kigali city from January 19 to February 8.
June 2021	Third wave	Reissue of measures such as curfew, intercity movement, school closure, remote working, and face-to-face meetings from July 1 (gradually eased). Lockdown in Kigali, Brera, Gichumbi, Kamonyi, Musanze and 4 other counties from July 16th to 26th
December 2021	Forth wave, Omicron Variant confirmed	In addition to restrictions on going out and going to work, people are required to be vaccinated in various places and to have a negative certificate of PCR test.

(2) Government Polices and Measures against COVID-19

The government policies and measures of Rwanda are as follows.

Table 3.4.2 The government policies and measures

Institution	Policies and Measures (Target, VC process, Time)	Results
Ministry of Trade and Industry	Contents: Price regulation Target: Retailers, Wholesalers VC stage: Distribution Period: March 2020	By deliberately raising food prices by some traders, MINICOM called for compliance with fixed prices for rice, maize, potatoes, cassava, sugar, other oil crops, oil seeds, oil residue and dry beans. Traders who did not comply were fined. 108 traders in Kigali, total RwF 8,500,000, 63 traders in Musanze and Muhanga, total RwF 1,195,000. https://twitter.com/RwandaTrade/status/1243396251028082689
Ministry of Agriculture and Animal Husbandry (MINAGRI)	Contents: Employment measures Target: Large farms and factories that own tea, coffee, sugar, milk, rice and flour factories VC stage: Processing Period: March 2020	Farmers and co-operatives, which employ many workers, have decreased in number of labors due to contact restrictions and movement restrictions. MINAGRI allowed to secure workers to maintain farm and factory activity. https://www.newtimes.co.rw/news/covid-19-agric-activities-continue-during-lockdown
Ministry of Agriculture and Animal Husbandry (MINAGRI)	Contents: Access to input materials Target: Farmers VC stage: Input, Production Scale: throughout Rwanda Period: March 2020	Allowed input dealers to continue selling fertilizers and seeds so that farmers' access to fertilizers and seeds is not restricted. https://www.newtimes.co.rw/news/covid-19-agric-activities-continue-during-lockdown
Ministry of Trade and Industry	Contents: Continued operation of agricultural product processing industry Target: Agricultural product processors VC stage: Processing Scale: throughout Rwanda Period: March 2020	The lockdown announced that all industries would be shut down, but the agricultural processing industry was excluded and allowed to continue operations. https://twitter.com/RwandaTrade/status/1242527636791996420
Ministry of Local Government	Contents: Food distribution, provision of stockpiled food Target: Vulnerable households affected by lockdown VC stage: Consumption Scale: 20,000 households in 3 districts of Kigali Period: March 2020	In Gakiriro in the Gasabo district, which has developed into a new business base in Kigali, the furniture and timber business was active, but the lockdown stopped the business. Support was provided to 20,000 households in 3 districts of Kigali, where many managers and workers who operate furniture and timber businesses live. https://www.newtimes.co.rw/news/govt-begins-distribution-essential-goods-citizens-affected-covid-19-lockdown
Office of the Prime Minister	Contents: Limitation of number of people accessing to market Target: Wholesalers, retailers VC stage: Distribution, Sales Scale: throughout Rwanda Period: May 2020	Admission to the market is determined to be within 50% of registered wholesalers / retailers. https://www.primature.gov.rw/index.php?id=131&tx_news_pi1%5Bnews%5D=907&tx_news_pi1%5Bcontroller%5D=News&tx_news_pi1%5Baction%5D=detail&cHash=44d5f16c2c13989f8fcb4a28ce57b8e4
Office of the Prime Minister	Contents: Obligation to accept electronic payments Target: Retailers, Wholesalers VC stage: Distribution, sales	https://www.primature.gov.rw/index.php?id=43&no_cache=1&tx_drblob_pi1%5BdownloadUid%5D=791

	Scale: throughout Rwanda Period: May 2020	
Rwanda government and EU	Contents: Cash benefits and food aid Target: 630,000 households VC stage: Consumption Scale: €52.87 million Period: 2019/2020 fiscal year, 2020/2021fiscal year[1]	It supports the Rwandan Government to expand social protection and promote agriculture supply chains in the context of the Government`s COVID-19 Economic Recovery Plan through increased cash transfers and food assistance to Rwandan citizens. https://www.ktpress.rw/2020/06/eu-rwanda-sign-rwf-55-bn-social-protection-grant/
Rwanda government	Contents: Economic Recovery Fund Target: Agricultural processors, logistics companies, etc. VC stage: Processing, distribution Scale: 100 billion RwF ($ 100 million) 350 billion RwF (additional $ 350 million) in March 2021 Period: 2 years from June 2020	It supports the recovery of businesses hardest hit by COVID-19 so that they can survive, resume operations and safeguard employment, thereby cushioning the economic effects of the pandemic. https://www.bnr.rw/browse-in/economic-recovery-fund/

Source: Extracted from http://fapda.apps.fao.org/fapda/#main.html

The figure below shows stringency index of government measures. The higher the index, the more severe the government's measures. In Rwanda, the number exceeded 90 in March 2020, when the first infection was found, but since then, it has been gradually decreasing while increasing and decreasing, and as of December 2021, it is around 50.

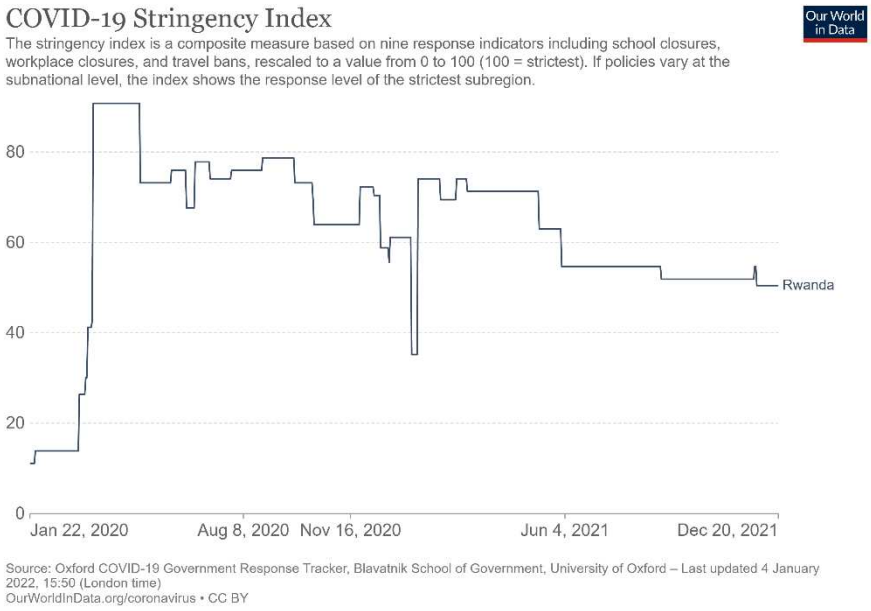


Figure 3.4.2 COVID-19 Stringency index[2]

[1] The fiscal year of Rwanda is from July 1 to June 30 of the following year (National Statistics of Rwanda).
[2] This is a composite measure based on nine response indicators including school closures, workplace closures, and travel bans, rescaled to a value from 0 to 100 (100=strictest).

(3) Initiatives by Development Partners

The cooperation regarding FVC of Rwanda's development partners is as follows.

Table 3.4.3 Contents and results of cooperation by development partners

Partner	Contents of support (Target, VC stage, scale, period)	Contents
FAO	Contents: Emergency agricultural support (provision of beans, maize, fertilizer, hoe, shovel, pickaxe, watering can) Target: Approximately 2,900households (13,651 people) of Ngororero, Nyabihu and Gakenke counties VC stage: Input, production Period: October 2020	The support was provided due to the effects of landslides, floods, and destruction of houses and infrastructure caused by heavy rains in April-May 2020, but not a support for COVID-19 damage. It is reported that support was provided to areas with households that earned only agricultural income, and that the materials and seeds provided helped farmers to regain their livelihoods. In addition, it has been reported that the supplied maize was hybrid seeds, and the beans were iron bean. The farmers planted some of them and ate some of them to improve nutrition. http://www.fao.org/rwanda/news/detail-events/ru/c/1371508/
FAO	Contents: Provision of vegetable seeds Target: Farmers in Muhanga and Karongi counties VC stage: Input, production Scale: 3,530 farmers (1,446 female, 2,084 male) Period: Around March 2020	Seeds of cabbage, carrots, onions, beets, eggplants, amaranths, green beans, and cucumbers were provided for the purpose of improving nutrition and generating income by selling vegetables. Farmers have reported that they have been given the opportunity to improve their eating habits and earning cash. FAO Rwanda Newsletter, December 2020
FAO ICA (Integrated Country Approach) Programme	Contents: Online consulting and knowledge exchange using Rwanda Youth in Agribusiness Forum (RYAF) platform Target: 1,400 RYAF members affected by COVID-19 VC stage: all stages Period: April 2020	Due to the lockdown in the first season of 2020, RYAF members experienced restricted access to input materials and extension services, post-harvest losses, collapse of pre-negotiated price, business plan interruptions, financial difficulties, and reduced labor demand. However, young farmers are positive, such as implementing business management by ICT, changing sales plans, producing alternative crops, obtaining the latest agribusiness information using ICT and social media, and preparing alternative business models. They are moving toward the post-corona era. http://www.fao.org/rural-employment/work-areas/youth-employment/ica-programme/rwanda/en/
WFP	Contents: Financial support, emergency financing, market access, truck arrangements, food and drug distribution, shared dividends Target: Purchase for Progress Program（P4P）Cooperative member VC stage: Input, production, processing, distribution, sales Period: from March 2020	Border closure excludes logistics, and as a thorough infection prevention measure, it is said that border trade is carried out by compulsory inspection, driver change at the border, decontamination of trucks. But this is limited to formal trade. It is said that 40% of Rwanda's trade is informal border trade, and most of it is carried out by women (half of whom are members of cooperative). As a result, border closure has eliminated many sources of income for women engaged in informal trade. It is reported that this support has resumed informal trade. https://eif4ldcs.exposure.co/women-at-the-rwanda-border
RCID Ltd, Access to Finance	Contents: National Agricultural Insurance Scheme	Since before the outbreak of COVID-19, WFP have been supporting mainly as a response to the decrease in sales due to unseasonable weather. In 2020 fiscal year,

Rwanda (NPO), DFID, MINAGRI, WFP, etc.	WFP Target: Small farmers of cooperatives VC stage: Production Scale of WFP support: Gatsibo, Nyagatare, Bugesera, Gisagara, Kirehe, Gicumbi, Huye, Rulindo, Ngoma, Rwamagana district Period: from April 2019	productivity declined due to heavy or light rain, and insurance has been paid. No insurance payments have been made due to the impact of COVID-19 so far. However, MINAGRI has requested farmers to join agriculture and livestock insurance by using government subsidies to minimize the impact of COVID-19. https://medium.com/world-food-programme-insight/crop-insurance-increases-food-security-and-productivity-in-rwanda-9bc30b00da1b
JICA	Contents: : Provision of vegetable seeds Target: Horticulture farmer VC stage: Input Scale: 120 million yen (20,000 ha in 29 counties) Period: from October 2020 to May 2021	At the request of MINAGRI to support the government's Economic Recovery Plan (ERP), nine kinds of seeds such as tomatoes and onions were donated. Farmers bear 50% of the cost to encourage self-help efforts rather than ending with emergency assistance. At the same time, utilizing the agricultural extension workers trained through the cooperation and cultivation technique manuals, the cultivation technique was taught to the farmers as well as the seeds. https://www.jica.go.jp/activities/issues/agricul/related/20201027.html
Japan International Food for the Hungry	Contents: Cooperation with government-led food distribution program Target: 1,000 households in eastern and southern provinces VC stage: Consumption Scale: maize flour 7,500kg, beans 10,000kg, soap 5,000 pieces Period: from April 2020	The government requested foods from institutions operating in the country. It seems that they contributed to the food shortage because they provided support in response. https://www.hungerzero.jp/activity/archives/202004/002974.html

3.4.2 Agriculture and Crops to Study

(1) Production and Trade

1) State of Agriculture

a. Main Crops and Dietary Life

Main economic activity of Rwanda is agriculture, which accounts for 33% of GDP and about 70% of the population is engaged in the agricultural sector, which is an important sector that contributes to food security, poverty reduction and sustainable environment creation. Small-scale rainfed agriculture is carried out with an average owned farmland area of 0.76 ha or less per household. The main cultivated crops are plantain, cassava, Irish potato, sweet potato, maize, and beans. Beans, potato, maize, rice, cassava, maize, etc. are consumed domestically, but are also exported within East Africa region. In addition, tea and coffee are export crops that are mainly exported outside East Africa. (FAOSTAT 2017-2019).

Rwandan staple foods are edible banana, beans, cassava, maize, sweet potato, and Irish potato, with little spices and simple seasoning. Traditional meals include cassava and maize dishes, ugali made from maize and water with vegetables, dish of cassava with eggplant and spinach, and fried bananas with vegetables, boiled pumpkin and beans, peanut paste, millet powder paste, etc. In most cases, staple food

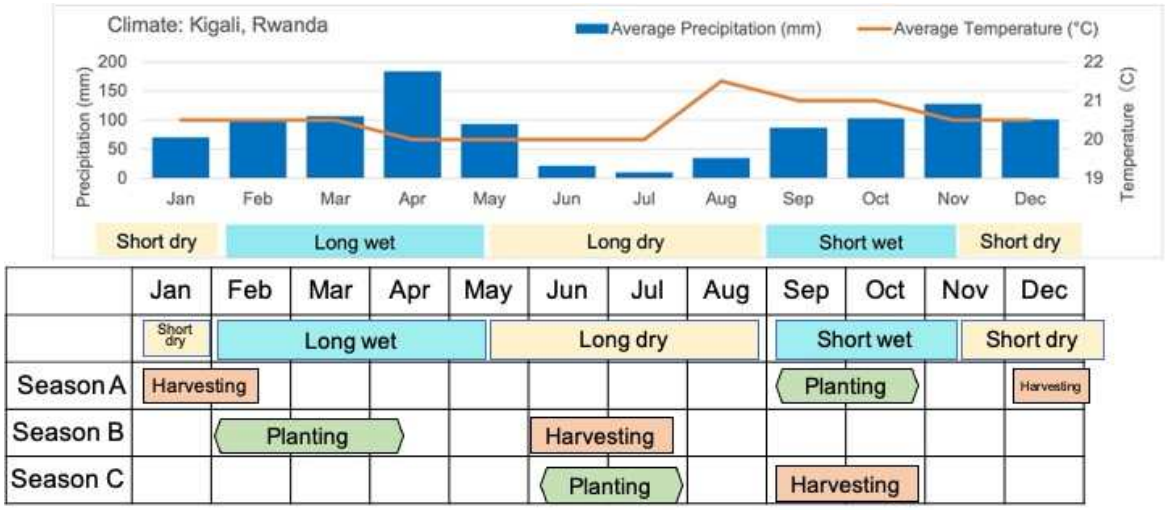
crops with vegetables are eaten in rural areas. There are also barbecue meat dishes and fish dishes in some areas, but in general, the consumption of meat and fish is low, and protein seems to be obtained from beans and dairy products. Tropical fruit trees such as avocado, banana, mango, and papaya are abundant, and nutritional intake by fruit trees can also be seen. On the other hand, in cities such as Kigali, it seems that there are cases of bread and tea for breakfast.

As for eating out, in cities and town canteens, chicken, fish, and goat meat with rice or french fries are common. Foreign dishes are limited to some wealthy people.

b. Main Cropping Seasons and Agricultural Zones

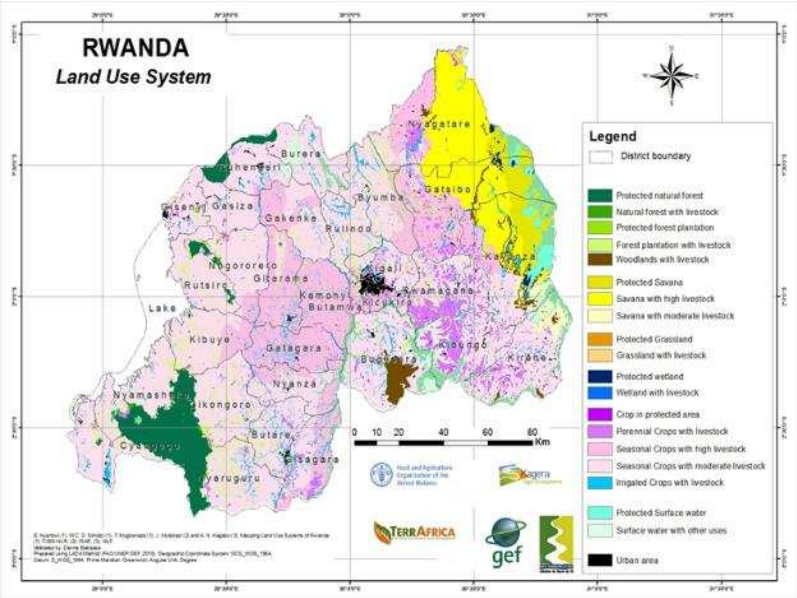
Rwanda, a landlocked country, is described as a "thousand hills" with highlands occupying most of its land. Despite being located near the equator, the climate is mild due to its height above sea level, with an average annual temperature of 20.1 degrees and an average annual rainfall of 1,000 mm in the capital Kigali (altitude of about 1,500 m). The country experiences a long dry season from late May to August, a short rainy season from September to beginning of November, a short dry season from late November to January, and a long rainy season from February to beginning of May. The cultivation period is season A (September-January), season B (February-June), and season C (July-September) for cultivating horticultural crops in areas and wetlands with irrigation facilities (Figure 3.4.3).

As for agricultural areas, forest protected areas are distributed in a part of the western region, and savanna areas with a lot of livestock are distributed in the northeastern region, but for other areas, agricultural-centered areas and agricultural and livestock areas are spread nationwide (Figure 3.4.4).



Source: Prepared by the survey team from FAO data

Figure 3.4.3 Meteorological data and planting season



Source: FAO

Figure 3.4.4 Land use map

2) Main Crop Production

The top 25 crop production items over the last three years are as follows (Table 3.4.4). Bananas, sweet potatoes, cassava, potatoes, plantain, beans, maize, and pumpkins, which are often used in the traditional Rwandan dishes mentioned above, occupy the top positions.

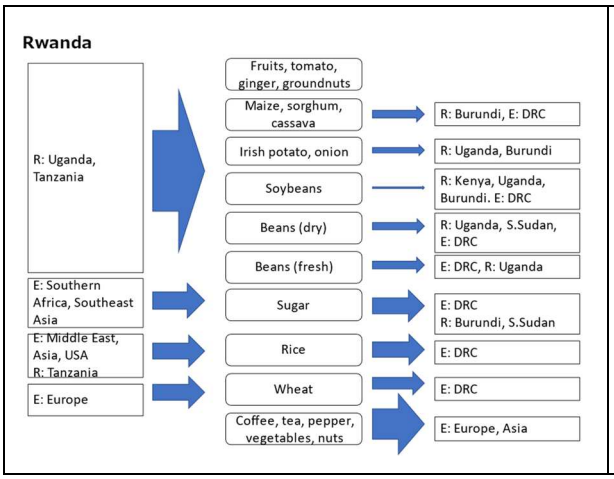
Table 3.4.4 Top 25 crop production items in Rwanda

	Item	Production (ton)
1	Bananas	1,786,446
2	Sweet potatoes	1,136,307
3	Cassava	1,088,551
4	Potatoes	888,965
5	Plantains and others	770,654
6	Beans, dry	464,749
7	Maize	396,638
8	Pumpkins, squash and gourds	255,344
9	Taro (cocoyam)	203,193
10	Sorghum	157,015
11	Rice, paddy	120,156
12	Sugar cane	112,921
13	Tomatoes	103,629
14	Cabbages and other brassicas	82,799
15	Fruit, fresh nes	82,947
16	Rice, paddy (rice milled equivalent)	80,144
17	Vegetables, fresh nes	72,403
18	Yams	55,442
19	Coffee, green	33,242
20	Tea	30,164
21	Fruit, tropical fresh nes	27,992
22	Soybeans	24,088
23	Groundnuts, with shell	20,314
24	Eggplants (aubergines)	22,329
25	Onions, dry	22,547

Source: FAOSTAT (2017-2019 average)

3) Trade and Distribution

The distribution image (Figure 3.4.5) and trade trends of major crops (Table 3.4.5) over the past three years are shown. Maize, cassava, beans, potatoes, tomatoes, etc. used in traditional Rwandan dishes are noticeably imported from Uganda and Tanzania. Most of sugar, rice and wheat are imported from outside the region, and domestic production does not seem to keep up with consumption. In terms of export value, in addition to traditional crops such as coffee and tea, spices, vegetables and nuts are exported to Asia and Europe, providing an opportunity to earn foreign currency. Most of Rwanda's key crops such as rice, sugar, maize and beans are exported to Burundi, Uganda and Kenya, where the northern corridor pass and DRC. The largest export crops are tea at $ 87.1 million, followed by coffee at $ 21.52 million, with little domestic consumption and specialized for export. On the other hand, cassava and plantain have a small export volume compared to the production volume, and most of them are consumed domestically. The crop with the highest import value was rice at $ 69.42 million, followed by maize at $ 27.54 million, suggesting that consumption cannot keep up with domestic production.



	Mainly domestic distribution	Mainly regional distribution	Mainly traded outside the region
Cereal crop	Plantain, Cassava	Maize, Sorghum	Rice, Wheat
Horticultural crop		Tomato, Soybeans, Irish potato, Onion	
Export crop			Coffee, Tea, Pepper

Figure 3.4.5 Distribution image

Source: Prepared by the survey team from FAOSTAT (2017-2019 average)
R: Regional distribution, E: Export

Table 3.4.5 Trade trends of major crops

Type	Crop	Production (ton)	Harvested area (ha)	Export value (1000US$)	Export amount (ton)	Export country	Import value (1000US$)	Import amount (ton)	Import country	Food supply quantity (kg/capita/yr/person)
Cereal crops	Maize	396,638	293,828	192	1,576	Burundi, DRC, Uganda	27,545	118,098	Uganda, Tanzania, Zambia, USA	16.75
	Rice	120,156	32,895	32,016	55,827	DRC, Burundi, Sudan	69,428	143,041	Pakistan, Thailand, Tanzania, India	10.57
	Cassava	1,088,551	169,951	15	111	DRC, Burundi	14,456	61,823	Tanzania, Uganda	62.95
	Plantain	770,654	91,151	1	2	United Kingdom	59	461	Uganda, Tanzania	79.80
	Sorghum	157,015	149,246	9	52	Uganda	6,042	32,751	Uganda, Tanzania	10.89
Horticultural crops	Irish potato	888,965	98,127	421	2,292	Uganda, Burundi	2,553	16,645	Uganda	115.36
	Onion	22,547	2,893	56	297	Uganda, Burundi	898	2,146	Tanzania, Uganda	0.93
	Tomato	103,629	9,944	3	7	DRC, Uganda	119	529	Uganda, Tanzania	7.83
	Sweet potato	1,136,307	183,011	11	6	Belgium, United Kingdom	90	616	Uganda, Tanzania	82.25
Others	Coffee	33,242	24,921	69,234	21,545	Switzerland, United Kingdom, Belgium, Uganda, USA, Singapre	342	849	Burundi, Tanzania	0.08
	Tea	30,164	19,668	87,101	29,448	Pakistan, United Kingdom, Kazakhstan, Egypt	435	296	Uganda	0.47

Source: FAOSTAT (2017-2019 average)[3], 2016-2018 average for food supply quantity

4) Distribution Structure

Traditional retail is the mainstream in Rwanda. Figure 3.4.6 shows the tomato supply chain, but other crops are said to have a similar distribution structure. In Rwanda, where there are many small-scale farmers, products are distributed from farmers or cooperatives to intermediary. Then, the route sold at retail shops in the city through multiple vendors is the mainstream. Some intermediaries also distribute to modern retailers such as export markets, hotels, and supermarkets. For small sales, the route sold in the rural market by cooperatives using own means of transportation like motorbikes also exists.

Intermediaries buy agricultural products from farmers cheaply, taking advantage of the difficulty in accessing the market for farmers. Then, intermediaries sell agricultural products which are unstable quality to retailers at high prices. The Esoko app developed in Ghana is also being rolled out to Rwanda to close the digital divide of small-scale farmers. Field staff hired by MINAGRI obtain market price

[3] According to FAOSTAT data, about 60% of coffee production is exported, but as shown in 3.4.3 (8), according to NAEB data described in the Survey Report on Information Collection / Confirmation of coffee cultivation and distribution in the Republic of Rwanda (2014, JICA), although there are annual fluctuations, about 95% of the raw beans produced are exported every year, and there is a divergence in the information.

information and enter it into the Esoko app database. The Esoko app not only provides market prices, but also weather forecasts, news, information distribution useful for agriculture, introduction and mediation of buyers, etc. The eRwanda project run by MINAGRI also provides village smartphones so that farmers who do not own smartphones who cannot use the Esoko app can access the information (http://www.esoko.gov.rw/). The Esoko Rwanda app also has an online platform that connects farmers and buyers to buy and sell, but only for coffee, tea, and some horticultural crops, with a small number of listings, which is still on developing stage (https://esoko.rw/)[4].

Esoko is an information-providing app, but the iSoko Nya Rwanda app developed by the iSoko Group is responsible for matching, payment, and logistics. There are several small supermarkets in Kigali, and many stores handle imported products, all of which are said to be expensive. Under such circumstances, iSoko Miniprix supermarket specializes in wholesale/ resale and retail of African agricultural products and crafts mainly of Rwanda, DRC, Kenya and Tanzania, and focuses on promotion and sale of valuable local products. Rwandan farmers use the online platform provided by Isoko Nya Rwanda when selling to iSoko Miniprix. Even rural producers far from the city can install the application on their smartphones and post information such as agricultural product descriptions, photos, and contact information so that iSoko Miniprix buyers can see it without going through an intermediary. Since it is intended for Rwandans who can operate apps on Android devices or iOS devices, it is probably used by relatively young farmers. It is possible to deal directly with supermarkets without having to visit supermarkets in urban areas. Since this application can be used by an unspecified number of people, it is possible to deal not only iSoko group supermarkets, but also directly with consumers. In addition, ISoko Nya Rwanda envisions connecting producers with overseas buyers and believes that it can also promote exports from Rwanda (https://isokonyarwanda.com/). In addition to the iSoko app, there are apps such as Vuba-Vuba and Rush foods, and there is website such as rwandamart. In Rwanda, which is an ICT-oriented country and is showing rapid development, traditional retail is the mainstream, but there are also rapidly modernized retails that allows direct market transactions without the intervention of intermediaries.

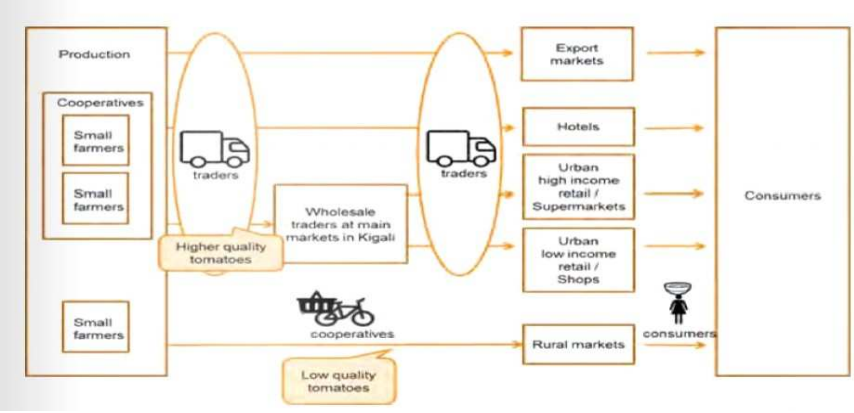


Figure 3.4.6 Supply chain of tomato in Rwanda

Source: SMART Tomato Supply Chain Analysis for Rwanda, 2016, SMASH Program by the Dutch Ministry of Foreign Affairs

[4] According to a person concerned with the JICA "Project for Water Management and Capacity Building" in Rwanda, the Esoko app was often used in rural areas until three years ago in the project target area, but smartphone usage service (enter the number by SMS and check crop prices) is currently stopped and seems to be rarely used.

(2) Selecting Crops to Study

Target crops were selected based on indicators such as the importance of the country considering from the statistics of FAO (domestic / export within and outside the region), the possibility of support from JICA / private companies, and the reality of the survey (Table 3.4.6). We selected three crops with different distribution forms for cereal crop. Since Rwanda is a CARD target country, rice was selected as the first cereal crop. Secondly, maize was selected which is mainly distributed within the region and one of the staple foods. In third, plantain was selected which is mainly distributed domestically and has a large amount of production. Although horticultural crops are a relatively small sector, they are intensive agriculture with high profit per unit area, and the Rwanda government, which has a small land area, has set the goal of promoting horticultural crop cultivation. Therefore, we selected three crops, potato, onion, and tomato, which are widely distributed in the region and have a relatively large production volume. For other crops, coffee, which is often distributed outside the region, was selected.

Table 3.4.6 Selected target crop and background

Type	Crop	Distribution type	Background
Cereal crops	Maize	Within region	One of staple foods. 7th rank in production volume. From within the region to DRC, Burundi (Northern corridor, Southern corridor) IM: Uganda, Tanzania→ EX: DRC, Burundi
	Rice	Within and outside region	CARD. From Asia and within the region to DRC (Northern corridor, Southern corridor) IM: Asia, Tanzania→EX: DRC
	Plantain	Domestic	3rd rank in production volume. Distributed domestically.
Horticultural crops	Irish potato	Within region	One of staple foods. 4th rank in production volume. Mutual distribution within the region. (Northern corridor, Southern corridor) IM: Uganda, Tanzania → EX: Uganda, Burundi
	Onion	Within region	Mutual distribution within the region. (Northern corridor, Southern corridor) IM: Uganda, Tanzania → EX: Uganda, Burundi
	Tomato	Within region	Import within the region. (Northern corridor, Southern corridor) IM: Uganda, Tanzania
Others	Coffee	Outside region	Export outside the region EX: Europe, Asia

The cropping calendar of these selected crops is shown below (Figure 3.4.7). Cereal crops are harvested in two seasons, A and B. Horticultural crops are harvested in two seasons. In wetlands of northern and western provinces with high rainfall or irrigated areas, horticultural crops are harvested in three seasons including season C.

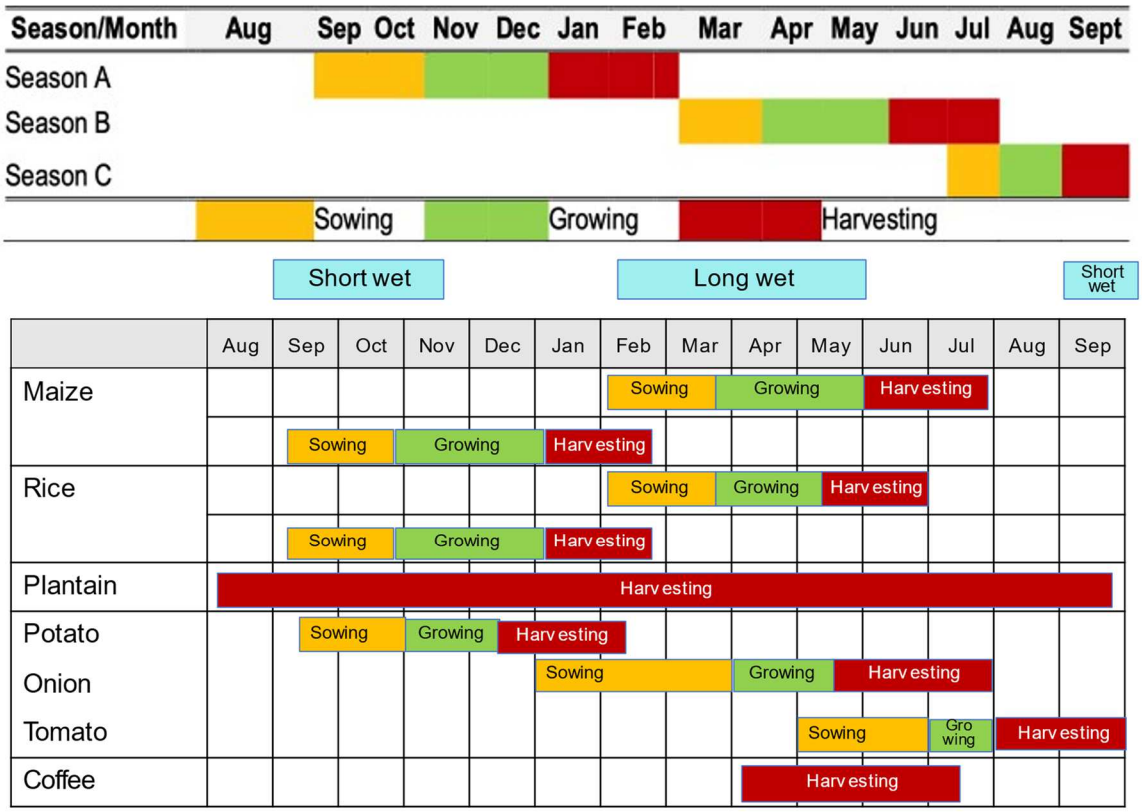


Figure 3.4.7 Cropping calendar of selected crops

Source: prepared by the survey team from FAO data

(3) Setting Hypothesis

As for the impact of COVID-19, it has been reported that the rise in food prices has been a major issue due to the decrease in supply because of stagnation of logistics of inputs and agricultural products by border closures and movement restrictions. On the production side, it has been reported that farmers' incomes have declined due to the decline in yields due to abnormal weather, but the impact of COVID-19 is expected to be small. Therefore, we hypothesized that there are vulnerabilities in the input, distribution, processing, sales, and consumption stages.

(4) Overview of FVC

1) Rice

Rice is a crop designated as a priority crop by MINAGRI's CIP (Crop Intensification Program[5]). In 2020, it was planted in a total of 14,000 ha in two cropping seasons, and the yield per unit area was 3.51 ton / ha. It is mainly produced in the wetlands of the upper Nile by farmers' cooperatives of small-scale farmers. Generally, double cropping in Season A (September-February) and Season B (March-July) are carried out. Rice cultivation area has increased from 3,549 ha in 2000 to about 14,000 ha in 2020, and all are irrigated in 2020. This is because a large amount of investment is being made in the reclamation

[5] CIP is a MINAGRI program introduced in 2007 in line with the National Agricultural Policy and Strategic Plan for Agricultural Transformation, consisting of four components: input of good agricultural materials, farmland consolidation, enhancement of extension services, and post-harvest management. It aims to increase the productivity of priority crops (maize, wheat, rice, potato, soybeans, cassava, plantain, legumes), increase the income of small-scale farmers and ensure food security (JICA, 2021).

of wetlands due to the government's measures to increase domestic rice production. The main production areas are Huye, Muhanga, Gasabo, Kamonyi, Ngoma and Rusizi. Although production is rising, demand overwhelms supply so that it currently relies on imports from Tanzania, India, Vietnam, Thailand, etc. for about 40% of consumption (FAO data).

a. Cropping Season of rice

Rice	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Season A		Sowing		Growing			Harvesting							
Season B								Sowing		Growing		Harvesting		

Figure 3.4.8 Cropping calendar of rice

b. Production Area

The main production areas are shown on the map.

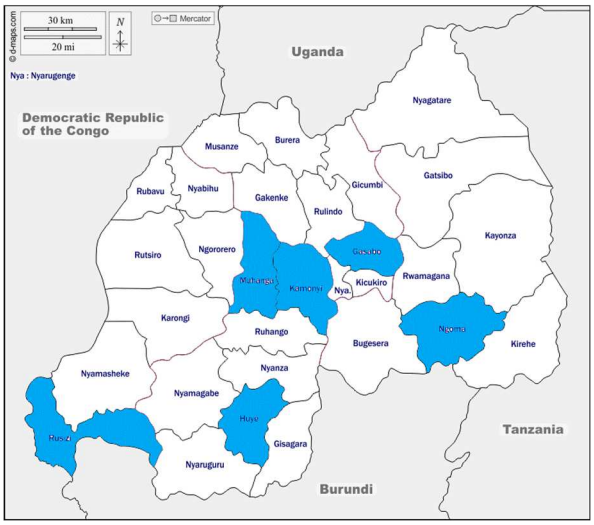
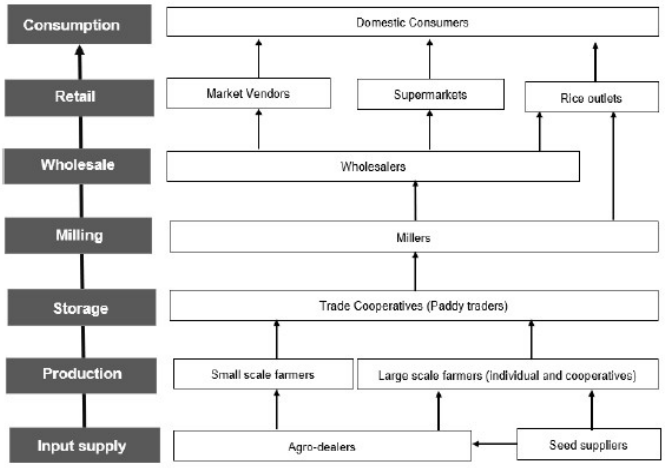


Figure 3.4.9 Main production area of rice

c. Supply Chain

Figure 3.4.10 shows the rice supply chain in Rwanda.



Source: Survey on Agriculture and Nutritious food Value Chain in Rwanda, 2021, JICA

Figure 3.4.10 Rice supply chain

d. Main Stakeholders

Figure 3.4.11 Stakeholders of rice

Source: Key informants survey result

2) Maize

Maize is a crop designated as a priority crop by MINAGRI's CIP (Crop Intensification Program) and is mainly produced by small-scale farmers for food security and cashing purposes. Over the last decade, maize production has increased by an average of 5% to 18% due to land-use alterations. According to national statistics, the proportion of maize sold on the market has increased rapidly over the past five years. Five years ago, 47.4% of production was sold to the market, but in the 2019 season A, 79.6% was supplied to the market （Survey on Agriculture and Nutritious food Value Chain in Rwanda, 2021, JICA）.

The yield of unit area of maize has been changing at 1.39 ton / ha in 2015, 1.35 ton / ha in 2018, and 1.2 ton / ha in 2020. Some innovative farmers harvest 4-5ton/ha. Despite its potential, it remains at a low level. The low yield in 2020 was due to the outbreak of Mamestra.

Increased maize production as a cash crop is due to increased domestic consumption, designation as a priority crop for government and humanitarian programs, quality trust from major milling companies, and increase in demand in neighboring countries such as DRC, Burundi, etc.

Maize grains and maize flour have import and export transactions with neighboring countries such as Uganda, Zambia, Kenya and Tanzania, and their production costs are lower than those of Rwanda, and their wholesale prices are also lower. Some are imported that do not meet the buyer's quality standards of Rwanda.

a. Cropping Season of maize

Maize	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Season A		Sowing		Growing			Harvesting							
Season B							Sowing		Growing			Harvesting		

Figure 3.4.12 Cropping calendar of maize

b. Production Area

The main production areas are shown on the map.

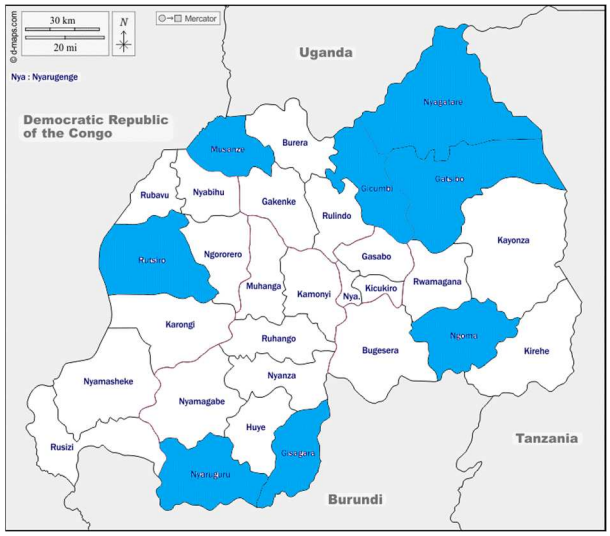
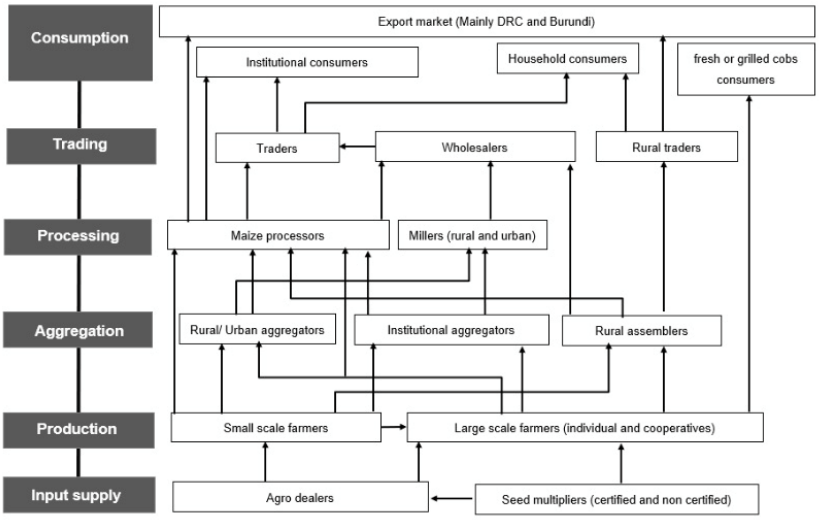


Figure 3.4.13 Main production area of maize

c. Supply Chain

Figure 3.4.14 shows the maize supply chain in Rwanda.



Source: Survey on Agriculture and Nutritious food Value Chain in Rwanda, 2021, JICA

Figure 3.4.14 Maize supply chain

d. Main Stakeholders

Source: Key informants survey result

Figure 3.4.15 Stakeholders of maize

3) Plantain

Plantain is one of Rwanda's main products as cash crop and edible crop. Introduced in Rwanda in 1971, the annual consumption in 2019 was 227 kg / person, the highest consumption in eastern Africa and the second highest consumption in the world.

90% of Rwanda's population consumes it as a staple food crop, and in 2018, 80% of small-scale farmers cultivate it, playing an important role in household food security. It is cultivated nationwide, but most of it is cultivated in the eastern province.

The average yield for the 2020 season A was 13.7 ton / ha, but it was reported to reach an average of 19.2 ton / ha for large farmers over 30 ton / ha in Nyanza, Rubavu and Ngoma counties. Production of plantain has grown significantly over the past five years, with annual production increasing from 765,538 ton in 2015 to 913,231 ton in 2020. In 2015, 19% of production was for market sale, 77.2% was for self-consumption, and the rest was for employment workers, field rents, gifts, and post-harvest losses. In 2020, market sales increased to 36.5% due to increased market demand. In addition, the import / export market is not large (JICA, 2021).

a. Cropping Season of plantain

	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Plantain	Harvesting													

Figure 3.4.16 Cropping calendar of plantain

b. Production Area

The main production areas are shown on the map. It is cultivated by small-scale farmers nationwide, but most of it is produced in the eastern province (blue), followed by in the suburbs of Kigali (light blue).

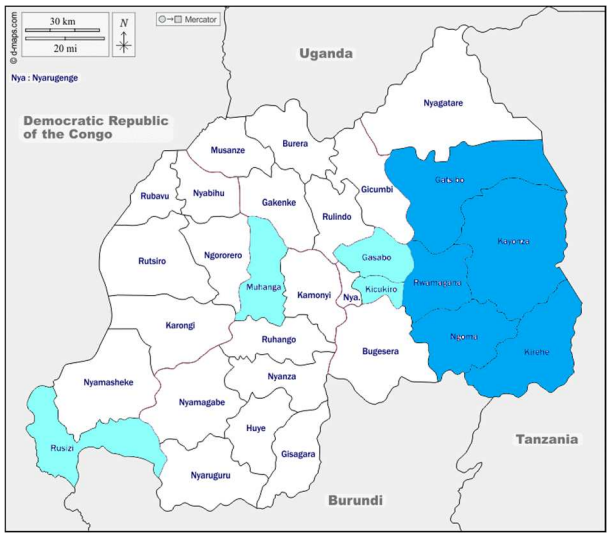
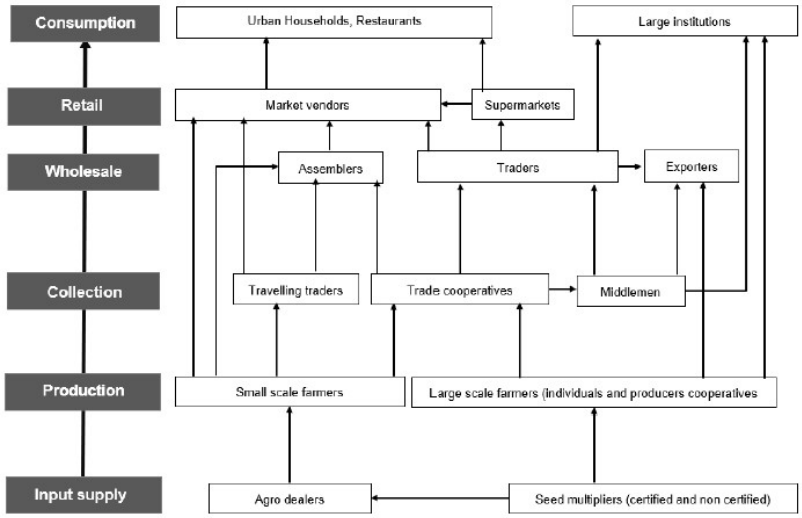


Figure 3.4.17 Main production area of plantain

c. Supply Chain

Figure 3.4.18 shows the plantain supply chain in Rwanda.



Source: Survey on Agriculture and Nutritious food Value Chain in Rwanda, 2021, JICA

Figure 3.4.18 Plantain supply chain

d. Main Stakeholders

Source: Key informants survey result

Figure 3.4.19 Stakeholders of plantain

4) Tomato

Tomato is one of the most popular vegetables produced in Rwanda. Both raw and processed are sold in the domestic market. It is estimated that about 240,000 households are involved in tomato production. The harvested area in 2016 was 13,414 ha, the production was 118,774 tons, while the production in 2019 was 105,758 tons. The main production area of tomato is Bugesera, Rwamagana, Kayonza, Rusizi, Nyagatare, Gatsiro, Burera, Musanze, Nyanza, Nyamasheke and Huye. Tomato is an important cash crop for small Rwandan farmers.

It is reported that tomato production is mainly for the domestic market, with 20-30% of the production being self-consumed and 70-80% being sold domestically. Rwandan tomato is said to be of lower quality and higher price than neighboring countries such as Uganda and Tanzania, which is not internationally competitive, and is not exported to Europe. Regarding imports, due to the limited cultivation period, it is not possible to meet domestic demand during the off-season, and although it is less than 5% of total consumption, it is imported from DRC and Burundi (JICA, 2021). In addition, it is reported that tomato processors are importing due to lack of raw materials in domestic production (key informant survey result).

a. Cropping Season of tomato

Tomato	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Season A		Sowing		Growing		Harvesting								
Season B						Sowing			Growing		Harvesting			
Season C										Sowing		Gro wing	Harvesting	

Figure 3.4.20 Cropping calendar of tomato

b. Production Area

The main production areas are shown on the map.

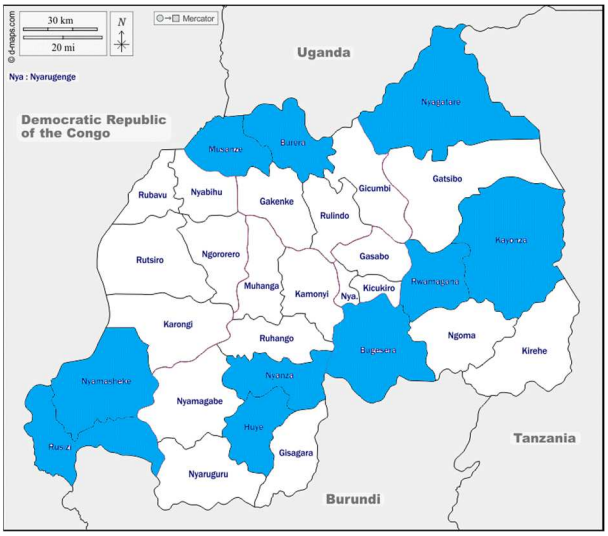
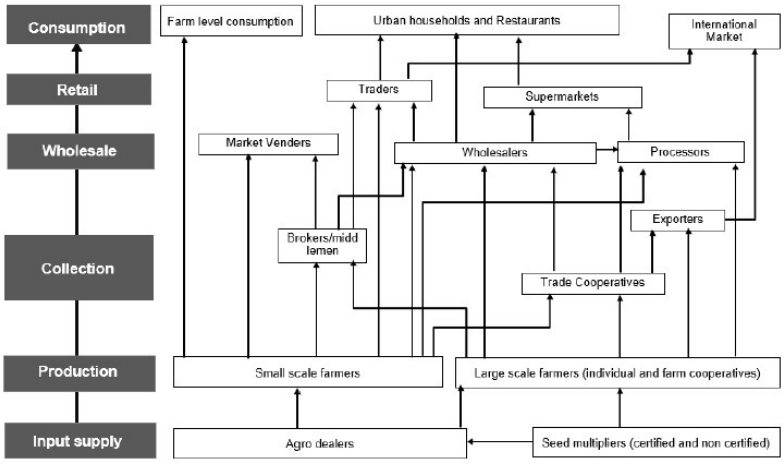


Figure 3.4.21 Main production area of tomato

c. Supply Chain

Figure 3.4.22Source: Survey on Agriculture and Nutritious food Value Chain in Rwanda, 2021, JICA

Figure 3.4.22 shows the tomato supply chain in Rwanda.



Source: Survey on Agriculture and Nutritious food Value Chain in Rwanda, 2021, JICA

Figure 3.4.22 Tomato supply chain

d. Main Stakeholders

Source: Key informants survey result

Figure 3.4.23 Stakeholders of tomato

5) Onion

Onions are produced over 20,000 tons per year and are sold nationwide, mainly in the domestic market, as raw foods, spices, and pickles, and are a basic vegetable that many Rwandans consume daily. Exports to Uganda and Burundi, imports from Uganda and Tanzania are seen, and some are also exported to Europe. Annual per capita consumption is 0.93 kg / capita / year, which is exceedingly small compared to 7.77 kg / capita / year in Uganda and 3.1 kg / capita / year in Ethiopia (FAOSTAT 2016-2018 average).

Onions are cultivated nationwide but are especially produced in the northern and southern provinces. Onion production is growing rapidly as a highly profitable vegetable due to growing demand in the domestic and overseas markets. Annual production from 2012 to 2018 was around 14,000 tons, but in 2019 it was 40,742 tons.

a. Cropping Season of onion

Onion	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Season A		Sowing		Growing		Harvesting								
Season B						Sowing			Growing		Harvesting			
Season C										Sowing		Gro wing		Harvesting

Figure 3.4.24 Cropping calendar of onion

b. Production Area

The main production areas are shown on the map. The light blue area is the area where season C production is particularly high.

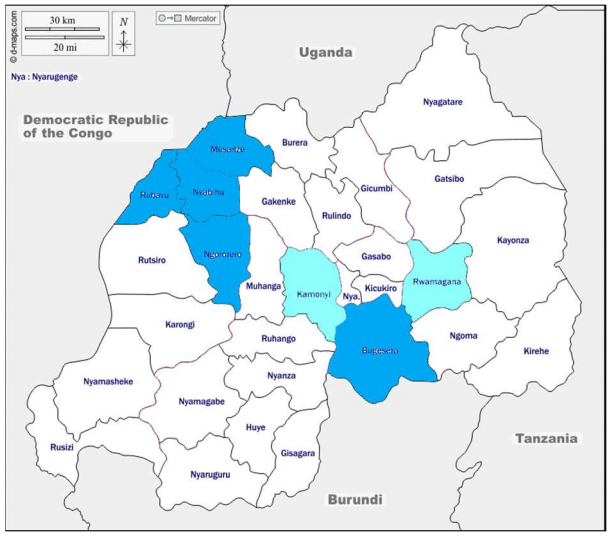
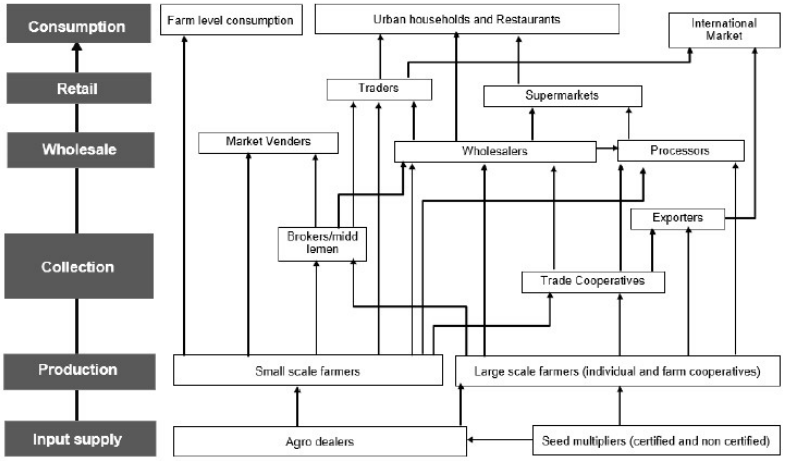


Figure 3.4.25 Main production area of onion

b. Supply Chain

Figure 3.4.26 shows the onion supply chain in Rwanda. It is basically the same as the tomato supply chain, except that there are almost no processors in Rwanda.



Source: Survey on Agriculture and Nutritious food Value Chain in Rwanda, 2021, JICA

Figure 3.4.26 Onion supply chain

d. Main Stakeholders

Figure 3.4.27 Stakeholders of onion

Source: Key informants survey result

6) Irish potato

Irish potato is a crop designated as a priority crop by MINAGRI's CIP (Crop Intensification Program). It is cultivated nationwide, but it accounts for more than 90% of the production in the 4 districts of Rubavu, Musanze, Nyabihu and Burera in the northwest region. Double cropping is common in Season A (late August to early February) and Season B (late February to early July).

In urban areas, it is a more popular food than maize and is consumed in a variety of forms, including boiled, baked, fried, and potato chips. It is estimated that it is cultivated in 3.9% of the cultivated area in each season, approximately 50,000 to 60,000 ha (JICA, 2021). Annual per capita consumption in 2018 is estimated at 145 kg. Exports to Uganda and Burundi, imports from Uganda and Tanzania are seen, and some are also exported to Europe (FAOSTAT).

a. Cropping Season of Irish potato

Potato	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Season A		Sowing		Growing		Harvesting								
Season B							Sowing		Growing		Harvesting			
Season C										Sowing		Gro wing		Harvesting

Figure 3.4.28 Cropping calendar of Irish potato

b. Production Area

The main production areas are shown on the map. 80% of Rwanda's potato production is cultivated in areas of northern volcanic ash soil (Further Africa, 2020). Volcanic ash soil is well-drained and suitable for potato production.

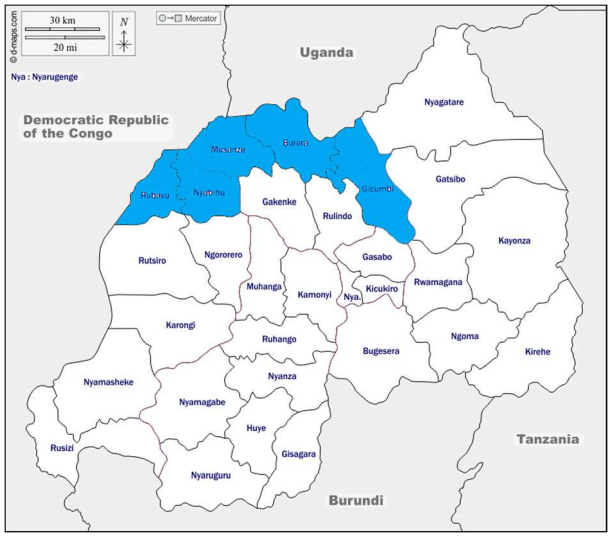
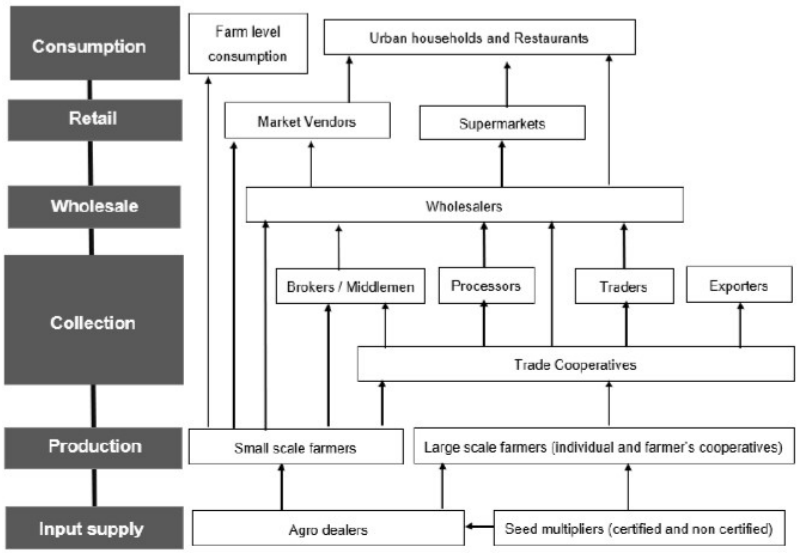


Figure 3.4.29 Main production area of Irish potato

c. Supply Chain

Figure 3.4.30 shows the onion supply chain in Rwanda.



Source: Survey on Agriculture and Nutritious food Value Chain in Rwanda, 2021, JICA

Figure 3.4.30 Irish potato supply chain

d. Main Stakeholders

Source: Key informants survey result

Figure 3.4.31 Stakeholders of Irish potato

7) Coffee

Coffee is a traditional commercial crop in Rwanda and is a typical export product that accounts for 29.3% of the export of agricultural products (https://oec.world/en/profile/country/rwa). Rwanda's coffees are produced by about 350,000 farmers out of 1.7 million farmers in the country, most of which are produced by small-scale farmers, with a production volume of 33,242 tons / year (FAOSTAT 2017-2019 average). Although there are yearly fluctuations, around 95%[6] of them are exported every year (Information collection and confirmation survey report on coffee cultivation and distribution in the Republic of Rwanda, 2014, JICA). Various measures for coffee have been decided by MINAGRI and implemented by affiliated organization, NAEB. To improve the quality of green coffee beans, NAEB assigned coffee staff in each province to manage nurseries, distribute fertilizers, and promote the development of washing stations for primary processing. Quality is being improved at the production and processing stages (Outline of Project for Strengthening Coffee Value Chain in Rwanda, JICA).

The main production area is western province, but it is also produced in parts of eastern and southern provinces. Exports are mainly to Switzerland for semi-washed coffee and mainly to the United States for washed and high-quality coffee. In addition, Robusta coffee, roasted coffee, and in recent years, natural and honey processed coffee have also been produced. Production has declined slightly year by year, but quality has improved significantly, with a washed coffee share of 30% in 2010 and 60% in 2016. There were only two coffee washing stations in 2002, but in 2018 it has increased to nearly 300. Investment in processing capacity and marketing bear much fruit. Since 2012, it has been exported to more than 40 countries including Switzerland, the United States, Japan, and the United Kingdom (Value

[6] In Table 3.4.5, i.e., FAOSTAT data, about 60% of the production volume is exported, so there is a gap in the information.

Chain Analysis for the Coffee Sector in Rwanda, 2018, CBI).

a. Cropping Season of coffee

	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Coffee									Harvesting					

Figure 3.4.32 Cropping calendar of coffee

b. Production Area

The main production areas are shown on the map.

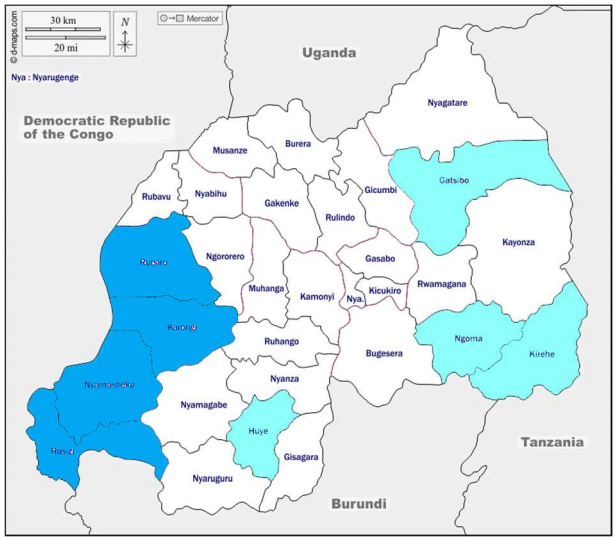
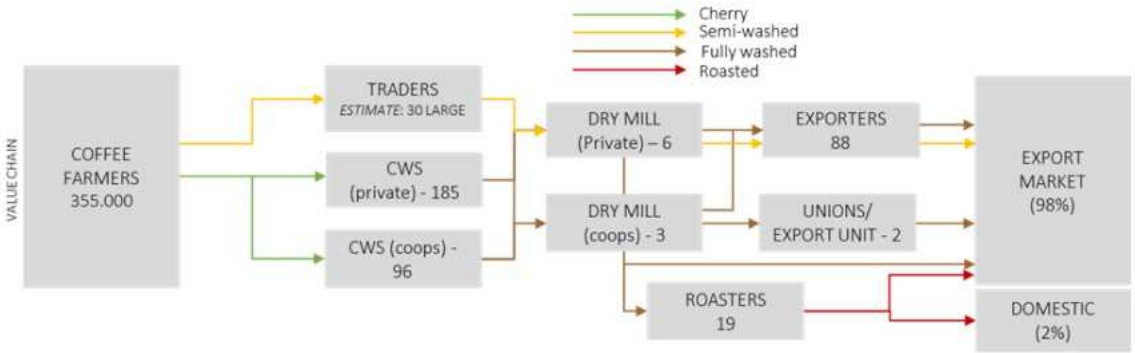


Figure 3.4.33 Main production area of coffee

c. Supply Chain

Figure 3.4.34 shows the coffee supply chain in Rwanda.



Source: Survey on Agriculture and Nutritious food Value Chain in Rwanda, 2021, JICA
*CWS: Coffee Washing Station

Figure 3.4.34 Coffee supply chain

d. Main Stakeholders

Figure 3.4.35 Stakeholders of coffee

Source: Key informants survey result

3.4.3 Impacts of COVID-19 on FVC and Underlying Factors

(1) Rice

1) Impacts on FVC of Respective Crop

The main impacts on the entire VC are as follows.

a. Decrease in production

It is reported that the global supply chain disruptions and domestic movement restrictions have affected domestic rice production (COVID-19 and Food Security, World Bank, 2020). Thus, it was considered to have an impact on harvested area and production volume in Season B of 2020 which coincided with the first lockdown. Table 3.4.7 shows the production volume, harvested area, and yield data. Generally, no significant changes were seen around COVID-19. However, it was revealed that the harvested area of small-scale farmers showed a significant decrease from 1,268 ha to 328 ha compared to season A and season B of 2020, and 1,347ha to 335 ha compared to season A and season B of 2021. It is unclear whether it is due to COVID-19 or whether the cultivation area of small-scale farmers in season B is originally small. Although the area of small-scale farmers is small compared to the total area, the cultivated area per household in Rwanda is 0.76ha, and 56.8% of households own less than 0.5ha of farmland. Considering the number of households, it is assumed that COVID-19 had a great impact on production. The study team also investigated data by county, but no significant difference was found before and after COVID-19. Especially in rainfed rice production areas, timely cropping is important, but the timely rice planting time of season B in 2020 coincided with the first lockdown period, and seasonal workers could not work in the field at the right time, or seed rice could not be procured at the right time. This affected to a decrease in yield and quality. Furthermore, due to the confusion in the

distribution of domestically produced rice, a large amount of surplus rice remained in the rice cooperatives' warehouse, which delayed the harvest, resulting in an increase in post-harvest loss, an increase in broken rice, and a decrease in the germination rate of seed rice (Key informant survey result). In areas of high poverty and malnutrition, where it is difficult to adapt to abnormal weather, the decline in yield because of COVID-19 is said to have been a double blow (Covid-19 and Rice Production in Africa - Empower Africa).

Table 3.4.7 Production, area and yield of rice by season

Season	2018			2019			2020			2021		
	A	B	C	A	B	C	A	B	C	A	B	C
Production amount (ton)	57,934	55,946	-	59,286	72,291	-	52,225	64,279	-	63,950	67,808	-
Harvested area (ha)	16,938	15,842	-	14,671	18,225	-	14,507	15,077	-	15,374	16,302	-
Among them, small scale farmers	n/d	n/d	-	n/d	n/d	-	1,268	328	-	1,347	335	-
Yield (ton/ha)	3.4	3.5	-	4.0	4.0	-	3.6	4.3	-	4.2	4.2	-

Source: UPGRADED SEASONAL AGRICULTURAL 2020 ANNUAL REPORT, National Statistics Institute of Rwanda

b. Decrease in domestic processing and distribution

In Rwanda, about 40% of rice consumption depends on imports, but due to the impact of COVID-19, Indian rice, which is the importer, is exported to China, which is not usually exported, and the supply to Africa is reduced. Additionally, it has been reported that the supply of rice to Africa has decreased due to abnormal weather in Thailand and Vietnam, which are the usual importers. Prior to February 2019, Uganda was the main supplier of staple foods from Africa, but diplomatic feuds closed the border with Uganda (Gatuna border) from February 2019. Since then, the major supplier of staple food crops has changed to Tanzania (FSNWG Food Security & Nutrition Working Group, 2021, East Africa Crossborder Trade Bulletin). As the rice supply from Southeast Asia has decreased, to make up for it, By that amount, a large amount of cheap rice flowed from Tanzania to Rwanda. As a result, the domestically produced rice is more expensive than the mass-imported Tanzanian rice, and the problem of not being able to find a sales destination has emerged. Rice millers have reduced the amount of rice purchased from rice cooperatives, and it is reported that 400 tons of paddy rice in 2020 season B and 492 tons in 2021 season A were stored in the cooperatives warehouse nationwide. After that, the government requested farmers to lower the producer price, so it was possible to secure sales destinations and sell domestic rice in the market (key informant survey results).

c. Decrease of producer price

As mentioned above, distribution has been restored as the government has requested farmers to lower producer prices. Farmers had no choice but to sell rice at low prices in order to maintain their daily lives. Producer prices per kg of rice in 2021 are said to have fallen from 320RwF ($ 0.32) before the pandemic to 270RwF ($ 0.27) (key informal survey results). Also, basically, farmers sell rice to rice millers through rice cooperatives. However, the import of Tanzanian rice has reduced the amount of rice millers purchasing from rice cooperatives. In addition, as the government demanded lower producer prices, farmers stopped selling to rice cooperatives and, in some cases, sold to illegal traders who bought at

higher prices. Although producer prices have fallen, consumer prices per kg of rice were $ 0.98 on February 14, 2020, and $ 1.08 on April 21, 2021 (fluctuations of $ 0.82 to $ 1.32 during the period). The impact on consumers was not considered to be significant (FAO data).

d. Decrease in consumption of domestic rice

As mentioned above, the purchase price of consumers was not significantly affected, but the consumption of domestic rice decreased, and the consumption of Tanzanian rice increased.

Table 3.4.8 Impact on each VC stage on rice

VC stage	2020		2021		Background and factors	Period
	Extent of impact	Impact	Extent of impact	Impact		
Input	Large	Shortage and delay of input	Medium	Shortage of input	Lockdown delayed the availability of seed rice and affected rainfed rice cultivation, where timely cropping is important. In 2021, the input delay recovered, but there was a shortage of input.	From first half of 2020 to present
Production	Medium	Production decreased	Medium	Production decreased	Because of lockdown, the flow of people was restricted, timely cropping became impossible, and the yield decreased. It recovered to some extent in 2021.	first half of 2020
Process	Large	Domestic processing volume decreased	Large	Domestic processing volume decreased	Due to the COVID-19 shock, imports from Southeast Asia decreased in both 2020 and 2021, and cheap rice imports from Tanzania increased. Even if rice millers purchased expensive Rwandan rice from farmers, they could not win the price competition of Tanzanian rice, so they had to stop the rice milling business.	first half of 2020 First half of 2021
Distribution	Large	Domestic distribution volume decreased	Large	Domestic distribution volume decreased	Like the background above, Rwandan rice has lost its place due to the increase in cheap rice imports from Tanzania.	first half of 2020 first half of 2021
Sales	Large	Decrease of producer price	Medium	Decrease of producer price	The government has requested to bring a producer price down so that Rwandan rice can be distributed and sold. Rice millers, distributors and sellers have resumed their businesses, and while normal sales have been carried out, the income of producers has decreased. Farmers have begun to sell to illegal buyers who buy at high prices. Sales to illegal buyers decreased in 2021.	first half of 2020 first half of 2021
Consumption	Large	Decrease of domestic rice consumption	Large	Decrease of domestic rice consumption	Although the impact on consumer prices was small, Tanzanian rice was cheaper and consumption of Tanzanian rice increased. The impact continued in 2021.	From first half of 2020 to present

Note: Large: Large negative impact, Medium: Negative impact, Small: No impact or minor impact, -: Not applicable. The extent of impact was rated based on the results of the key informant survey, the questionnaire survey, and the results of the field survey.

Rice farmer in Eastern Province

Imported Tanzanian rice

Tanzanian rice in warehouse of wholesaler

Photo 3.4.1 Supply chain of rice in Rwanda

2) Change of VC Flow

Due to the COVID-19 pandemic, the VC flow of rice changed as shown in Figure 3.4.36.

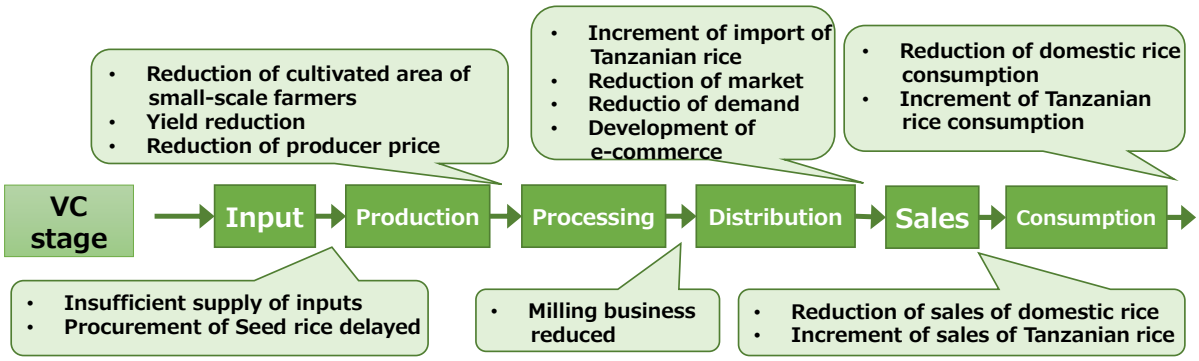


Figure 3.4.36 Flow of rice VC changed due to the influence of COVID-19

(2) Maize

1) Impacts on FVC of Respective Crop

The main impacts on the entire VC are as follows.

a. Increase of maize farmers

In March-June 2020 and January-April 2021, service providers and store owners who were unable to continue their business due to measures such as business suspension, distribution restrictions, and movement restrictions, converted to agricultural activities which were allowed to continue their business. The shift to maize production is because the decline in consumer income has brought about a change in the demand structure and the demand for maize, the staple food, has increased (key informant survey results). In addition, maize is mostly produced by small-scale farmers (Table 3.4.9), which has no serious impact of shortage of seasonal workers during the lockdown from March to April 2020 and during the restrictions on movement from January to February 2021. Furthermore, during the lockdown from March to April 2020, the input materials were not supplied to the farmers due to the movement restrictions of the input dealers. After that, it was reported that the input materials were supplied by

providing the input dealers with a travel pass (key informant survey result). It was also considered that the hurdle to conversion to maize cultivation was low. Rwandans can apply / register the travel pass from website or by phone.

As a result, maize production increased, but distribution decreased. Therefore, despite the demand, it did not flow to consumers and a lot of surplus products were generated (key informal survey results). Quantitative data before and after COVID-19 also showed that maize production in 2020 Season B and 2021 Season A was higher than usual (Table 3.4.9).

Table 3.4.9 Production, area and yield of maize by season

Season	2018			2019			2020			2021		
	A	B	C	A	B	C	A	B	C	A	B	C
Production amount（ton）	332,670	91,534	-	331,090	90,128	-	353,999	94,634	-	378,641	104,041	-
Harvested area (ha)	218,179	78,151	-	215,159	73,139	-	221,521	72,918	-	236,642	80,570	-
Among them small scale farmers	n/d	n/d	-	n/d	n/d	-	215,307	71,376	-	229,757	78,782	-
Yield (ton/ha)	1.5	1.2	-	1.5	1.2	-	1.6	1.3	-	1.6	1.3	-

Source: UPGRADED SEASONAL AGRICULTURAL 2020 ANNUAL REPORT, National Statistics Institute of Rwanda

b. Decrease of distribution volume

More than 90% of maize farmers are small-scale farmers, and many of the small-scale farmers gather to form cooperatives and sell to aggregators and processors, so that they have many group activities.

Due to lockdown in March 2020, movement restrictions and various infectious disease control measures hindered farmers' meetings, lost decision-making opportunities, and caused confusion within cooperatives, but with minimal sales interruptions has been reported. However, it is said that some aggregators and processors have suspended their businesses and did not purchase from farmers because the sales destinations are limited due to market access restrictions such as only 50% of regular vendors are allowed to enter the market. In addition, only 50% of people such as hotels and restaurants are allowed to enter the market, and demand for the service industry has decreased due to the contraction of the business. Informal distributors also became difficult to move and did not buy from farmers. It is also reported that the product was sold at a price that was almost the same as the discard price (RwF190 / kg) due to lack of storage facilities such as cooperative refrigerating rooms and warehouses and lack of post-harvest processing techniques. During the lockdown in March 2020, the supply chain among farmers, aggregators, processors, and sales companies was cut off, distribution volume has declined, producer prices have fallen, and the income of stakeholders has declined. and it was thought that the income of the parties concerned was inevitably reduced (key informant survey results).

Due to the decrease in distribution volume, many post-harvest losses occurred from May to August 2020 and the cooperatives' storage facilities were in short supply. Since the post-harvest operation techniques has not been developed, products were rotted and disposed, or sold at a price that was almost the same as the discard price (RwF190 / kg).

In East Africa, including Rwanda, the cold chain distribution network is not well developed, and post-harvest loss, in which agricultural, forestry and fishery products and processed foods are spoiled in the process of storage and distribution, has become a major issue (Ministry of Agriculture, Forestry and

Fisheries, 2016). Horticultural crops are perishable, and in Rwanda, where a cold chain is not maintained, the loss is large. It is said that even in grains, the loss due to the generation of aflatoxin, which is a harmful substance, amounts to 16-22% of the production. Launched in December 2020, Kigali's Cold Chain Development Center (ACES) not only reduces food loss, improves farm profits, promotes efficient market launch of agricultural products, but also properly manages the COVID-19 vaccine. Therefore, maintenance is being promoted quickly (2021, Pick-Up! Africa Vol.138).

Table 3.4.10 Impact on each VC stage on maize

VC stage	2020		2021		Background and factors	Period
	Extent of impact	Impact	Extent of impact	Impact		
Input	Small	No large impact	Small	No large impact	The supply of input materials was stagnant in 2020, but it was resolved by issuing a traveling pass to the input company.	First half of 2020
Production	Small	Producers increased	Small	Producers increased	Due to the decrease in demand for high-quality horticultural crops, the number of maize producers, i.e., staple food producers have increased. A similar trend can be seen in 2021.	First half of 2020
Process	Small	Processing volume decreased	Small	Processing volume decreased	As for aggregators and processors, purchases from farmers have shrunk and sales destinations have decreased due to movement restrictions and market shrinkage. A traveling pass was issued to the logistics company, and some of them were resolved.	first half of 2020 second half of 2020
Distribution	Large	Distribution volume decreased	Medium	Distribution volume decreased	Like the above background, logistics companies have reduced purchases from farmers and reduced sales destinations due to movement restrictions and market shrinkage. A traveling pass was issued to the logistics company, and some of them were resolved. In 2021, the distribution volume recovered than in 2020.	First half of 2020 second half of 2020
Sales	Large	Sales volume decreased	Medium	Sales volume decreased	Due to market shrinkage, limited number of people entering to market, and movement restrictions, the seller's business was interrupted, and sales volume decreased. In 2021, many sellers resumed their sales business or resumed by reducing their business.	First half of 2020 second half of 2020
Consumption	Large	Consumption increased	Medium	Consumption increased	Purchasing decreased due to the difficulty of consumers accessing the market. However, since it is a staple food, demand increased. The impact continued in 2021.	first half of 2020 second half of 2020

Note: Large: Large negative impact, Medium: Negative impact, Small: No impact or minor impact, -: Not applicable. The extent of impact was rated based on the results of the key informant survey, the questionnaire survey, and the results of the field survey.

Maize farmer (Eastern Province). As a farmer leader, she guides nearby farmers. Income declined due to decrease in producer price.

Maize grinding machine (Southern Province). Processing volume decreased.

Photo 3.4.2 Supply chain of maize in Rwanda

2) Change of VC Flow

Due to the COVID-19 pandemic, the VC flow of maize changed as shown in Figure 3.4.37.

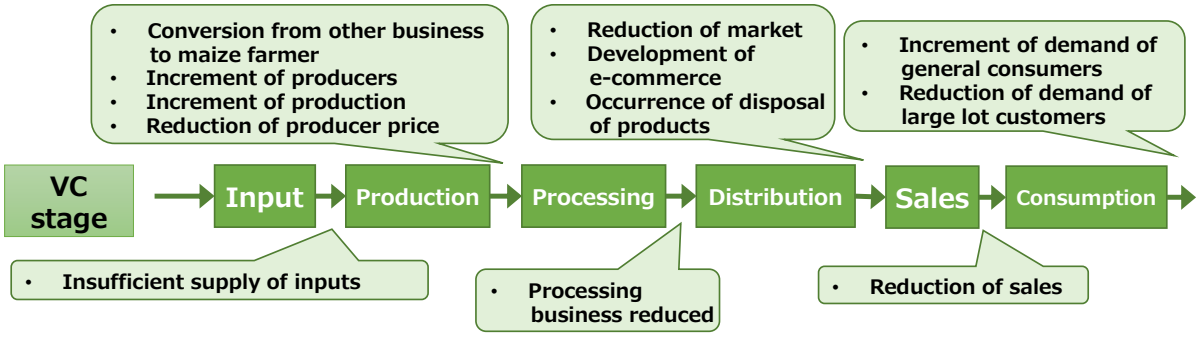


Figure 3.4.37 Flow of maize VC changed due to the influence of COVID-19

(3) Plantain

1) Impacts on FVC of Respective Crop

The main impacts on the entire VC are as follows.

a. Decrease in production

Plantain is designated as priority crop by MINAGRI's CIP (Crop Intensification Program). Plantain is perennial crop and are different from annual crops like vegetables which require new inputs every year such as seeds, base fertilizers, agricultural machinery, and equipment. It seems that the lockdown had almost no impact on input or production. Furthermore, it was reported that homemade compost manure was often used instead of chemical fertilizer, and the supply of chemical fertilizer was not significantly affected. Although there was a regional decline in revenue due to the outbreak of BXW (Banana Xanthomonas wilt), production was unrelated to COVID-19. Quantitative data show that in Rwanda, the yield per unit area for 2020 season A, just before the outbreak of infected people, was 13.8 ton / ha,

which was lower than usual, but it recovered in 2020 season B, which was the harvest after the lockdown. In the 2021 season A, the yield decreased again due to the outbreak of diseases (Table 3.4.11).

Table 3.4.11 Production, area and yield of plantain by season

Season	2018			2019			2020			2021		
	A	B	C	A	B	C	A	B	C	A	B	C
Production amount (ton)	406,044	353,652	-	456,351	364,566	-	502,972	410,259	-	529,788	439,405	-
Harvested area (ton)	21,389	19,767	-	25,340	20,155	-	36,464	22,089	-	38,916	24,193	-
Among them, small scale farmers	n/d	n/d	-	n/d	n/d	-	36,370	22,040	-	38,846	24,151	-
Yield (ton/ha)	19.0	17.9	-	18.0	18.1	-	13.8	18.6	-	13.6	18.2	-

Source: UPGRADED SEASONAL AGRICULTURAL 2020 ANNUAL REPORT, National Statistics Institute of Rwanda

b. Utilization of ICT

The BXW application of smartphones developed for farmers is rapidly increasing in number taking opportunity of COVID-19 spread. This app was developed by "Digital tool for monitoring and control of Banana Xanthomonas Wilt (BXW) disease in Rwanda (abbreviation: ICT4BXW)" implemented by IITA (International Institute of Tropical Agriculture) and RAB in2018-2020 and can be used free of charge. This is an example of solving social issues by utilizing ICT, which has come to rely on smartphone application for diagnosis, management, and control of BXW, which used to collect information face-to-face. In addition, an e-commerce project is underway that will allow online sales and purchase of plantains and their processed foods (key informant survey result).

c. Decrease in distribution volume and sales volume

From March to September 2020, the decrease in distribution volume and sales volume was noticeable. Due to movement restrictions, purchases from farmers and cooperatives were restricted, and buyers, logistics, and wholesale businesses were reduced, but the government issued a travel pass, and some of them were resolved.

d. Decrease in purchasing power

The various measures taken by COVID-19 have reduced consumer purchasing power and reduced consumption as a result of the loss of income-generating opportunities for consumers and the difficulty in accessing the market. The decrease in consumption was particularly noticeable from July to August 2020. Since price fluctuations occur every year, it is unlikely that consumers have lost their purchasing power. However, plantains have a high share for self-consumption, and the impact was not so serious (key informant survey result).

e. Change in price

Producer price of plantain fell from March to May 2020, i.e., $ 0.25 to $ 0.30/kg, but are said to have recovered since then. Consumer prices per kg of bananas (edible and plantain) were $ 1.11 on February 14, 2020, and $ 1.12 on April 21, 2021. The fluctuation range during the period was $ 0.62 to $ 1.52, which was more than double the difference between the lowest price and the highest price (FAO Daily

Food Prices Monitor data). The consumer price of cooking bananas in 2019 is $0.19/ kg for the lowest price and $ 0.28/ kg for the highest price. It cannot be said that the price fluctuation is due to the COVID-19 impact (FAO data). The price difference between 2020 and 2019 is based on the statistical information of only plantains in the JICA report, while the FAO data shows edible banana and plantains.

Table 3.4.12 Impact on each VC stage on plantain

VC stage	2020		2021		Background and factors	Period
	Extent of impact	Impact	Extent of impact	Impact		
Input	Small	No large impact	Small	No large impact	Plantain is a perennial crop, and the input is small, so the impact is minimal.	From first half of 2020 to present
Production	Small	Production volume decreased, ICT utilization	Small	Production volume decreased, ICT utilization	Although affected by the spread of BXW, it has nothing to do with COVID-19. The number of users of smartphone application is increasing rapidly.	From first half of 2020 to present
Process	-	No large impact	-	No large impact	There are no noticeable reports.	From first half of 2020 to present
Distribution	Medium	Distribution volume decreased	Medium	Distribution volume decreased	Due to movement restrictions and market shrinkage, purchases from farmers have shrunk, and subsequent logistics have also shrunk. However, the share for self-consumption is high, and the impact is not so large.	First half of 2020 Second half of 2020
Sales	Medium	Sales volume decreased	Medium	Sales volume decreased	Due to movement restrictions and market shrinkage, there is a shortage of buyers, and the number of customers is decreasing. However, the share for self-consumption is high, and the impact is not so large.	First half of 2020 Second half of 2020
Consumption	Medium	Purchasing power increased	Small	No large impact	Purchasing decreased due to the difficulty of consumers accessing the market. In particular, the consumption remarkably decreases in July-August 2020.	From first half of 2020 to present

Note: Large: Large negative impact, Medium: Negative impact, Small: No impact or minor impact, -: Not applicable. The extent of impact was rated based on the results of the key informant survey, the questionnaire survey, and the results of the field survey.

Plantain farmer in Eastern Province. Sales price decreased in 2020, and income decreased.

The spouse of plantain farmer raises cow. Apply cow manure compost to the field

Retailer of plantain and potato (Kigali City). Handling volume reduced.

Photo 3.4.3 Supply chain of plantain in Rwanda

2) Change of VC Flow

Due to the COVID-19 pandemic, the VC flow of plantain changed as shown in Figure 3.4.38.

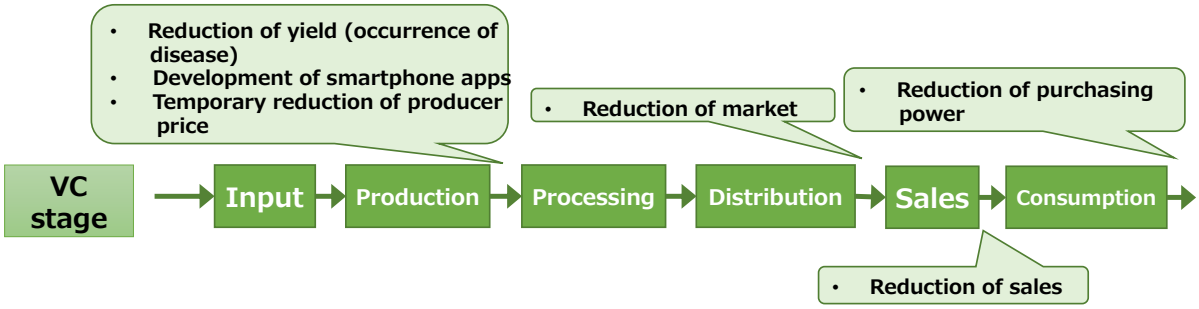


Figure 3.4.38 Flow of plantain VC changed due to the influence of COVID-19

(4) Tomato

1) Impacts on FVC of Respective Crop

The main impacts on the entire VC are as follows.

a. Decrease in input materials

20% of horticultural farmers have difficulty accessing seeds and seedlings and 18% have difficulty accessing fertilizer due to border closure and intercity movement restrictions during lockdown of first half season of 2020（Rapid Impact Assessment of COVID-19 on the Horticulture Value Chain & Business Continuity in Rwanda, 2020, Oxfam）. Key informant survey also reported that imported materials were not available in a timely manner. Local retailers reported that they were unable to sell their inputs to local farmers due to difficulty in accessing large urban agricultural material shops. Cooperative members often rely on cooperatives for access to input materials, technical services and financial services, and it has been reported that services have been disrupted. With COVID-19 as a trigger, organic farming methods that use natural fertilizers and pesticides and do not require access to input material shops are also attracting attention (The Resilience of Smallholder Farmers in Times of

Crisis, 2020, Organic without Boundaries). Many companies are also interested in purchasing organic produce (FAO Rwanda Newsletter, 2020).

b. Deterioration of farm profits

On the production side, there was a lack of services from extension workers such as lack of production techniques, pest management, post-harvest management, processing technology, and market access information. In addition, due to the loss of timely harvesting opportunities because of labor shortages, unstable financial services, and market shortages, production and sales decreased and farmers' profits deteriorated (key informant survey result). However, from the quantitative data, there was no significant difference in vegetable production between before and after COVID-19 (Table 3.4.13). Key informant survey result shows that some tomatoes were discarded due to the decline in purchasing power of buyers and consumers from May to August 2020. Therefore, it was inferred that the deterioration in profits of farmers was due to the decrease in sales volume rather than the decrease in production volume.

Table 3.4.13 Production, area and yield of vegetables by season

Season	2018			2019			2020			2021		
	A	B	C	A	B	C	A	B	C	A	B	C
Production amount (ton)	162,938	145,272	40,417	158,927	155,506	36,072	161,114	166,272	52,492	159,669	172,936	56,979
Harvested area (ha)	13,649	12,480	3,017	14,801	14,972	3,744	18,246	15,945	5,912	20,181	15,574	5,061
Among them, small scale farmers	n/d	n/d	n/d	n/d	n/d	n/d	18,149	15,843	n/d	20,051	15,364	n/d
Yield (ton/ha)	11.9	11.6	13.4	10.7	10.4	9.6	8.8	10.4	8.9	7.9	11.1	11.3

Source: UPGRADED SEASONAL AGRICULTURAL 2020 ANNUAL REPORT, National Statistics Institute of Rwanda

c. Stagnation of processing industry

At the processing stage, access to imported and domestic raw materials was restricted, and there was a shortage of processed raw materials, leading to a decline in profits. In addition, commitment of social distance on the processing line of the factory caused a decrease in productivity. 45% of horticultural crop processors experienced a shortage of packaging materials (Oxfam,2020).

d. Decrease in distribution volume and sales volume

Border closure and restrictions on intercity movement have blocked buyers, wholesalers, aggregators, market players, etc. to access farmers and lost access means to the market. In particular, logistics stagnated domestically and within the region from May to August 2020. Furthermore, due to the shrinking domestic market, the closure of the DRC market, which is the center of exports within the region, and the decline in purchasing power of hotels, restaurants, schools, and general consumers, which are the supply destinations of tomatoes, the sales destinations have also shrunk (Key informant survey results).

Before the pandemic occurred, post-harvest loss due to undeveloped cold chain had been an issue, but it is probable that due to the stagnation of distribution, large post-harvest loss occurred for fresh

horticultural crops. As for exports, demand has also fallen. 69% of horticultural crop distributors reported a decline in sales due to distribution restrictions and restricted access to the market by consumers (Oxfam, 2020). In addition, in regional distribution, diplomatic tensions between countries in eastern Africa existed before the outbreak of COVID-19, affecting border trade. However, outbreak of pandemic and measures such as border closures and strict control of freight trucks at borders had worsen the situation. Informal traders have almost disappeared, and distribution within the region has further decreased (key informant survey result).

d. Changes in price

It is reported that the wholesale price of tomato has dropped from RwF600 / kg before COVID-19 to RwF300 / kg after COVID-19 pandemic, and the income of farmers has decreased. The consumer price was $ 0.88 per kg on February 14, 2020, $ 0.95 on April 21, 2021, and the fluctuation range during the period was $ 0.41 to $ 1.21, which has a three times difference between the lowest price and the highest price. (FAO data). From the results of the key informant survey, there is information that the consumer price of tomato jumped temporarily immediately after the start of COVID-19 infection, and price information flowed among farmers so that farmers expected to make a profit and switched to tomato cultivation. However, due to a shortage of buyers and sales destination, many farmers have disposed of it, and it is said that the number of tomato farmers has decreased in the second half of 2020. Producer prices have fallen, but consumer prices have risen (National Institute of Statistics of Rwanda). Due to the influence of COVID-19, it is speculated that it may have cost money at the distribution stage, such as stagnation of transportation, storage of crops, and disposal in the process.

Table 3.4.14 Impact on each VC stage on tomato

VC stage	2020		2021		Background and factors	Period
	Extent of impact	Impact	Extent of impact	Impact		
Input	Large	Shortage of input	Medium	Shortage of input	Due to movement restrictions, the input companies could not obtain imported good quality seeds, seedlings, and fertilizers. Especially lack of nitrogen fertilizer. The government provided a travel pass to the input company, and some of them were resolved. However, due to movement restrictions, farmers could not access the input materials. Although the impact of 2021 was smaller than that of 2020, the impact of the lack of imported materials continued.	first half of 2020
Production	Large	Producers increased, producer profit decreased	Medium	Producer profit decreased	Decrease in workers due to movement restrictions. As the price of tomato rose, farmers who thought they would make a profit switched to tomato cultivation. For both 2020 and 2021, producer profit decreased due to a decrease in sales volume.	first half of 2020
Proces	Large	Processing	Small	No large	Many processed raw materials depend	first half

s		industry stagnated		impact	on imported tomatoes, but the number of processed raw materials has decreased due to restrictions on imports. It recovered in 2021.	of 2020
Distribution	Large	Distribution volume decreased	Medium	Distribution volume decreased	Due to movement restrictions and market shrinkage, purchases from farmers have shrunk, and subsequent logistics have also shrunk. Issued a travel pass to a vegetable distributor and partially resolved it. Dispose of surplus tomatoes. Distribution volume in 2021 recovered due to the reopening of restaurants and schools.	first half of 2020
Sales	Large	Sales volume decreased	Medium	Sales volume decreased	Due to border closure, overseas buyers could not enter the country, schools were closed, and events such as weddings were postponed, resulting in a decrease in sales destinations. As an alternative, E-marketing has developed. Remittance via mobile phones has developed. Sales volume in 2021 recovered due to the reopening of restaurants and schools.	first half of 2020
Consumption	Large	Consumption increased	Large	Consumption increased	Purchasing decreased due to the difficulty of consumers accessing the market. The consumption tendency of staple food crops is higher than that of horticultural crops in 2021 as well.	From first half of 2020 to present

Note: Large: Large negative impact, Medium: Negative impact, Small: No impact or minor impact, -: Not applicable. The extent of impact was rated based on the results of the key informant survey, the questionnaire survey, and the results of the field survey.

Tomato farmer in Eastern Province. Sales price increased in 2020 but decreased in 2021 because of intensified competition.

A major processor. Manufacture of tomato ketchup. Requested technical support for organic certification.

The product of the processor. Ketchup and chili sauce.

Photo 3.4.4 Supply chain of tomato in Rwanda

2) Change of VC Flow

Due to the COVID-19 pandemic, the VC flow of tomato changed as shown in Figure 3.4.39.

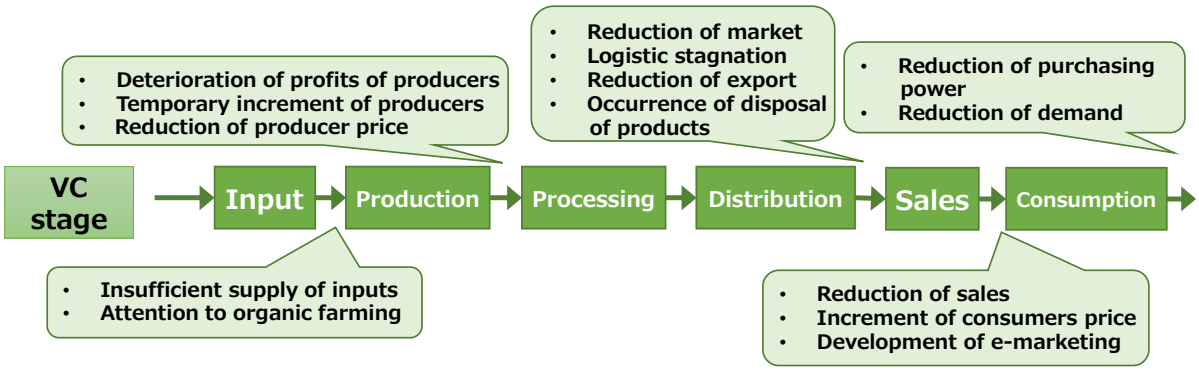


Figure 3.4.39 Flow of tomato VC changed due to the influence of COVID-19

(5) Onion

1) Impacts on FVC of Respective Crop

The main impacts on the entire VC are as follows.

a. Decrease in input materials

Onions were affected by COVID-19, which was similar to impacts on tomato. Farmers had trouble in accessing seeds, agrochemicals, and fertilizers due to border closures and intercity movement restrictions during the first half of 2020 lockdown. It is reported that this is a result of insufficient imports of imported materials, physical inaccessibility of farmers to agricultural material stores, and reduced purchasing power of farmers.

b. Decrease in production and quality

From the results of the key informant survey, from March to June 2020 and from January to February 2021, workers could not access the field due to lockdown and movement restrictions, and due to the shortage of workers, it was impossible to produce in a timely manner. In addition, it is reported that the lack of services provided by extension workers and the instability of financial services resulted in a decrease in yield and quality in Season B of 2020. However, from the quantitative data, there was no significant difference in vegetable production between before and after COVID-19 (Table 3.4.13).

c. Decrease in distribution volume and sales volume

In terms of distribution, domestic, intra-regional, and extra-regional logistics have stagnated due to border closures and restrictions on intercity movement. Logistics restrictions on agricultural products were excluded, but the number of truck crew was limited, which prevented distributors and buyers from accessing farm fields, especially remote fields, resulting in confusion from May to August 2020. After that, the government issued travel passes to distributors, but due to the closure of aggregation points, border closures, DRC market closures, and shrinking domestic markets, distributors were unable to find a sales destination (key informant survey result). If the cold chain is maintained, onions can be stored well, so measures such as storing them in a collection site were taken, but in Rwanda, even before the pandemic occurred, post-harvest loss due to undeveloped cold chains had been an issue. In the eastern province, due to high rainfall in 2020, the water content of onions was higher than usual, and the storage

period was shortened. There are reports that onions were corrupted and discarded because it could not be sold in the shrunk market due to the impact of COVID-19 (KT Press, 2021).

Although onions are mainly distributed within the region, but they are also distributed to Europe, and it can be said that they were greatly affected by COVID-19. The Rwanda's horticultural crop distribution outside the region was relatively small and was not exported by cargo airplane but was loaded into the cargo space of passenger aircraft and exported. As a result, access to horticultural crops outside the region was cut off due to the suspension of passenger flights under the lockdown declaration for the first half of 2020. As a result, the suspension of passenger flights under the lockdown declaration for the first season of 2020 cut off the means for exporting horticultural crops outside the region. It is estimated that this has had an impact on the livelihoods of 3,600 smallholders of horticultural crop sector (IDH News article, 2020).

Since April 2020, with the support of IDH (The Sustainable Trade Initiative) and NAEB (National Agricultural Export Development Board), the operation of cargo airplane by RwandAir for fresh produce has started, and the number of fresh produces discarded has been decreasing. Although the number of cargo airplane was small and the airway freight rose, the price of the final product did not rise, and it was reported that there were cases that exporters of horticultural crops could not expect sales and gave up exporting.

In regional distribution, diplomatic tensions between countries in eastern Africa existed before the outbreak of COVID-19, affecting border trade. However, outbreak of pandemic and measures such as border closures and strict control of freight trucks at borders had worsen the situation. Thus, distribution within the region has further decreased.

d. Decrease in consumption volume

Due to the closure of hotels, restaurants, schools, etc., which were large-scale consumption destinations of onions, and the decrease in income of general consumers, the consumption of onions decreased sharply from July to October 2020 and from January to June 2021 (key informal survey results).

e. Changes in price

The consumer price per kg of onion is $ 0.72 on February 14, 2020, and $ 0.88 on April 21, 2021.The fluctuation range during the period was $ 0.51 to $1.01, and there was a double difference between the lowest price and the highest price (FAO data). From the key informant survey results, immediately after the start of COVID-19 infection, the consumer price of onions jumped temporarily, so in anticipation of profits for farmers, they switched to onion cultivation and people who were doing other businesses turned into farmers. However, due to a shortage of buyers and sales destinations, many farmers have disposed the harvests, and it is said that the number of onion farmers has decreased in the second half of 2020, which is a phenomenon similar to that of tomatoes.

Table 3.4.15 Impact on each VC stage on onion

VC stage	2020		2021		Background and factors	Period
	Extent of impact	Impact	Extent of impact	Impact		
Input	Large	Shortage of input	Medium	Shortage of input	Due to movement restrictions, the input companies could not obtain imported good quality seeds, seedlings, and fertilizers. Especially lack of nitrogen fertilizer. The government provided a travel pass to the input company, and some of them were resolved. However, due to movement restrictions, farmers could not access the input materials. Although the impact of 2021 was smaller than that of 2020, the impact of the lack of imported materials continued.	first half of 2020
Production	Large	Production volume and quality decreased	Small	No large impact	Decrease in workers due to movement restrictions. In the eastern province, the water content of onions increased because of heavy rain. No negative impacts of weather have been reported in 2021.	first half of 2020
Process	-	No impact	-	No impact	There are almost no onion processors in Rwanda.	
Distribution	Large	Distribution volume decreased	Medium	Distribution volume decreased	Due to movement restrictions and market shrinkage, purchases from farmers have shrunk, and subsequent logistics have also shrunk. Issued a travel pass to a vegetable distributor and partially resolved it. Exports to outside the region have dropped sharply. In 2021, both regional distribution and exports outside the region recovered in some extent.	first half of 2020
Sales	Large	Sales volume decreased	Medium	Sales volume decreased	Due to border closure, overseas buyers could not enter the country, schools were closed, and events such as weddings were postponed, resulting in a decrease in sales destinations. As an alternative, E-marketing has developed. Remittance via mobile phones has developed. Sales volume in 2021 recovered due to the reopening of restaurants and schools.	first half of 2020
Consumption	Large	Consumption decreased	Large	Consumption decreased	Purchasing decreased due to the difficulty of consumers accessing the market. Consumption had dropped sharply until the first half of 2021 but recovered in the second half.	From first half of 2020 to present

Note: Large: Large negative impact, Medium: Negative impact, Small: No impact or minor impact, -: Not applicable. The extent of impact was rated based on the results of the key informant survey, the questionnaire survey, and the results of the field survey.

Tanzanian onion handled by wholesalers (Kigali City)

Wholesaler of Nyabugogo Market, Nyarugenge District. Difficult to raise funds (Kigali City).

Photo 3.4.5 Supply chain of onion in Rwanda

2) Change of VC Flow

Due to the COVID-19 pandemic, the VC flow of onion changed as shown in Table 3.4.15Figure 3.4..

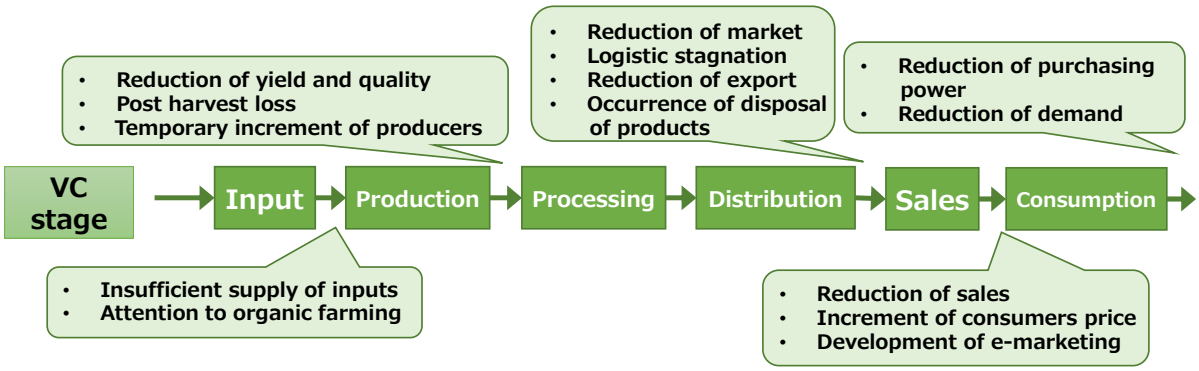


Figure 3.4.40 Flow of onion VC changed due to the influence of COVID-19

(6) Potato

1) Impacts on FVC of Respective Crop

The main impacts on the entire VC are as follows.

a. Insufficient seed potatoes

2% of potato seeds are supplied with guaranteed seeds by a formal seed trading system, and 98% are self-seeded by an informal seed trading system (or traditional seed trading system). Also, homemade compost is often used in potato field. Thus, there was no significant impact of COVID-19 other than restriction of procurement for chemical fertilizers and pesticides.

Potato farmers using guaranteed seeds to produce good quality potatoes and popular with buyers was severely damaged. These farmers' seed potatoes are obtained through the potato seed trading system. In this system, RAB usually make the basic seed potatoes in the laboratory and supply them to a farm-led organization consisting of seed potato producers and cooperatives called Seed Potato Fund (461 farm households, consisting of 2,619 people from 45 unions). They breed healthy, disease-free, high-quality

seed potatoes and provide a stable supply to farmers. Potato farmers who want guaranteed seeds purchase seed potatoes from the relevant organizations, related companies, or seed potato producers who have been instructed by the relevant organizations (AGRITERRA Homepage). Since it is more expensive than unguaranteed seeds, the purchasing group is considered to be middle-class or higher farmers. However, due to restrictions on intercity movement during the lockdown in the first half of 2020, RAB lacked laboratory equipment, and the Seed Potato Fund was unable to produce better quality seed potatoes than usual. Thus, it prevented farmers from accessing high-quality seed potatoes, which had a major impact on their input, leading to obtain poor-quality seed potatoes.

b. Decrease of production volume

According to the key informant survey, meetings and technical trainings are usually held with extension workers and RAB staff before planting begins for the purpose of improving potato production. From July to August 2020, technical training was canceled or postponed, resulting in a drop in production and worsening farmers' profits. After that, a travel pass was issued to the RAB staff, and follow-up training was conducted during the cultivation period. Quantitative data showed that potato production in 2020 season B and C was lower than before COVID-19. In Season A of 2021, it was confirmed that the production volume returned to the usual level (Table 3.4.16).

With the decrease in production, Musanze is developing new production areas from the viewpoint of food security (key informant survey result).

Table 3.4.16 Production, area and yield of potato by season

Season	2018			2019			2020			2021		
	A	B	C	A	B	C	A	B	C	A	B	C
Production amount (ton)	439,512	396,064	80,487	468,931	422,266	82,211	427,471	352,441	78,609	463,562	393,371	81,348
Harvested area (ha)	50,836	60,644	7,740	49,728	49,244	8,618	51,516	43,950	9,208	52,196	51,595	9,667
Among them, small scale farmers	n/d	n/d	n/d	n/d	n/d	n/d	51,364	43,660	n/d	52,081	n/d	n/d
Yield (ton/ha)	8.6	6.5	10.4	9.4	8.6	9.5	8.3	8.0	8.7	8.9	7.6	8.4

Source: UPGRADED SEASONAL AGRICULTURAL 2020 ANNUAL REPORT, National Statistics Institute of Rwanda

c. Stagnation of processing industry

Processors were unable to procure processing machines and equipment from overseas due to suspension of airflight and restrictions on truck movement, and processing capacity declined, especially from May to June 2020. After that, it became possible to transport processing machines and equipment by issuing a travel pass to the input company (key informant survey result).

d. Decrease of distribution volume and sales volume

From March to April 2020, the potato sales market shrank. Logistics were unable to transport potatoes from farmers to the market due to movement restrictions. Due to the shortage of sales market, farmers had a lot of surplus products and stored and planted them as seed potatoes for the next season. Some

logistics companies were issued travel passes during lockdown and could buy harvests from farmers, but the effect was limited.

In addition, potatoes are mainly distributed within the region, but like onions, they are also distributed to Europe. Due to the suspension of passenger flights under the lockdown declaration for the first half of 2020, exporting horticultural crops outside the region was cut off. In regional distribution, diplomatic tensions between countries in eastern Africa existed before the outbreak of COVID-19, affecting border trade. However, outbreak of pandemic and measures such as border closures and strict control of freight trucks at borders had worsen the situation. Thus, distribution within the region has further decreased.

e. Changes in price

Producer prices fell sharply in the first half of 2020 as domestic, within region and outside region logistics stagnated and demand declined because of limitation of hotel and restaurant customers, declining of consumer purchasing power, and buyer shortages. It is said that the situation has not improved in the first half of 2021. According to the key informant survey, the producer price per kg of potatoes is $ 0.15-0.20. While the consumer price is $ 0.33 on February 14, 2020, and $ 0.33 on April 21, 2021 (variation range from $ 0.2 to $ 0.4 during the period), and both producer and consumer prices remained low (FAO data).

Table 3.4.17 Impact on each VC stage on potato

VC stage	2020		2021		Background and factors	Period
	Extent of impact	Impact	Extent of impact	Impact		
Input	Large	Shortage of seed potato	Medium	Shortage of input	Movement restrictions have restricted access to good quality seed potato producers to distribute seed potatoes to farmers. The government provided a travel pass to the input company, and some of them were resolved. However, due to movement restrictions, farmers could not access input materials. Although the impact of 2021 was smaller than that of 2020, the impact of the lack of imported materials continued.	First half of 2020
Production	Small	Production volume decreased, new production area developed	Small	New production area developed	Farmers using guaranteed seeds had restricted access to seed potatoes due to movement restrictions, affecting production. From the viewpoint of food security, production area of Musanze was newly developed after COVID-19.	First half of 2020
Process	Large	Processing industry stagnated	Medium	Processing industry stagnated	Due to the suspension of air freight, overseas processors could not procure raw materials. Domestic processors could not procure overseas processing machines and equipment for the same reason. In 2021, the procurement of	First half of 2020

					equipment has recovered, and the processing volume is returning to the original level.	
Distribution	Large	Distribution volume decreased	Medium	Distribution volume decreased	Due to movement restrictions and market shrinkage, buyers' purchases from farmers have shrunk, and farmers store surplus production for seed potatoes. Logistics has also shrunk. Issuing a travel pass to a vegetable distributor has partially resolved the distribution within the region. Exports outside the region have dropped sharply. The negative effects of exports outside the region continued in 2021.	first half of 2020
Sales	Large	Sales volume decreased	Medium	Sales volume decreased	Producer prices have fallen sharply because of COVID-19 and have not recovered. Sales also decreased due to the stagnation of distribution. E-marketing and remittance via mobile phones have developed. It recovered in 2021 to some extent.	From first half of 2020 to present
Consumption	Large	Consumption decreased	Large	Consumption decreased	Purchasing decreased due to the difficulty of consumers accessing the market. Potato makes less full by weight than maize, and demand for potato did not recover in 2021.	From first half of 2020 to present

Note: Large: Large negative impact, Medium: Negative impact, Small: No impact or minor impact, -: Not applicable. The extent of impact was rated based on the results of the key informant survey, the questionnaire survey, and the results of the field survey.

The only potato processor in Rwanda. It is difficult to raise funds because it cannot be exported.

Processors buy potatoes from 500 small-scale farmers and sell them as potato chips.

Photo 3.4.6 Supply chain of potato in Rwanda

2) Change of VC Flow

Due to the COVID-19 pandemic, the VC flow of potato changed as shown in Figure 3.4.41Figure 3.4.37.

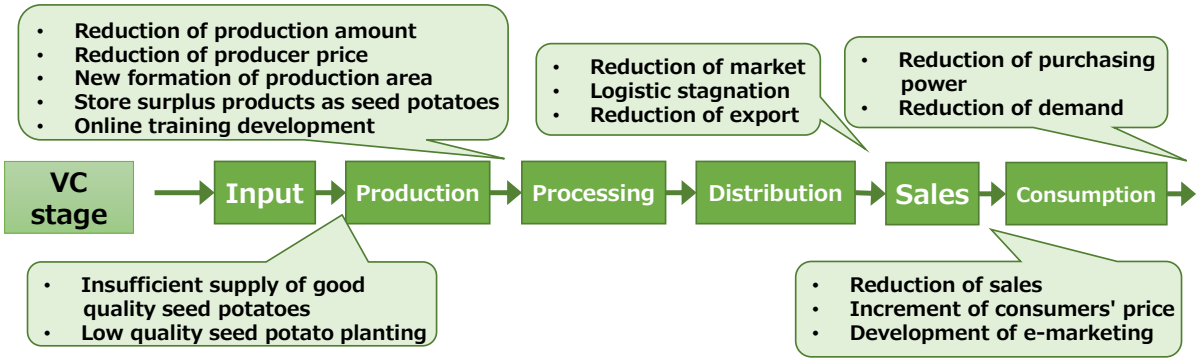


Figure 3.4.41 Flow of potato VC changed due to the influence of COVID-19

(7) Coffee

1) Impacts on FVC of Respective Crop

The main impacts on the entire VC are as follows.

a. Established resilient supply chain

The global coffee industry is less affected by the COVID-19 pandemic, and as of October 2020, it has been reported that global coffee exports and consumption have changed by -4.9% and consumption by -0.9% compared to before the COVID-19 pandemic（Rwandan Coffee exports during COVID-19, 2021, IGC).

A formal route of supply chain has also been established for coffee in Rwanda, with exports declining 33.5% between January-November 2019 and January-November 2020. However, due to the rise in the export unit price of Rwandan coffee, the decrease in export value was only 18.4% comparing in the same period above. It is reported that the impact was particularly small in traditional companies and multinational companies. Meanwhile, the export value of non-traditional crops such as horticultural crops decreased by 56.3% during the same period (2021, IGC). Table 3.4.18 shows the production volume and export volume in the coffee marketing year, and the production volume has been flat or slightly increased, while the export volume has decreased significantly.

More than half of the people involved in the coffee industry received support such as postponement of interest payment from the government, tariff exemption, travel permission for mandatory workers, extension of corporate tax payment deadline, subsidized loan, etc. It has been reported that impacts of COVID-19 were minimized (IGC 2021, Rwandan coffee exports during COVID-19)

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Table 3.4.18 Annual[7] production and export of coffee

Season	2017/2018	2018/2019	2019/2020	2020/2021
Production volume (60kg bag)	293,000	372,000	353,000	380,000
Export volume (60kg bag)	367,383	398,667	363,877	289,106

Source: Trade Statistics Tables, International Coffee Organization. 2017/2018 and 2018/2019 export volumes are FAOSTAT data for January-December 2018 and January-December 2019. 2019/2020 and 2020/2021 Export volumes are ICO data from August 20th to July 21st of the following year. Therefore, there are some years when the export volume is higher than the production volume.

b. Possibility of decrease of yield

Coffee, a perennial crop is fertilized immediately after the harvest season, and in Rwanda, it is usually done from September to November. NAEB and CEPAR urged the government to order fertilizer early and issue a travel pass to fertilizer company early because they concerned about delayed fertilizer application from September to November 2020, Thus, there was almost no effect.

Additionally, coffee growers are usually well-supported by the government and NAEB bears part of the cost of the input. On the contrary, the impact of COVID-19 has had the negative effect of reducing the government budget for the agricultural sector and delaying the arrival of coffee production subsidies. Nevertheless, it is reported that in the second half of 2020 (season A), subsidies were given, and the production system returned to normal. However, from the quantitative data, the production volume has been constant since 2018/2019 (Table 3.4.18).

c. Decrease of sales volume

Every year, exporters travel abroad for market transactions, but the number of trips has decreased significantly due to the reduction of international flights since March 2020. Meetings and price negotiations are held online with buyers, and coffee samples are now delivered by international delivery such as DHL. This had a positive effect on exporters, as it reduced market costs.

In addition, many companies experienced higher international freight rates due to lockdown in each country. It was affected by the increase in operating costs due to the increase in the detention time of goods at the border and Mombasa port. Under such circumstances, with COVID-19 as an opportunity, investors are also expanding into e-commerce sales transactions such as Alibaba.com.

Table 3.4.19 Impact on each VC stage on coffee

VC stage	2020		2021		Background and factors	Period
	Extent of impact	Impact	Extent of impact	Impact		
Input	Large	Possibility of decrease of yield	Small	No large impact	The funds originally allocated for coffee production flowed to other sectors, delaying the arrival of input materials such as fertilizers. Recovered in the	First half of 2020

[7] The Marketing Year of coffee is from October to September of the following year (International Coffee Organization).

					second half of 2020 (A season).	
Production	Small	No large impact	Small	No large impact	Experienced shortage of workers due to movement restrictions.	First half of 2020
Process	Small	No large impact	Small	No large impact	Experienced shortage of workers and delayed arrival of necessary materials and equipment due to movement restrictions and logistics restrictions.	First half of 2020
Distribution	Small	No large impact	Small	No large impact	Operation costs increased due to stagnant logistics at export transit points. The impact is minimal as the supply chain is well established and there are no informal transactions originally.	First half of 2020
Sales	Medium	Sales volume decreased	Small	Sales volume decreased	Demand in overseas markets declined in the first half of 2020, but demand may decline outside of the impact of COVID-19. For example, during the period when many products from Brazil, Peru and Colombia are distributed, the demand of Rwanda coffee will decrease. Therefore, the decline in demand in the first half of 2020 is nothing special. In the second half of 2020, the export volume and value recovered as usual. E-commerce has developed.	From first half of 2020 to present
Consumption	Small	No impact	Small	No impact	Domestic consumption is about 5% of total production, so there is little impact on Rwandans.	From first half of 2020 to present

Note: Large: Large negative impact, Medium: Negative impact, Small: No impact or minor impact, -: Not applicable. The extent of impact was rated based on the results of the key informant survey, the questionnaire survey, and the results of the field survey.

2) Change of VC Flow

Due to the COVID-19 pandemic, the VC flow of coffee changed as shown in Figure 3.4.42Figure 3.4.41Figure 3.4.37.

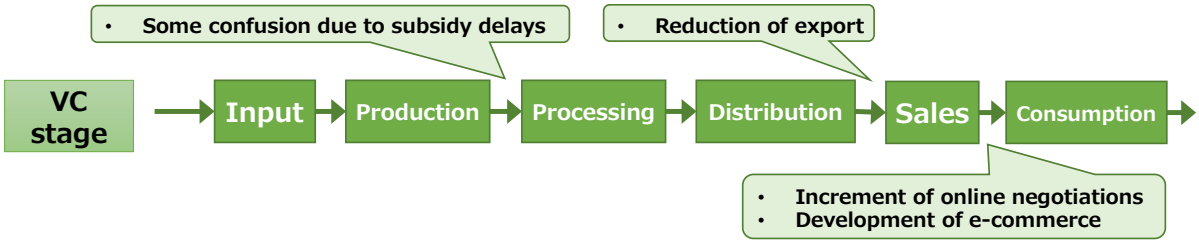


Figure 3.4.42 Flow of coffee VC changed due to the influence of COVID-19

3.4.4 Impacts on each VC Stage

(1) Overview of Influence on FVC

The impact on whole FVC is as follows (Table 3.4.20).

The VC stage, which had only a short-term impact, was input, production, and processing. In the first half of 2020, there were negative impacts such as decrease in supply and a decrease in production

volume and processing volume. However, there has been no major confusion since the latter half of 2020, when the supply of agricultural materials, processing machinery and equipment was restored and when the movement restrictions of agricultural personnel were lifted. Rather, the positive impact of COVID-19 continues currently, including the formation of new production areas (potatoes), the development of online training for farmers by KOICA and private sectors in the Netherlands (Delphy, MoneyPhone) (potatoes, etc.), the development of online ToT by Dutch development partners and international NPOs (CABI), the use of smartphone apps (all crops), online negotiations (coffee), and attention to organic farming (horticultural crops), etc. However, the weak position of producers, which has continued since before COVID-19, remains unchanged. Producers do not get the right price, and producer prices remain low relative to production costs.

On the other hand, the distribution, sales, and consumption stage has been affected for a long time, and some of them are still negatively affected. Although market contraction and assembly restrictions have been eased since 2021, the effects of the decrease in distribution volume and the generation of waste of agricultural products have not recovered before the outbreak of COVID-19. The background of the impact of the distribution stage is that the border with Uganda (Gatuna border) has been closed due to diplomatic tensions before the outbreak of COVID-19, and it is still closed. In addition, although restrictions on the distribution of agricultural products in other border trades have been eased by providing travel passes to traders, the procedures have become complicated, distribution costs have risen, and the distribution of illegal traders is still stagnant.

The background of the impact on the sales stage is the decrease in distribution volume and demand, and inevitably there is a decrease in sales volume. However, due to the impact of COVID-19, non-face-to-face activities developed. Price negotiations for coffee and some horticultural crops with foreign countries will be held at online conferences, and cost savings can be seen. In addition, sales of all crops by e-commerce have developed, and the positive impact is continuing.

The biggest background to the impact on the consumption stage is the decline in income of general consumers, which has the effect of increasing consumption of low-priced crops and decreasing consumption of high-priced horticultural crops, continuing in the latter half of 2021. In the first half of 2020, the number of large consumers decreased due to the closure of schools, hotels and restaurants, but as of October 2021, the number of large customers is recovering due to the reopening of schools and the reopening of business with conditions. As for rice, the sales volume of Tanzanian rice is large, and the opportunity to consume domestic rice is decreasing, and the consumption of domestic rice is still small as of 2021.

Table 3.4.20 Impact, background, and period of the whole FVC

VC	Impact	Background	Period
Input	Decrease of supply Delay of supply Difficult access of supply	Distribution obstruction Movement restrictions Increase prices of input materials Diversion of subsidies (coffee)	first half of 2020
Production	Yield reduction Decrease of production	Insufficient input Distribution obstruction	first half of 2020

	Delay of harvest Deterioration of quality Decrease in cultivation of small farmers (rice) Crop conversion (maize) Temporary conversion of crops (horticultural crops) Decrease of producer prices Occurrence of post-harvest loss (rice, maize, tomato, onion) Store surplus products as seed potatoes Decrease in income New production area formation (potato) Utilization of ICT (online training, smartphone app) Attention to organic farming (horticultural crops)	Movement restrictions Demand changes	
Processing	Decrease of processing volume (tomato, potato) Decrease of milled rice volume	Insufficient production Shortage of domestic raw materials Significant shortage of imported raw materials Insufficient procurement of processing machines and equipment Compliance with social distance	first half of 2020
Distribution	Decrease of distribution volume Increase of import (rice) Decrease of export (horticultural crops) Emergence of waste agricultural products (maize, horticultural crops)	Distribution obstruction Uganda border (Gatuna) closed Market shrinkage Meeting restrictions Rising logistics costs Illegal transaction stagnation	From first half of 2020 to first half of 2020
Sales	Decrease of sales volume Increase of selling prices E-commerce development Cost savings	Decrease of distribution volume Demand shrinkage Increase of online meetings	From first half of 2020 to first half of 2020
Consumption	Increase of consumption by general consumers (staple food crop) Decrease of consumption by general consumers (horticultural crops) Decrease of consumption of large customers Increase of consumption of imported products (rice) Decrease of domestic consumption (rice)	Income decline Movement restrictions Increase of general consumer demand (staple food crop) Decrease of general consumer demand (horticultural crops) Decrease of demand for large customers	From first half of 2020 to present

Source: Survey team

(2) Impacts on Input Stage and Underlying Factors

1) Overview

Of the 7 input dealers conducted the survey, 4 dealers import and sell input materials, 2 dealers purchase domestically and sell input, and 1 dealers manufacture fertilizer overseas, import and sell input materials including domestic fertilizers.

At the input stage, due to the background of obstruction of distribution, movement restrictions, and increasing prices of input materials, there were effects of a decrease in supply volume, supply delays,

and difficulty in accessing supply materials. The impact of procurement was mainly in the first half to the second half of 2020. After that, the government provided a travel pass to the input dealers, and the distribution of input materials has been restored. However, since the procurement price of input materials has not decreased, even if the input dealers procure input materials, the selling price must be raised, and the purchasing power of farmers remained low. As of October 2021, sales volume has not returned before the outbreak of COVID-19. Regarding coffee, there was an event that the coffee subsidy was diverted to another purpose, but it is reported that the subsidy was handed over from the latter half of 2020 and returned to the normal production system.

Input company YARA. Handles fertilizers for maize, rice, potatoes, coffee and vegetables (near Kigali city)

Seeds in the warehouse of the input company ETG (near Kigali city). Based in Kenya, it is distributed in 45 countries around the world.

Liquid fertilizer in the warehouse of the input company ETG (near Kigali city). Handles all agricultural input materials.

Photo 3.4.7 Input dealers in Rwanda

2) Change of sales

Among the seven dealers that conducted the survey, the impact on sales was different, and the sales volume of fertilizers, seeds, and agrochemicals was decreased for some dealers. On the contrary, some dealers answered that the sales volume increased or did not change (Figure 3.4.43). Fertilizers, seeds, and agrochemicals decreased the most in April to June 2020 due to movement restrictions because of border closures. The sales volume of imported seeds of maize dropped sharply in January to March 2021, and the sales volume of domestic seeds of maize increased at the same time. This is because the government's agricultural policy (15th National Leadership Retreat) announced in 2018 has decided to switch from imported seeds of maize to domestic seeds produced by a specific seed company in the next three years. The situation was different depending on the type of seed (VC survey). With this decision, the Government of Rwanda invested in 15 private seed companies to improve seed production and breeding capacity with the support of the Alliance for a Green Revolution in Africa (AGRA). In the example of RISCO, the seed production of maize and beans was increased from 12 tons to 100 tons/ha (AGRILINKS, Rwanda on the Path to Self-Sustainability with Improved Seed for Major Crops).

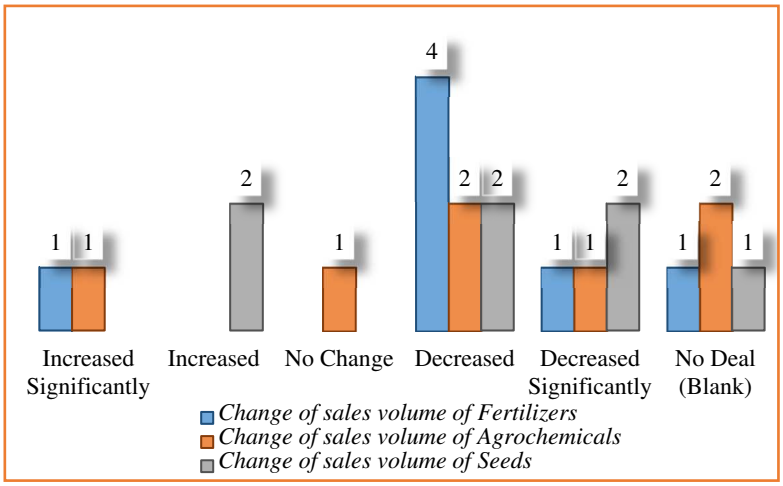


Figure 3.4.43 Changes of sales of input materials

Source: VC survey

It became clear that many dealers believe that the reason for the decrease in sales volume is due to distribution restrictions, increased prices, and the balance between supply and demand for seeds, agrochemicals, and fertilizers (Figure 3.4.44). Also, major foreign vendors are no longer interested in doing business in Africa, which originally has a small market share. Even if Rwandan dealer placed an order, the dealer had a problem that foreign vendor could not deliver it easily. There was also an opinion that the sales volume decreased because the international price of DAP (diammonium phosphate fertilizer) increased and the input dealers could not procure it without the support of the Rwandan government, so they refrained from procuring it.

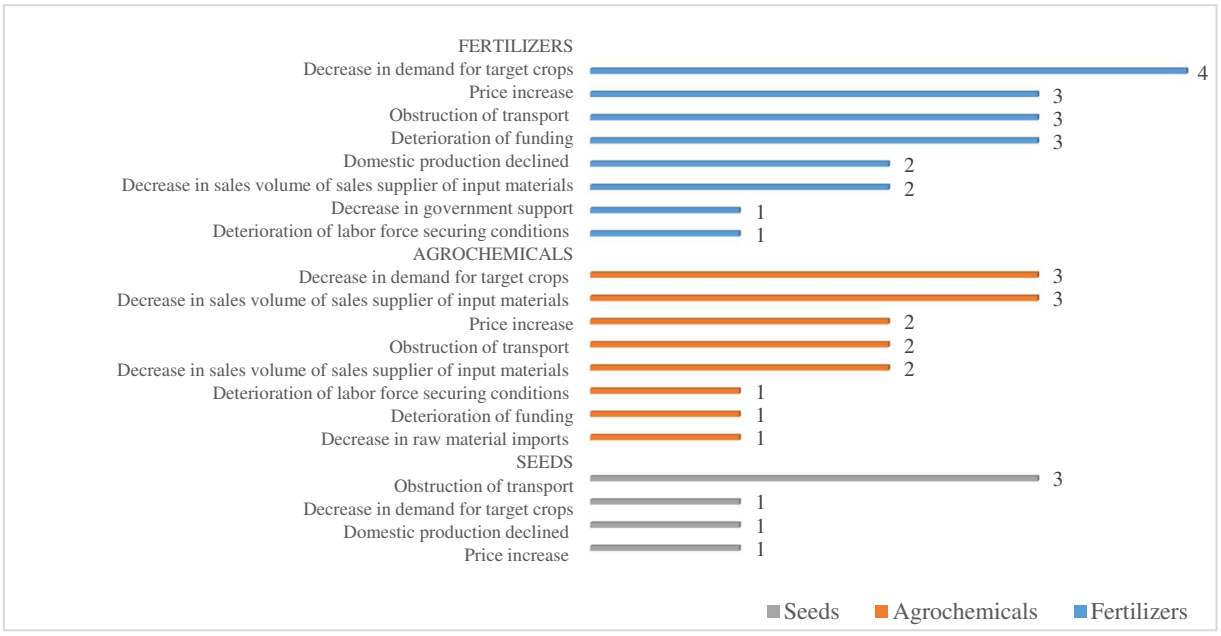


Figure 3.4.44 Factors behind the decrease in the sales volume of input materials

Source: VC survey

Many respondents answered that the change in the selling price of input materials increased in fertilizers, agrochemicals, and seeds (Figure 3.4.). However, the period of impact depends on the input materials, i.e., July to September 2020 and January to September 2021 for fertilizers, July to December 2020 and April to June 2021 for agrochemicals, April to September 2020 and July to September 2021 for seeds.

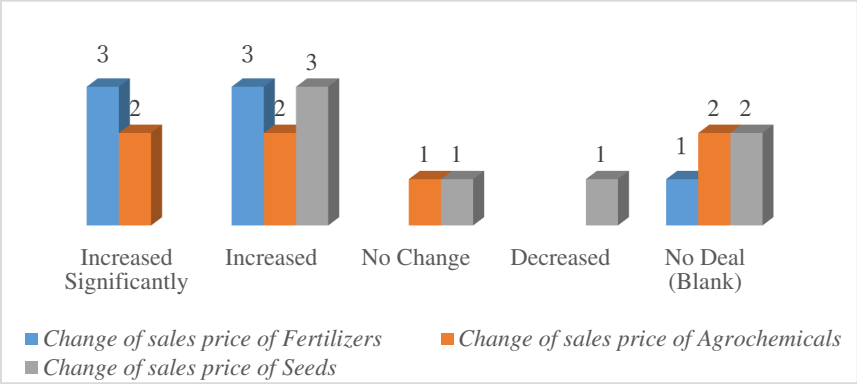


Figure 3.4.45 Change in sales price of input materials

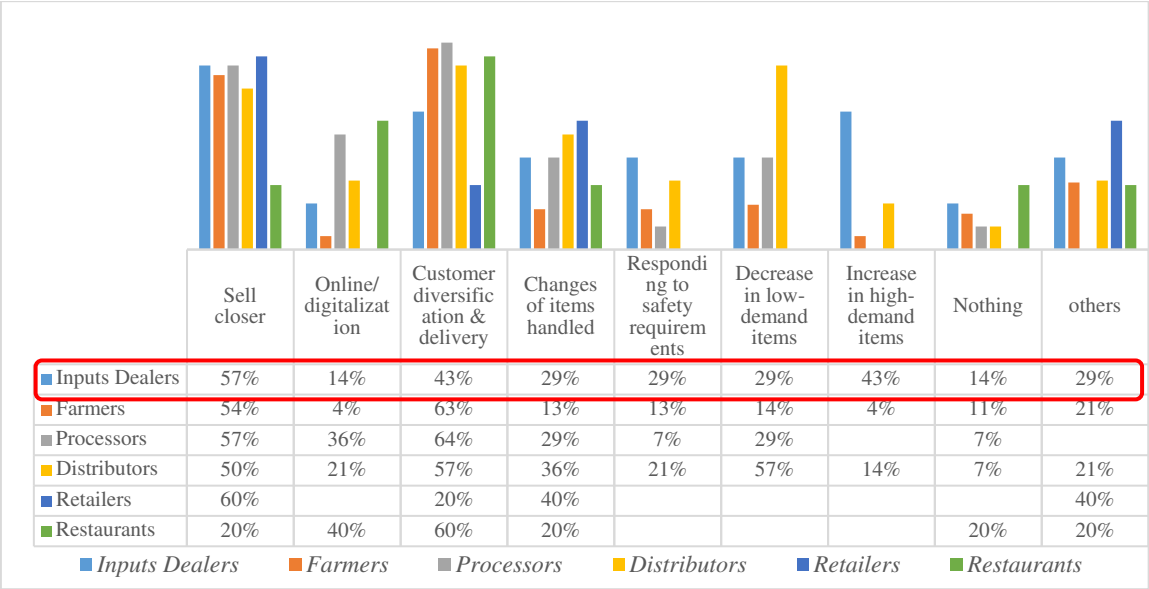
Source: VC survey

3) Change of procurement

The impact on procurement and the impact on sales are correlated. As shown in Figure 3.4.44, there were many opinions that the sales volume was small because the procurement volume decreased, and that the procurement and sales decreased due to distribution restrictions and high prices.

4) Measures taken against COVID-19

The response to COVID-19 in sales, procurement, and business is as follows. In terms of sales, more than half responded by selling at close locations, and nearly half responded by diversifying customers, responding to delivery, and increasing the number of high-demand input materials. In terms of procurement, nearly 90% responded to online / digitalization, and more than half responded by diversifying suppliers. In terms of business, all businesses took measures for infectious hygiene, and nearly half took measures to promote digitalization and temporary dismissal.



	Sell closer	Online/ digitalization	Customer diversification & delivery	Changes of items handled	Responding to safety requirements	Decrease in low-demand items	Increase in high-demand items	Nothing	others
Inputs Dealers	57%	14%	43%	29%	29%	29%	43%	14%	29%
Farmers	54%	4%	63%	13%	13%	14%	4%	11%	21%
Processors	57%	36%	64%	29%	7%	29%		7%	
Distributors	50%	21%	57%	36%	21%	57%	14%	7%	21%
Retailers	60%		20%	40%					40%
Restaurants	20%	40%	60%	20%				20%	20%

Inputs Dealers *Farmers* *Processors* *Distributors* *Retailers* *Restaurants*

Figure 3.4.46 Measures taken against COVID-19 in terms of sales for input dealers

Source: VC survey

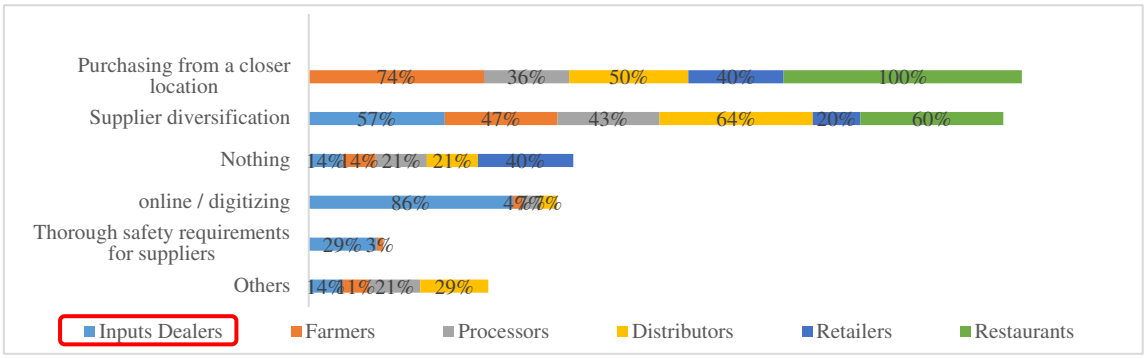
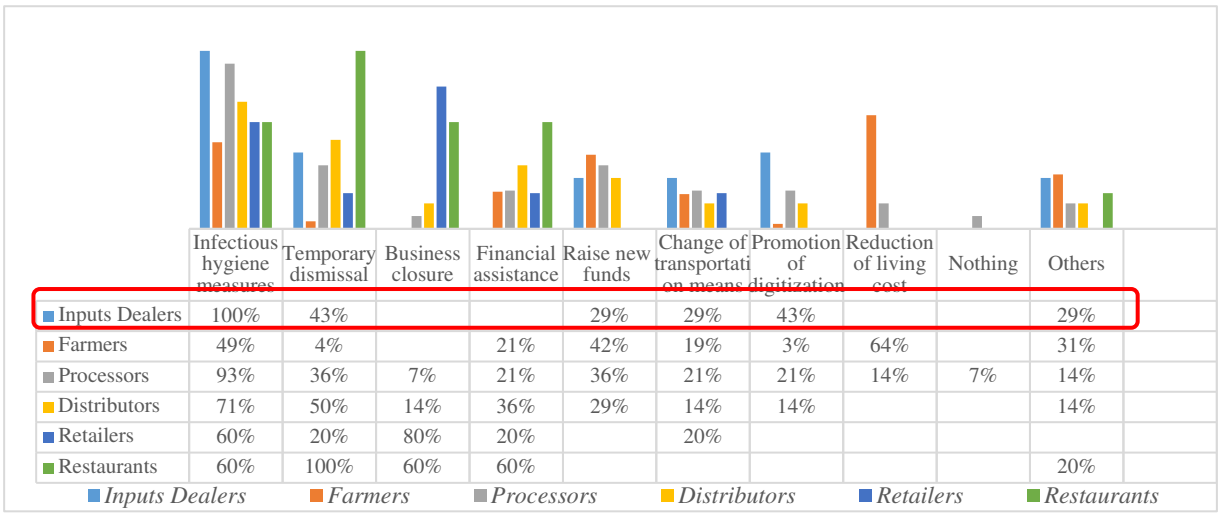


Figure 3.4.47 Measures taken against COVID-19 in terms of procurement for input dealers

Source: VC survey



	Infectious hygiene measures	Temporary dismissal	Business closure	Financial assistance	Raise new funds	Change of transportation means	Promotion of digitization	Reduction of living cost	Nothing	Others
Inputs Dealers	100%	43%			29%	29%	43%			29%
Farmers	49%	4%		21%	42%	19%	3%	64%		31%
Processors	93%	36%	7%	21%	36%	21%	21%	14%	7%	14%
Distributors	71%	50%	14%	36%	29%	14%	14%			14%
Retailers	60%	20%	80%	20%		20%				
Restaurants	60%	100%	60%	60%						20%

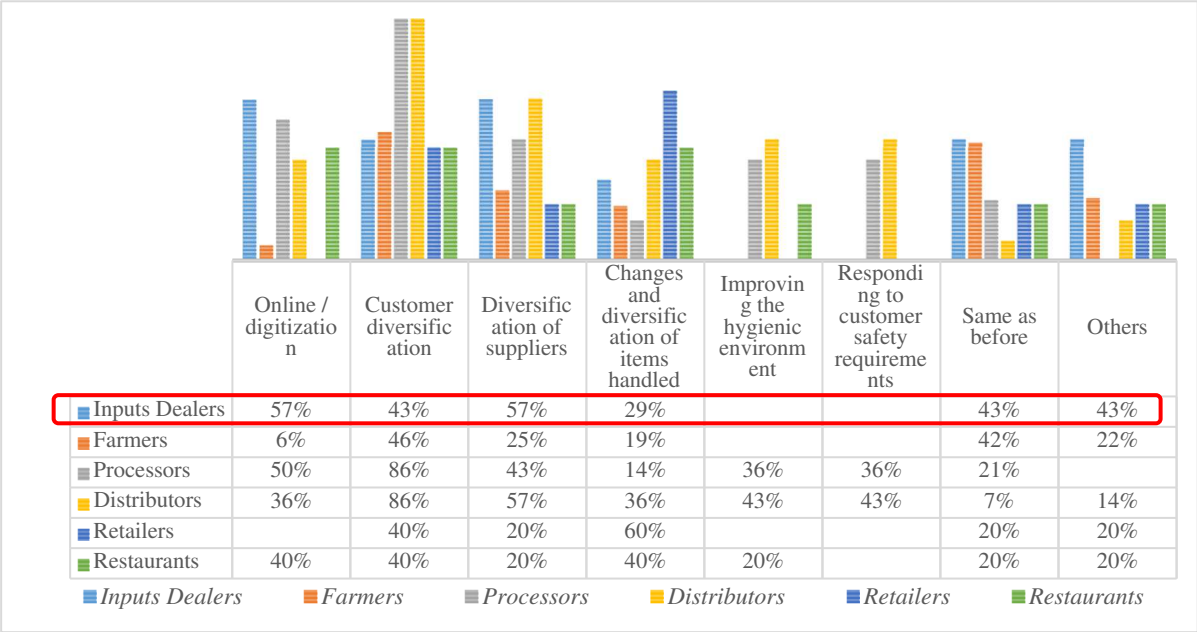
Inputs Dealers *Farmers* *Processors* *Distributors* *Retailers* *Restaurants*

Figure 3.4.48 Measures taken against COVID-19 in terms of business for input dealers

Source: VC survey

5) Change of business environment

Under the influence of COVID-19, about half of the input dealers have seen changes such as online / digitalization, diversification of suppliers, and diversification of customers, and responded that they would like to continue the measures. On the other hand, nearly half answered that they were the same as before.



	Online / digitization	Customer diversification	Diversification of suppliers	Changes and diversification of items handled	Improving the hygienic environment	Responding to customer safety requirements	Same as before	Others
Inputs Dealers	57%	43%	57%	29%			43%	43%
Farmers	6%	46%	25%	19%			42%	22%
Processors	50%	86%	43%	14%	36%	36%	21%	
Distributors	36%	86%	57%	36%	43%	43%	7%	14%
Retailers		40%	20%	60%			20%	20%
Restaurants	40%	40%	20%	40%	20%		20%	20%

Inputs Dealers *Farmers* *Processors* *Distributors* *Retailers* *Restaurants*

Figure 3.4.49 Changes of business environment

Source: VC survey

6) Support

About half of the input dealers did not receive government support. On the other hand, some dealers received infectious hygiene measures support, digitization support, mechanization support, tax exemption and subsidies for fertilizer purchase.

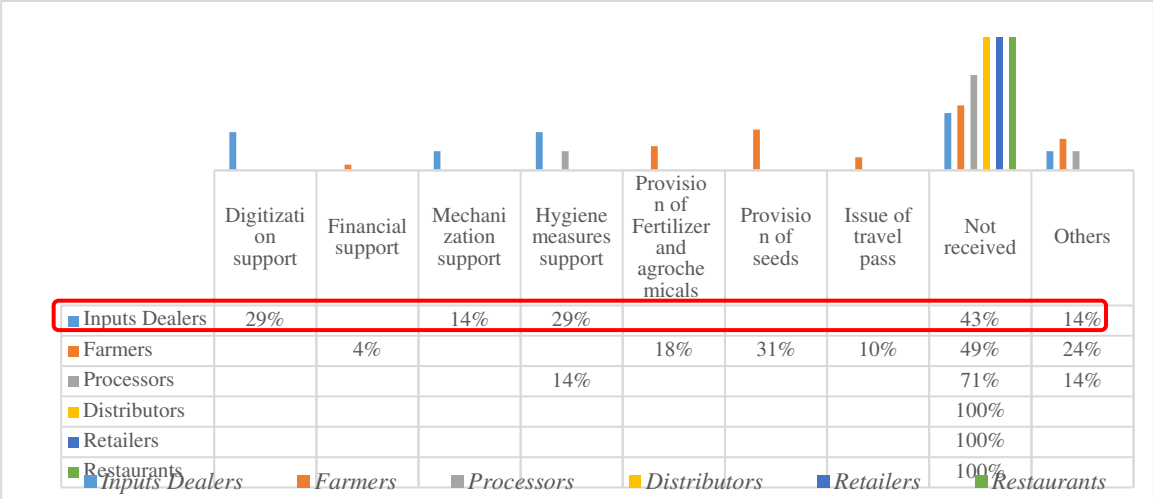


Figure 3.4.50 Government support

Source: VC survey

7) Challenges, Needs and Perspective

Issues related to the procurement of input materials were shortage of transportation means, high transportation costs, unstable supply of input materials, and shortage of input materials. Issues related to sales were missing sales markets / buyers, fierce price competition, reduced sales volumes, difficulty in obtaining imported input materials, increased transportation costs, and shortage of means of transportation.

The most common procurement needs were financial support, and more than half of the needs were digitization support and infectious hygiene measures support. Regarding specific financial support, an increase in government subsidies was mentioned. Also, there was an opinion that since the purchasing power of farmers is declining, farmers required to provide a guarantee fund, a mechanism to set the procurement price to a sustainable price.

The perspective for input dealers is generally positive, and they will continue their business by aiming for digitalization and diversification of customers and suppliers.

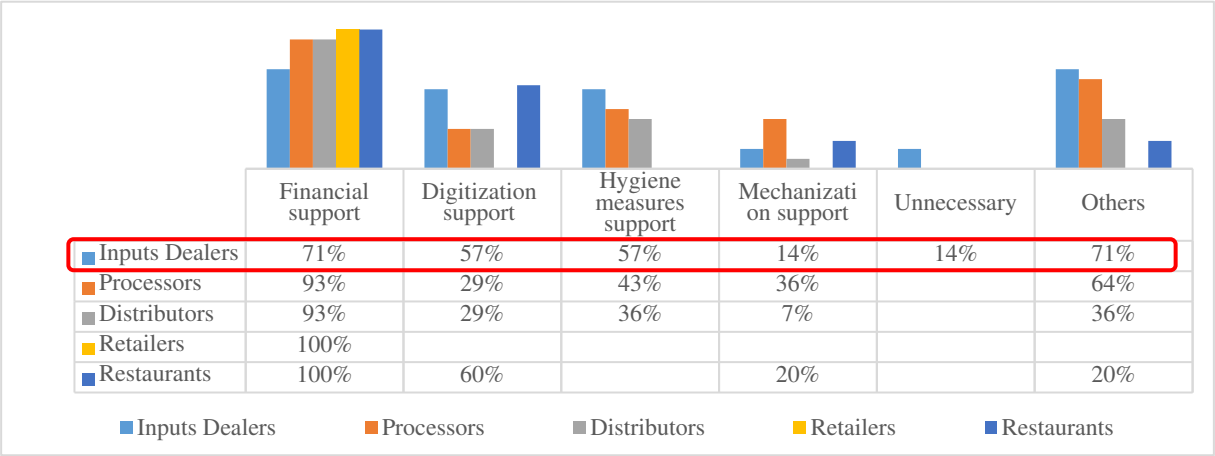


Figure 3.4.51 Needs by input dealers

Source: VC survey

(3) Impacts on Production Stage and Underlying Factors

1) Overview

A value chain survey to investigate the impact and background of COVID-19 on farmers was conducted on the following 72 farmers.

34 farmers in Eastern Province: maize, plantain, coffee, onion, tomato, rice

16 farmers Western Province: coffee, onion, potato, plantain

13 farmers in Northern Province: potato, onion, maize, coffee

4 farmers in Southern Province: rice, maize, tomato

5 farmers in Kigali City and urban area: rice, maize, onion, tomato

The basic information of 72 farmers is as follows (Fig. 3.4.52). 86% of the target farmers were households with five or more people, most of their main income source was agricultural activities. The source of income did not change before and after COVID-19.

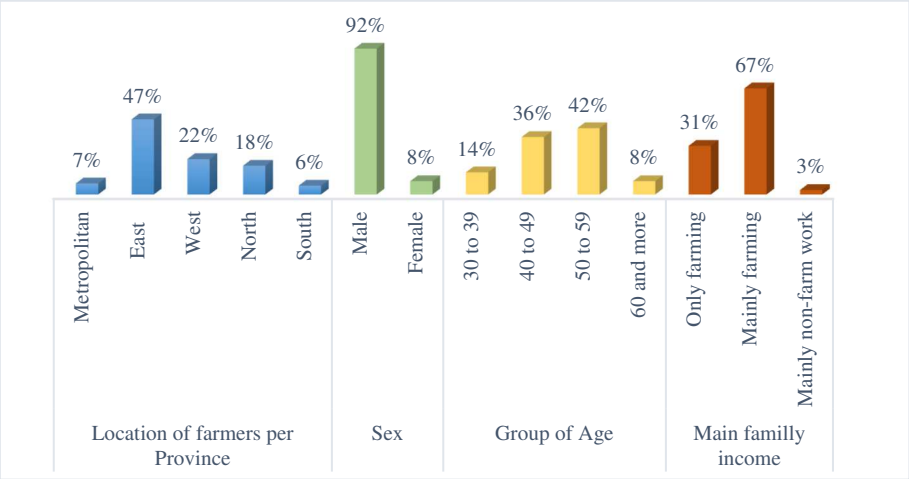


Figure 3.4.52 Basic information of farmers

Source: VC survey

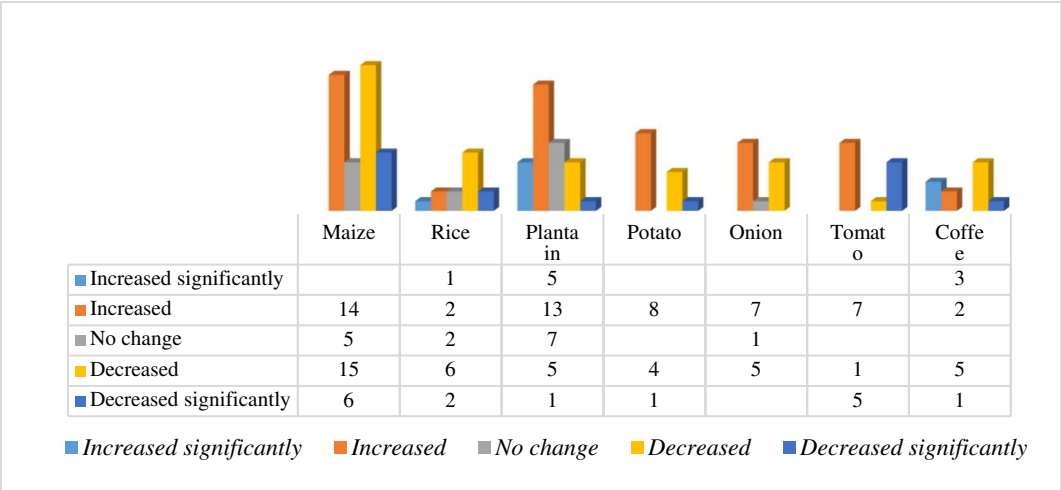
In the production stage, the most common impact and background of COVID-19 was that the procurement price of input materials was high, and the production cost was high, so farmers had to raise the selling price, but the demand decreased, and the market shrank. As the number of purchasers decreased, there were many farmers in which the selling price was lowered, the minimum amount of money was obtained, and the living cost was maintained.

However, for the evaluation of the impact of COVID-19 on agricultural activities, 28 out of 50 farmers answered that they had a slight impact. It was more than the farmers who answered that they had a large impact. Originally, farmers engaged in agriculture to secure customers after producing, so it is assumed that the problem became more apparent due to the impact of COVID-19.

2) Change of Production

Regarding the increase and decrease in production before and after COVID-19, some farmers said that

it increased, while others said that it decreased, and the situation was different depending on the farmer. For the period of increase and decrease of maize, the proportion of farmers whose production volume increased and those whose sales volume decreased was large in January to March 2021. Plantain and potato tended to have a large proportion of farmers whose production volume increased and decreased in July to September 2021. Other crops varied from farmer to farmer, and it was difficult to understand the big trends.



	Maize	Rice	Plantain	Potato	Onion	Tomato	Coffee
Increased significantly		1	5				3
Increased	14	2	13	8	7	7	2
No change	5	2	7		1		
Decreased	15	6	5	4	5	1	5
Decreased significantly	6	2	1	1		5	1

Figure 3.4.53 Change in crop production of farmers

Source: VC survey

The farmers' perceptions of the factors behind the change in crop production are shown below. The most common cause of production decline was bad weather and was unrelated to COVID-19. Next, many farmers thought that it was because of decreased yields, decreased inputs of fertilizers and agrochemicals, insufficient labor force, and decreased cultivation area. A notable answer is that maize farmers in the Eastern Province switched to chia seeds, which are highly profitable crops, resulting in a decrease in the production of the target crops.

The most common response to the increase in crop production was good weather and was not related to COVID-19. Next, many farmers thought that it was because of increased yields, increased inputs of fertilizers, seeds and agrochemicals, increased cultivation area, and reduced outbreaks of pests. The opposite factor to that of the decrease in production was mentioned. A notable answer is the future contract with the input company (One Acre Funds -Tubura), in which the input materials such as fertilizer are provided first, and the fertilizer cost and the product price are settled after harvesting. It was pointed out that it was not affected by the input by COVID-19 and did not affect the production volume.

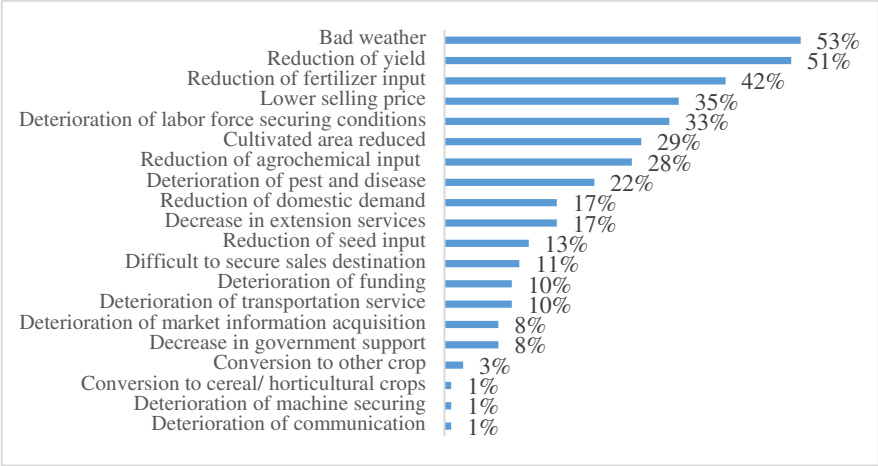


Figure 3.4.54 Factors of decrease in crop production volume and sales volume

Source: VC survey

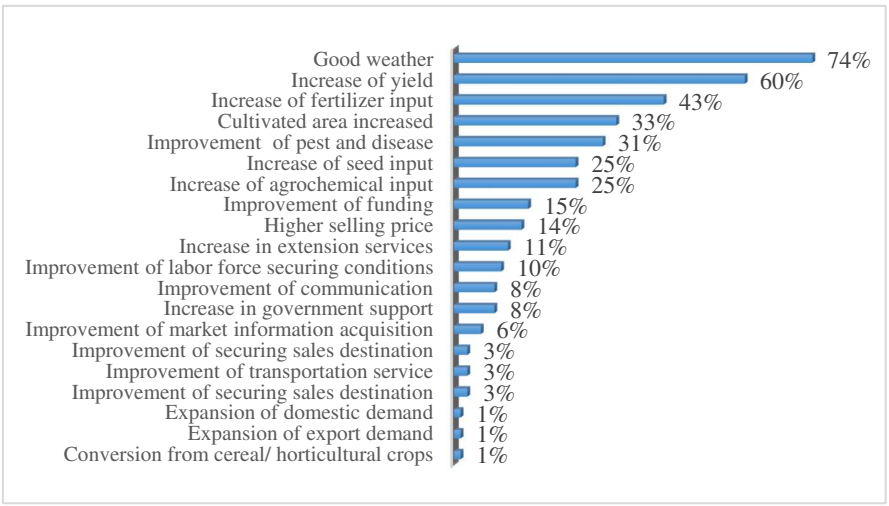


Figure 3.4.55 Factors of increase in crop production volume and sales volume

Source: VC survey

3) Change of Sales

The factors behind the change in crop sales are shown in Figure 3.4.54 and Figure 3.4.55. The reason for the decrease in sales volume was that the production volume decreased because of bad weather, decreased yield, and decreased fertilizer input, resulting in a decrease in sales volume. A notable answer was that coffee buyers asked farmers to grow organic coffee, which made it difficult to grow and reduced yields, but the selling price was not worth it.

The most common answer as a factor for the increase in crop sales was that the sales volume increased because the crop production increased because of good weather, increased yield, increased fertilizer input, etc. The opposite factor to the factor of decrease was mentioned. A notable answer was that the improved storage environment for maize allowed us to continue selling without discarding surplus products.

COVID-19 adversely affected the selling price of agricultural products for various reasons based on the purchasing power of buyers and changes in behavior. 77% of the farmers surveyed experienced a decline

or significant decline in producer prices for 6 crops other than coffee (Figure 3.4.56). However, the period of impact depends on the crop, with maize falling sharply in January to March 2021, rice falling or falling sharply in April to September 2021, plantain and potato falling sharply in July to September of 2020 and 2021, tomato falling or falling sharply in April to September of 2020 and 2021. Meanwhile, coffee experienced a rise in selling prices or a significant rise in April to September 2021.

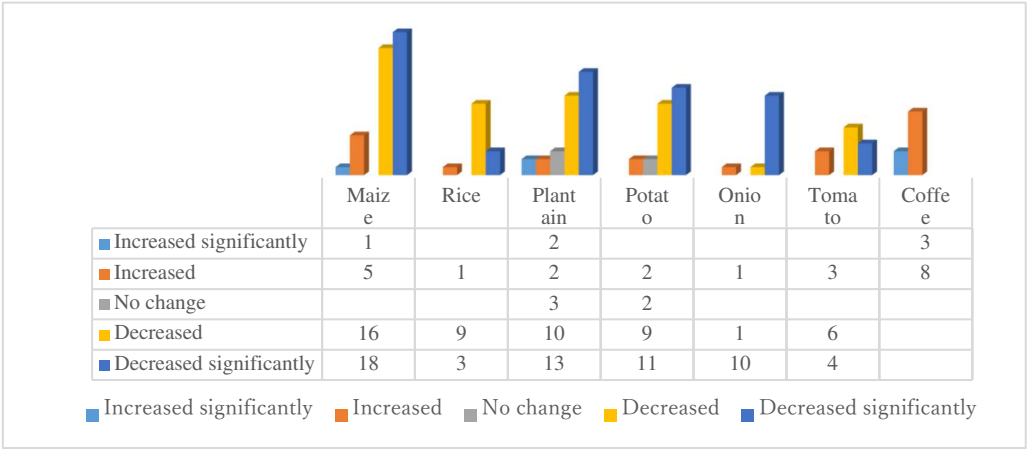


Figure 3.4.56 Change in crop sales price of farmers

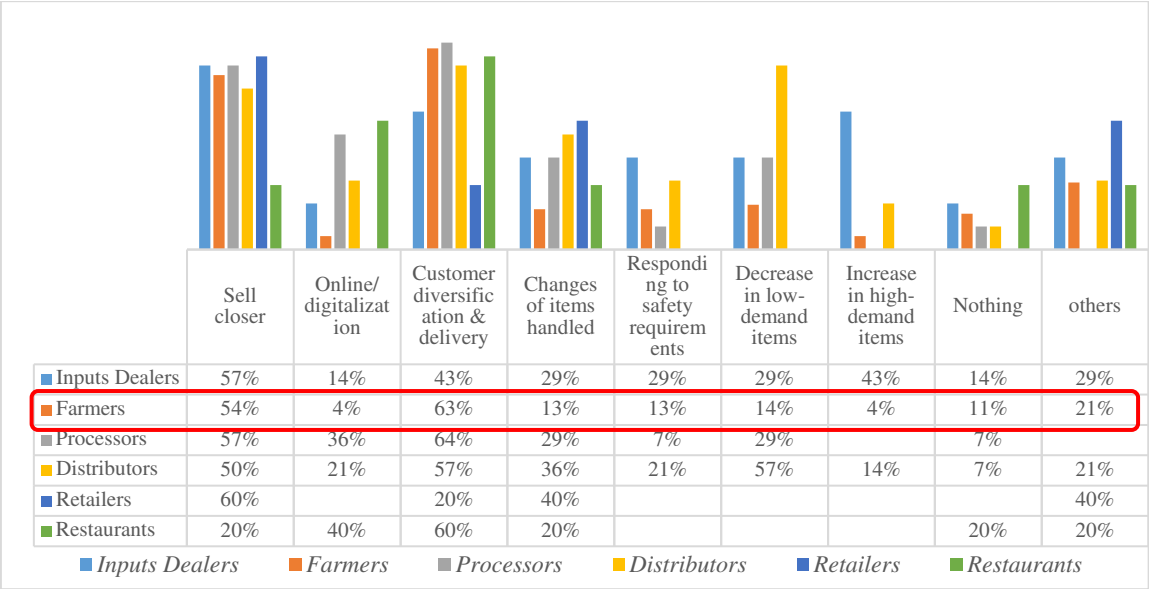
Source: VC survey

4) Change of procurement

There is a correlation between the impact on input material procurement and the impact on production and sales. As shown in Figure 3.4.54 and Figure 3.4.55, the amount of input materials such as fertilizers, agrochemicals, and seeds were small, so the cultivation area decreased, the yield decreased, and the production and sales volumes were small.

5) Measures taken against COVID-19

The response to COVID-19 in sales, procurement, and business is as follows. In terms of sales, more than half took measures such as selling in close locations and diversifying customers. For sales in close locations, there are many cases where farmers who usually bring them to the market switch to selling to middlemen in the field or bringing them to local cooperatives. The diversification of customers also included farmers who cultivated contracts with buyers. Regarding procurement, 74% took measures to procure from nearby locations and 47% took measures to diversify the input dealers. Farmers struggling high price of input materials often switched to cheaper input dealers to reduce production costs. In terms of business, 64% cut down on living expenses and tried to carry out agricultural activities, and nearly half of the farmers took measures for infectious hygiene. On the other hand, most farmers did not take temporary dismissal or digitize.



	Sell closer	Online/ digitalization	Customer diversification & delivery	Changes of items handled	Responding to safety requirements	Decrease in low-demand items	Increase in high-demand items	Nothing	others
Inputs Dealers	57%	14%	43%	29%	29%	29%	43%	14%	29%
Farmers	54%	4%	63%	13%	13%	14%	4%	11%	21%
Processors	57%	36%	64%	29%	7%	29%		7%	
Distributors	50%	21%	57%	36%	21%	57%	14%	7%	21%
Retailers	60%		20%	40%					40%
Restaurants	20%	40%	60%	20%				20%	20%

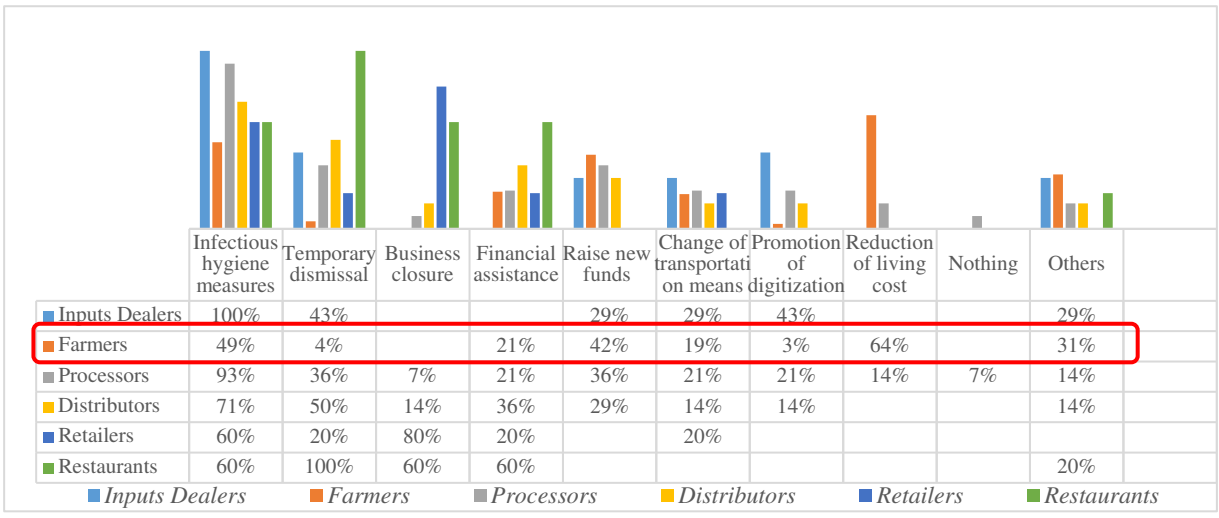
Inputs Dealers *Farmers* *Processors* *Distributors* *Retailers* *Restaurants*

Figure 3.4.57 Measures taken against COVID-19 in terms of sales for farmers

Source: VC survey

Figure 3.4.58 Measures taken against COVID-19 in terms of procurement for farmers

Source: VC survey



	Infectious hygiene measures	Temporary dismissal	Business closure	Financial assistance	Raise new funds	Change of transportation means	Promotion of digitization	Reduction of living cost	Nothing	Others
Inputs Dealers	100%	43%			29%	29%	43%			29%
Farmers	49%	4%		21%	42%	19%	3%	64%		31%
Processors	93%	36%	7%	21%	36%	21%	21%	14%	7%	14%
Distributors	71%	50%	14%	36%	29%	14%	14%			14%
Retailers	60%	20%	80%	20%		20%				
Restaurants	60%	100%	60%	60%						20%

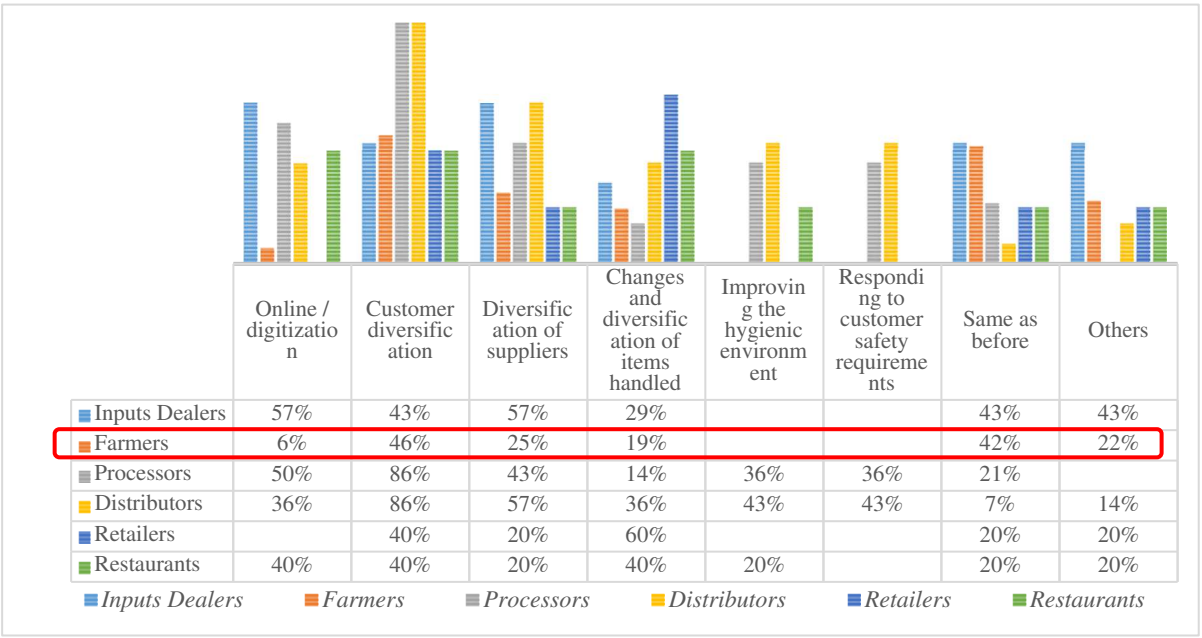
Inputs Dealers *Farmers* *Processors* *Distributors* *Retailers* *Restaurants*

Figure 3.4.59 Measures taken against COVID-19 in terms of business for farmers

Source: VC survey

6) Change of business environment

Under the influence of COVID-19, nearly half of the farmers have seen changes such as diversification of customers and responded that they would like to continue the measures. On the other hand, nearly half answered that they would continue to farm as they did before COVID-19. In addition, there were answers such as crop conversion, break savings and continue agricultural activities, focus on livestock activities and input abundant compost, start planting in the dry season, improve relationships with middlemen and sell at prices corresponding with labor.



	Online / digitization	Customer diversification	Diversification of suppliers	Changes and diversification of items handled	Improving the hygienic environment	Responding to customer safety requirements	Same as before	Others
Inputs Dealers	57%	43%	57%	29%			43%	43%
Farmers	6%	46%	25%	19%			42%	22%
Processors	50%	86%	43%	14%	36%	36%	21%	
Distributors	36%	86%	57%	36%	43%	43%	7%	14%
Retailers		40%	20%	60%			20%	20%
Restaurants	40%	40%	20%	40%	20%		20%	20%

Figure 3.4.60 Changes of business environment

Source: VC survey

7) Support

About half of the farmers did not receive government support. On the other hand, some farmers received seed supply, fertilizer and agrochemicals supply, travel pass issuance, and maize farmers' cooperatives received financial support to compensate for yield losses.

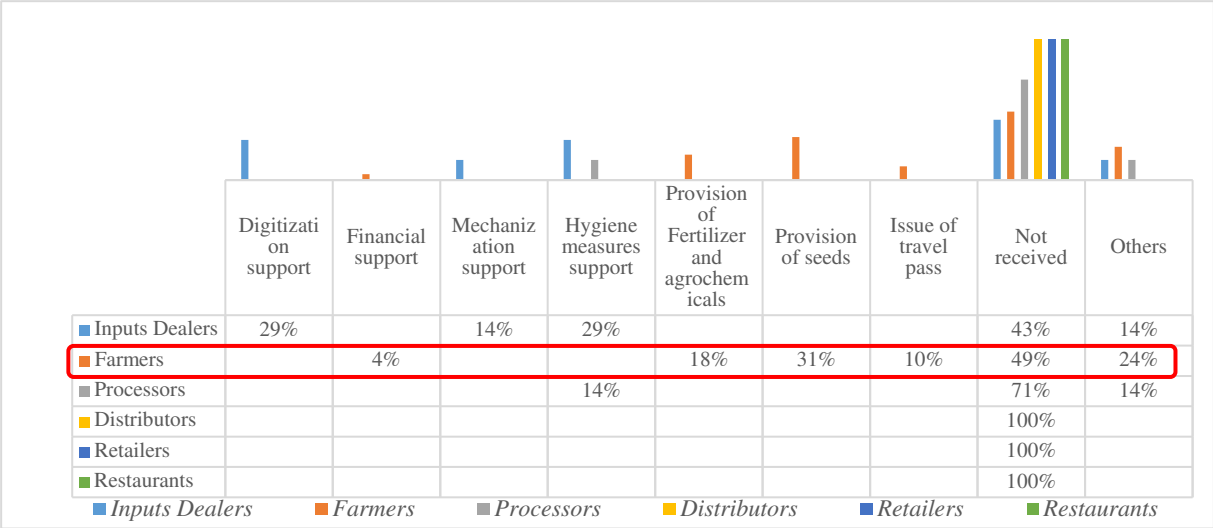


Figure 3.4.61 Government support

Source: VC survey

8) Challenges, Needs and Perspective

The biggest impact of the occurrence of COVID-19 on farmers was the movement restrictions answered by 45 out of 51 farmers, followed by lower selling prices of 34 farmers and lower demand of 32 farmers. Few farmers have actively tried to improve the situation by changing crops, changing buyers, and cooperating with neighboring farmers in response to these issues. Many farmers adopted the change, sold it at a low price, earned the minimum amount of money they needed to live (the first VC survey).

Most farmers cited financial support (96%) as a need, followed by support for connecting farmers and buyers (76%), price control of input materials (76%), infrastructure development (64%), and increased training (63%). There were opinions that specific financial support was the establishment of an agricultural compensation fund and support for farmers to access bank loans. There were opinions that specific support for infrastructure development included improving logistics means to reduce the number of intermediaries and establishing a small-scale processing factory. There were also opinions such as creating a mechanism to impose sanctions on buyers who do not respect contract with farmers, supporting the enhancement of farmers' negotiating power, and improving the leadership and management of cooperatives.

The perspective for farmers is generally positive, and they think agricultural environment will be restored as vaccination progresses, they will adopt change and live, seed purchase prices are gradually declining and will eventually return, etc.

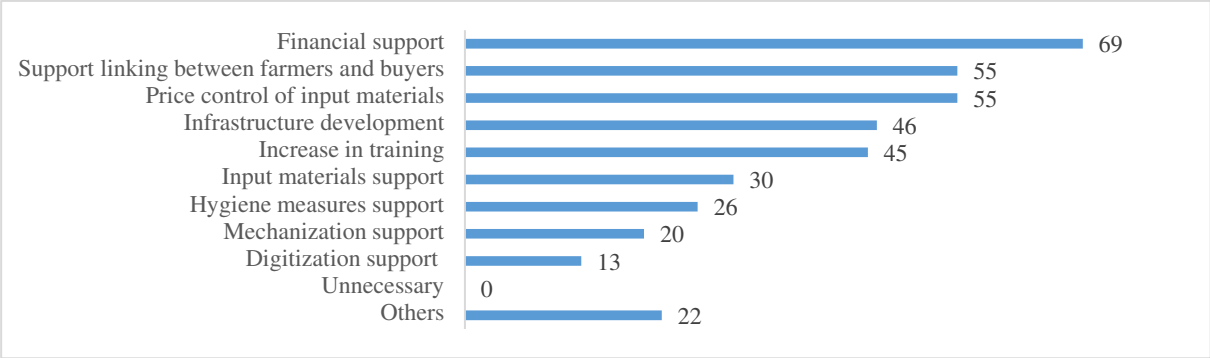


Figure 3.4.62 Needs by farmers

Source: VC survey

(4) Impacts on Processing Stage and Underlying Factors

1) Overview

The regional distribution of the 14 processors that conducted the survey was 8 in Southern Province, 1 in Eastern Province, 2 in Northern Province, 1 in Western Province, and 2 in Kigali city. The target crops were 4 maize, 3 rice, 2 plantain, 1 tomato, and 1 potato. The breakdown of processing was 5 food processing, 3 rice milling, 4 milling, and 2 coffee processing 2. 3 were for domestic and export, and 11 were for local consumption.

At the input and production stages, the impact of COVID-19 remains even in the first half of 2021, but at the processing stage, it is mainly from April to September 2020 immediately after the occurrence of COVID-19, and the impact remains in 2021 is only rice millers. Many processors have reduced the amount of processing due to government policies that forced them to shorten their business hours or suspend operations, shortage of raw materials due to transportation restrictions, lack of sales destinations, and reduced demand for processed products.

2) Change of sales

Of the 14 processors surveyed, most had reduced or significantly reduced sales (Figure 3.4.63). The exception is potato, which are said to have increased sales. The period of decrease in sales was April to June 2020 for all maize companies, January to March 2021 for all rice millers, and July to September 2020 for coffee processors. The period of increase in sales was July to September 2020 for potato processors.

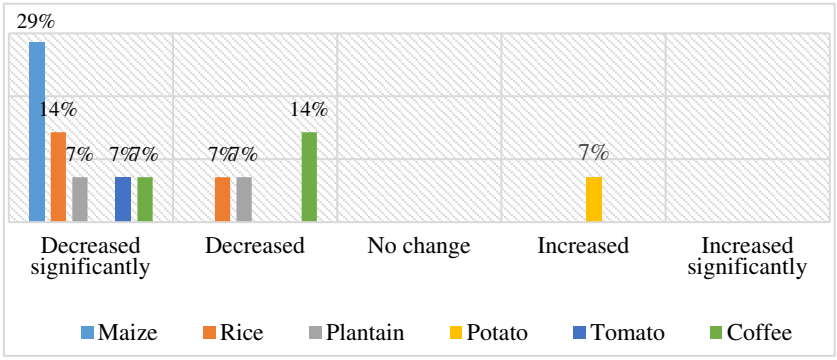


Figure 3.4.63 Change of sales volume of processed goods

Source: VC survey

Regarding the factors behind the decrease in sales volume, the most common answers for all crops were decreased demand, movement restrictions, sales restrictions, and low selling prices (Figure 3.4.64). In addition, there was an opinion that rice and maize could not be sold due to insufficient storage capacity. The reason for the increase in potato sales was the availability of abundant raw materials in July to September 2020.

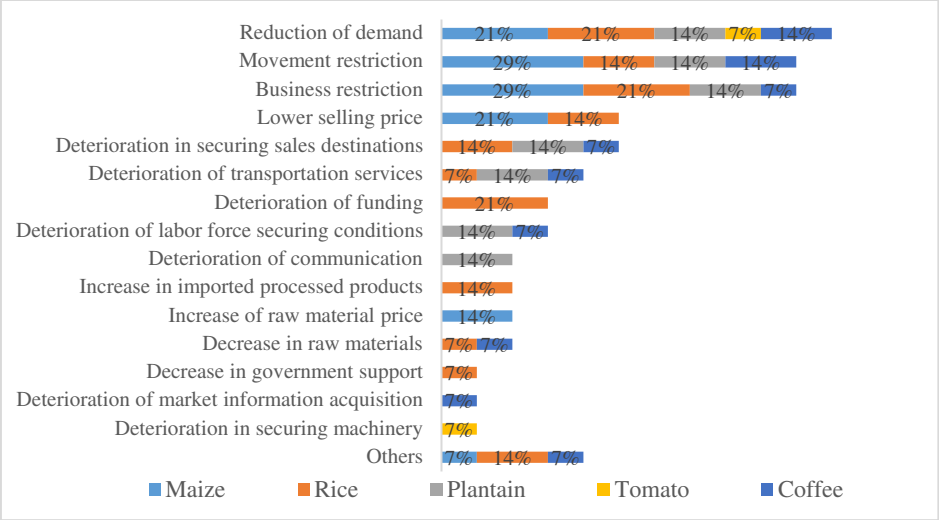


Figure 3.4.64 Factors of decrease in sales volume of processed products

Source: VC survey

Changes in sales price of processed products differed by processing dealer and crop, whether increased or decreased or no change. 3 out of 3 rice millers said that it decreased (Figure 3.4.65). The period of the impact also depends on the processing dealers, with 2 maize processors said it decreased in April to June 2020 and 2 maize processors said it increased in the same period. Rice millers said that it decreased in January to March 2021, plantain processor said it decreased in April to September 2020, and coffee processor said it decreased in July to September 2020.

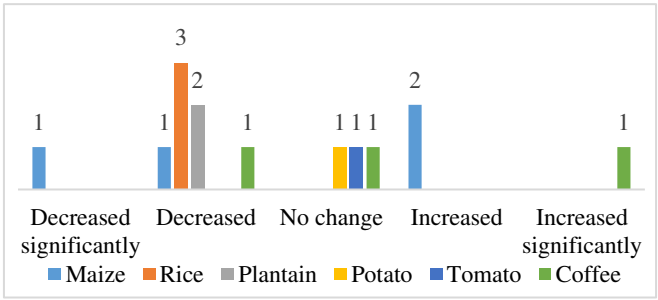


Figure 3.4.65 Change of sales price of processed products

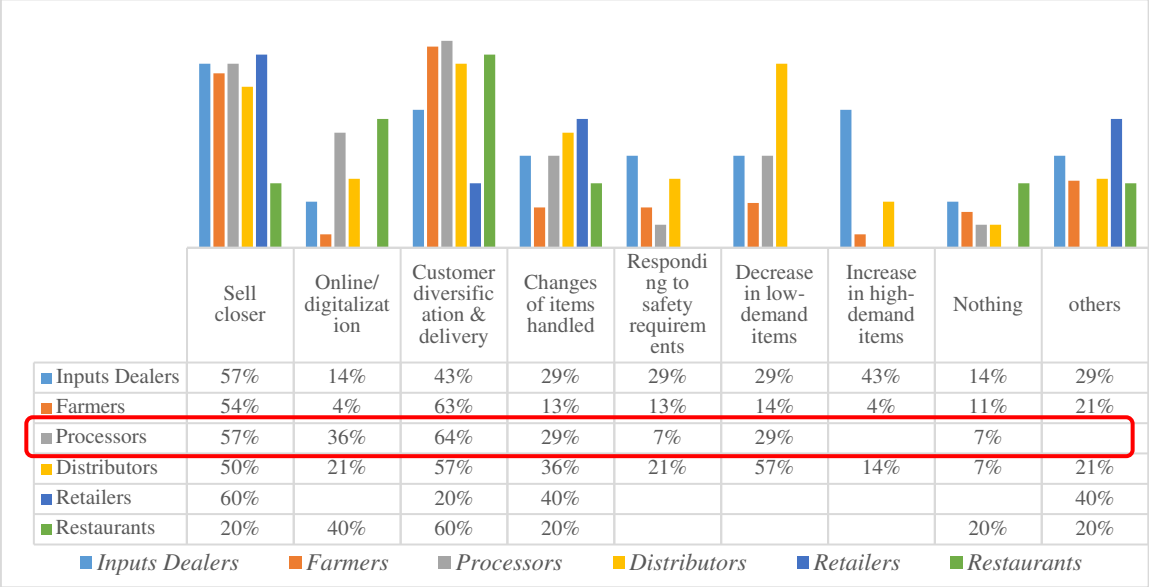
Source: VC survey

3) Change of procurement

The impact on raw material procurement and the impact on sales are correlated, and as shown inFigure 3.4.64, sales volume increased due to high raw material prices, insufficient procurement of raw materials, and an increase in imported processed products (inflow of Tanzanian rice).

4) Measures taken against COVID-19

The response to COVID-19 in sales, procurement, and business is as follows. In terms of sales, more than half took measures such as selling in close locations and diversifying customers. In addition, around 30% took measures such as online / digitization, changes in products handled, and reduction of products with low demand, all of which are measures due to movement restrictions. In terms of procurement, 43% responded by diversifying suppliers and 36% responded by procuring from nearby locations. In addition, after the outbreak of COVID-19, the illegal sale of rice by many farmers has become a problem, and it is said that processors have also carried out activities to encourage farmers to collect rice by cooperatives and bring it to rice millers. In terms of business, 93% of processors took infectious hygiene measures, and 36% of processors closed temporarily and raised new funds.



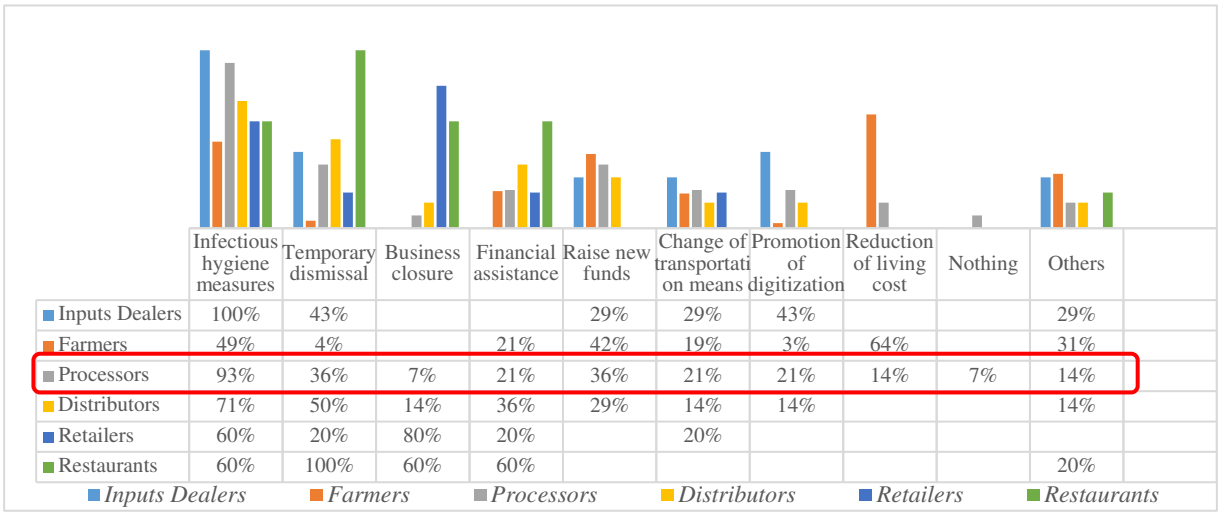
	Sell closer	Online/ digitalization	Customer diversification & delivery	Changes of items handled	Responding to safety requirements	Decrease in low-demand items	Increase in high-demand items	Nothing	others
Inputs Dealers	57%	14%	43%	29%	29%	29%	43%	14%	29%
Farmers	54%	4%	63%	13%	13%	14%	4%	11%	21%
Processors	57%	36%	64%	29%	7%	29%		7%	
Distributors	50%	21%	57%	36%	21%	57%	14%	7%	21%
Retailers	60%		20%	40%					40%
Restaurants	20%	40%	60%	20%				20%	20%

Figure 3.4.66 Measures taken against COVID-19 in terms of sales for processors

Source: VC survey

Figure 3.4.67 Measures taken against COVID-19 in terms of procurement for processors

Source: VC survey



	Infectious hygiene measures	Temporary dismissal	Business closure	Financial assistance	Raise new funds	Change of transportation means	Promotion of digitization	Reduction of living cost	Nothing	Others
Inputs Dealers	100%	43%			29%	29%	43%			29%
Farmers	49%	4%		21%	42%	19%	3%	64%		31%
Processors	93%	36%	7%	21%	36%	21%	21%	14%	7%	14%
Distributors	71%	50%	14%	36%	29%	14%	14%			14%
Retailers	60%	20%	80%	20%		20%				
Restaurants	60%	100%	60%	60%						20%

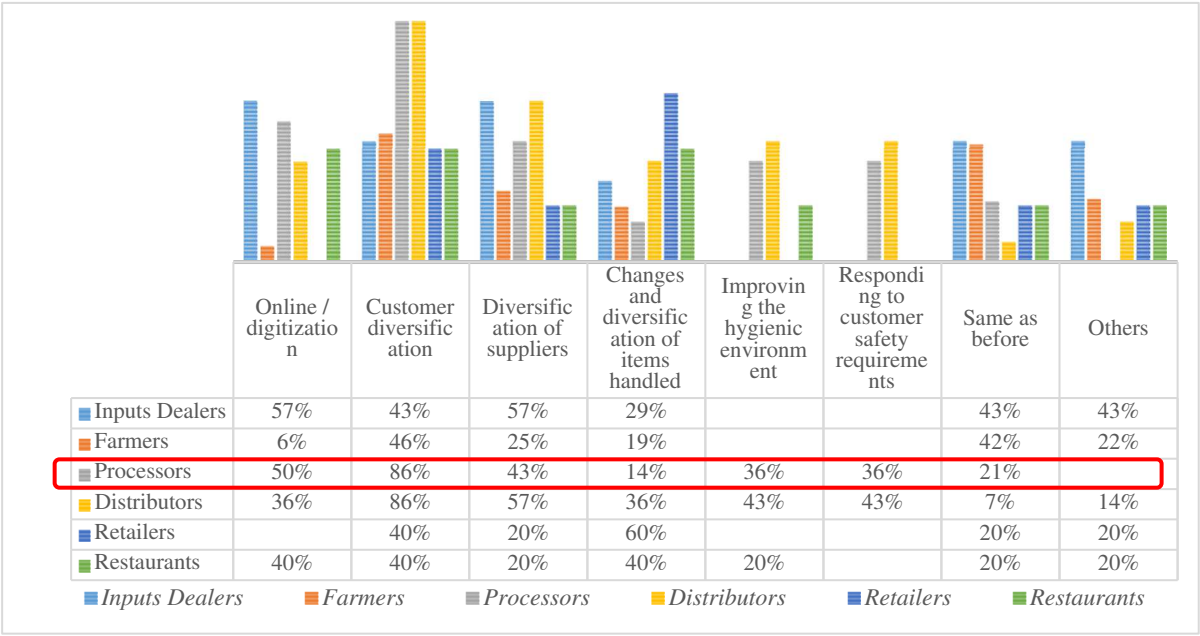
Inputs Dealers *Farmers* *Processors* *Distributors* *Retailers* *Restaurants*

Figure 3.4.68 Measures taken against COVID-19 in terms of business for processors

Source: VC survey

6) Change of business environment

Under the influence of COVID-19, processors have seen changes such as customer diversification (86%), online / digitalization (50%), and supplier diversification (46%) and responded that they would like to continue the measures. On the other hand, 21% of processors answered that they were the same as before.



	Online / digitization	Customer diversification	Diversification of suppliers	Changes and diversification of items handled	Improving the hygienic environment	Responding to customer safety requirements	Same as before	Others
Inputs Dealers	57%	43%	57%	29%			43%	43%
Farmers	6%	46%	25%	19%			42%	22%
Processors	50%	86%	43%	14%	36%	36%	21%	
Distributors	36%	86%	57%	36%	43%	43%	7%	14%
Retailers		40%	20%	60%			20%	20%
Restaurants	40%	40%	20%	40%	20%		20%	20%

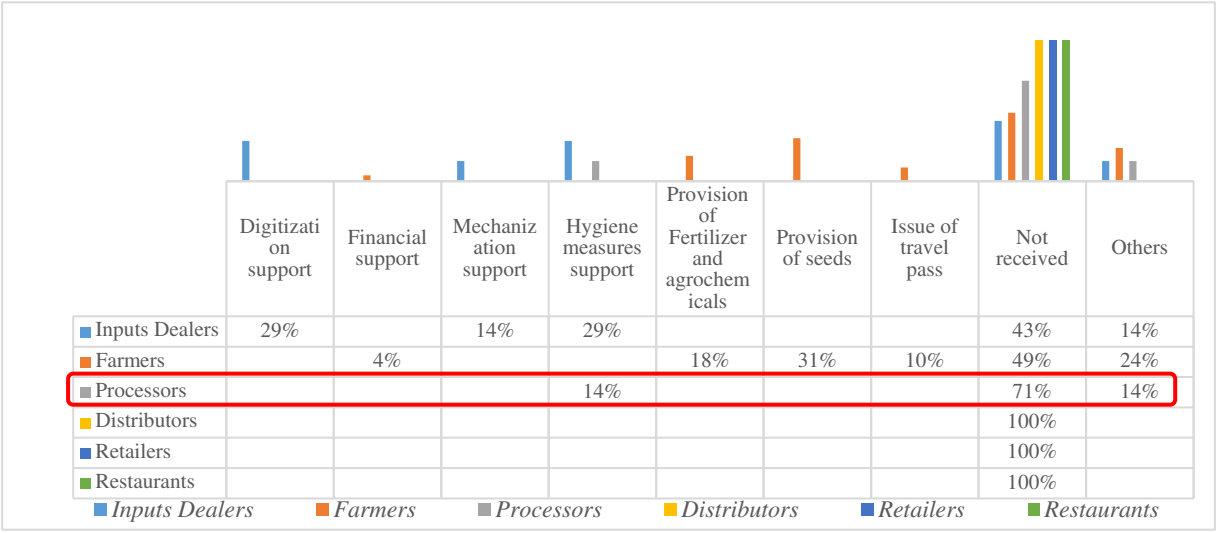
Inputs Dealers *Farmers* *Processors* *Distributors* *Retailers* *Restaurants*

Figure 3.4.69 Changes of business environment

Source: VC survey

7) Support

71% of processors did not receive government support. On the other hand, some processors received support for infectious hygiene measures. In addition, in order to solve the problem of illegal rice sales by farmers, local government agencies helped processors to collect rice in a cooperative and bring it to rice millers.



	Digitization support	Financial support	Mechanization support	Hygiene measures support	Provision of Fertilizer and agrochemicals	Provision of seeds	Issue of travel pass	Not received	Others
Inputs Dealers	29%		14%	29%				43%	14%
Farmers		4%			18%	31%	10%	49%	24%
Processors				14%				71%	14%
Distributors								100%	
Retailers								100%	
Restaurants								100%	

Inputs Dealers *Farmers* *Processors* *Distributors* *Retailers* *Restaurants*

Figure 3.4.70 Government support

Source: VC survey

8) Challenges, Needs and Perspective

The challenges to raw material procurement were that the quality of raw materials was poor, the amount of raw material procured was small, and the processing materials were expensive from the maize and potato

processors. The largest issue for sales was that there was no sales destination for all the crops.

To overcome this challenge, the most common needs for processors was financial support (93%). There were many processors requesting market expansion such as support for entry into the domestic and international markets, support for entry into the potato chip market, support for transportation means to the market to secure sales destinations. In addition, there are high needs for infrastructure development, including support for the introduction of milling machine (maize), support for domestic packaging material manufacturers, maintenance of storage (rice, maize), maintenance of refrigerating rooms (vegetables), and maintenance of hydroelectric power generation at processing plants, etc. On the software side, support for post-harvest processing techniques for farmers and support for organic certification (tomato) were mentioned. The processors who sold to bars and restaurants think that it is possible to secure sales destinations if business normally resumes, so they demand vaccination for all the people, prevent infection, and resume the business as soon as possible.

The perspective for processors is generally positive, and they we will continue their business and adopt the changes in COVID-19 by aiming for diversification of customers, online / digitalization, and diversification of suppliers.

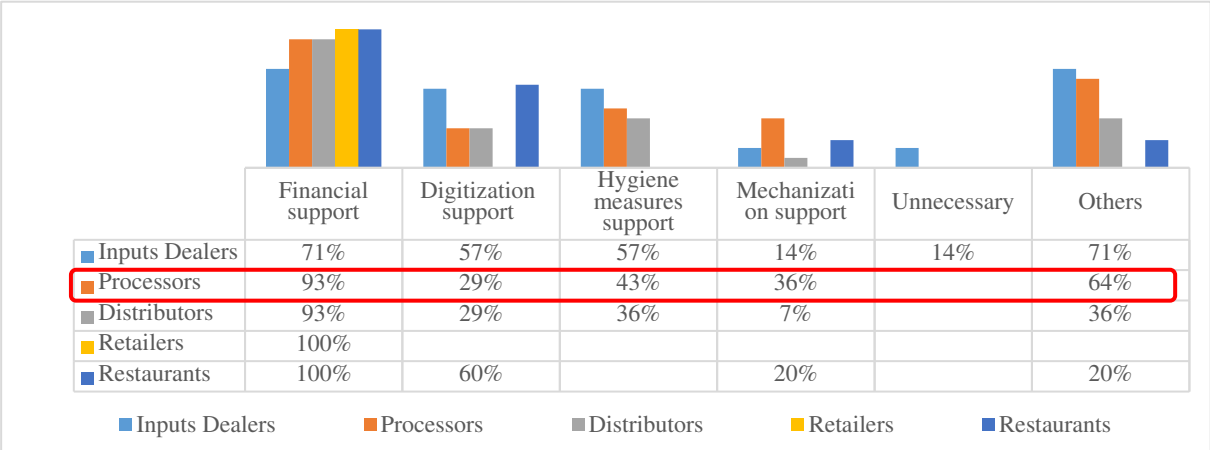


Figure 3.4.71 Needs by processors

Source: VC survey

(5) Impacts on Distribution Stage and Underlying Factors

1) Overview

The regions and business distributions of the 14 distributors surveyed were Kigali City (6 wholesalers, 4 transporters), Southern Province (3 transporters), and Eastern Province (1 transporter). The service area of 14 distributors were 1 nationwide, 7 within in the province, and 6 within the county.

From April to June 2020, immediately after the occurrence of COVID-19, all distributors had restrictions on purchasing and sales due to the temporary closure of the market, reduction in working hours, and the decline in purchasing power of customers due to lockdown. Thus, revenue also decreased. Since then, procurement has been returning to normal, but sales volume has not returned to normal.

2) Change of sales

Of the 14 distributors surveyed, the sales volume of all distributors decreased or significantly decreased (Fig. 3.4.72). The exception is potato, which are said to have increased sales. Sales volumes declined in April to June 2020 (maize, rice, onions, coffee) and January to December 2021 (target crops other than maize). It is considered that the sales volume has not recovered before COVID-19.

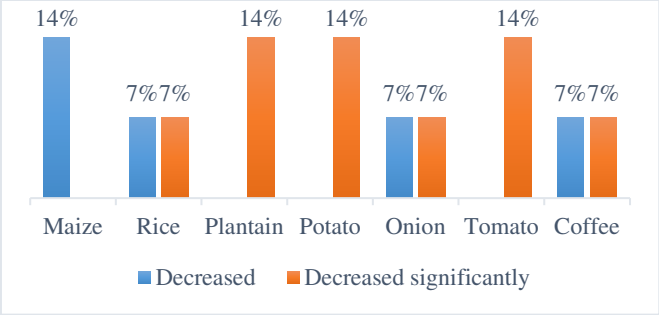


Figure 3.4.72 Change of crop sales volume of distributors

Source: VC survey

The study team surveyed distributors across crops regarding the factors behind the decrease in sales volume. The most common answers were a decrease in demand, movement restrictions, sales restrictions, customer sales restrictions, and a decline in distribution methods (Table 3.4.21).

Table 3.4.21 Factors of decrease in distributor sales

Alternatives of factors that reduced sales volume	No. of distributors who responded
Reduction of demand	14
Movement restriction	11
Business restriction	10
Business restriction of customers	9
Deterioration of transport services	7
Low selling price	6
Decrease in raw materials	4
Deterioration of market information acquisition	4
Deterioration of funding	3
Deterioration of labor force securing conditions	3

Source: VC survey

Change in crop sales price increased or decreased depending on the distributor and crop, with increased sales price for potato, tomato, and coffee, and decreased sales price for rice and plantain, potato, onion, and tomato (Figure 3.4.73).

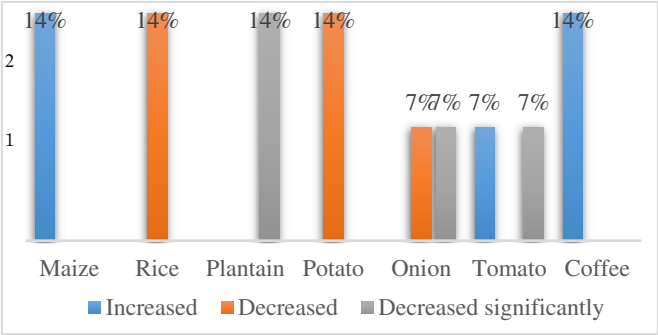


Figure 3.4.73 Change of sales price of crops of distributors

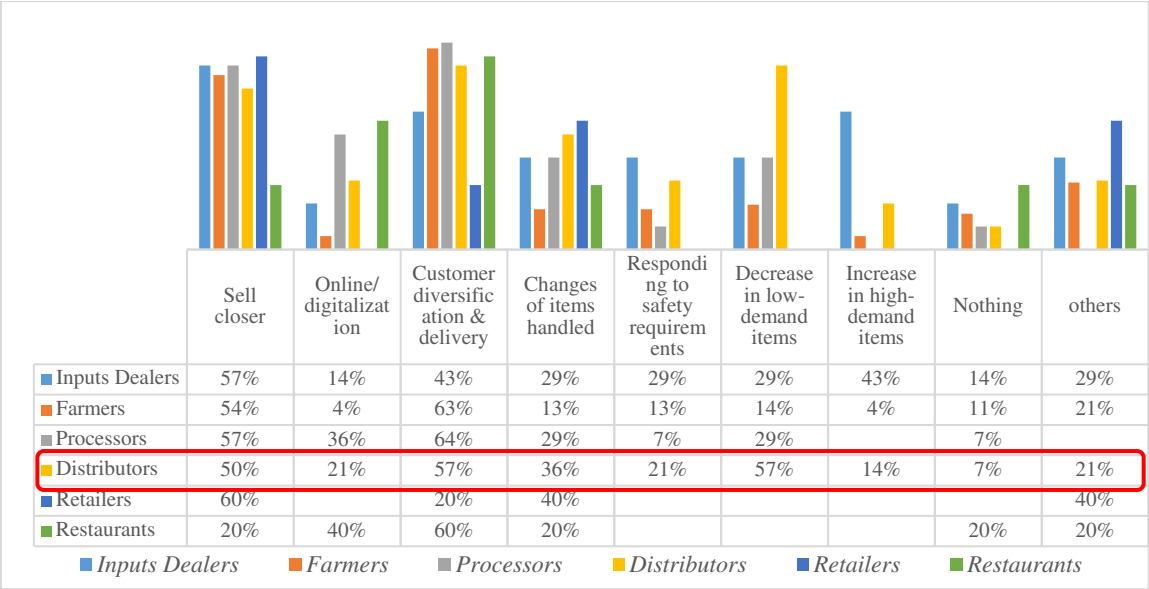
Source: VC survey

3) Change of procurement

The impact on crop procurement and the impact on sales are correlated. As shown in Table 3.4.21, it can be seen that the amount of crop procured decreased and the amount of sales decreased due to movement restrictions, business restrictions, and stagnation of distribution means.

4) Measures taken against COVID-19

The response to COVID-19 in sales, procurement, and business is as follows. In terms of sales, more than half took measures such as reducing products with low demand, diversifying customers/ delivering, and selling in close locations. In addition, 20 to 30% took measures such as changes in the products handled, online / digitization, and thorough safety requirements from suppliers. It is a measure against restricted movement and a measure to maintain a balance between supply and demand. In terms of procurement, 64% took measure by diversifying suppliers and 50% by procuring from nearby locations. In terms of business, 71% of distributors took infectious hygiene measures, 50% took temporary dismissal, and 36% raised new funds. Another answer was that the cooperation system with importers was improved.



	Sell closer	Online/ digitalization	Customer diversification & delivery	Changes of items handled	Responding to safety requirements	Decrease in low-demand items	Increase in high-demand items	Nothing	others
Inputs Dealers	57%	14%	43%	29%	29%	29%	43%	14%	29%
Farmers	54%	4%	63%	13%	13%	14%	4%	11%	21%
Processors	57%	36%	64%	29%	7%	29%		7%	
Distributors	50%	21%	57%	36%	21%	57%	14%	7%	21%
Retailers	60%		20%	40%					40%
Restaurants	20%	40%	60%	20%				20%	20%

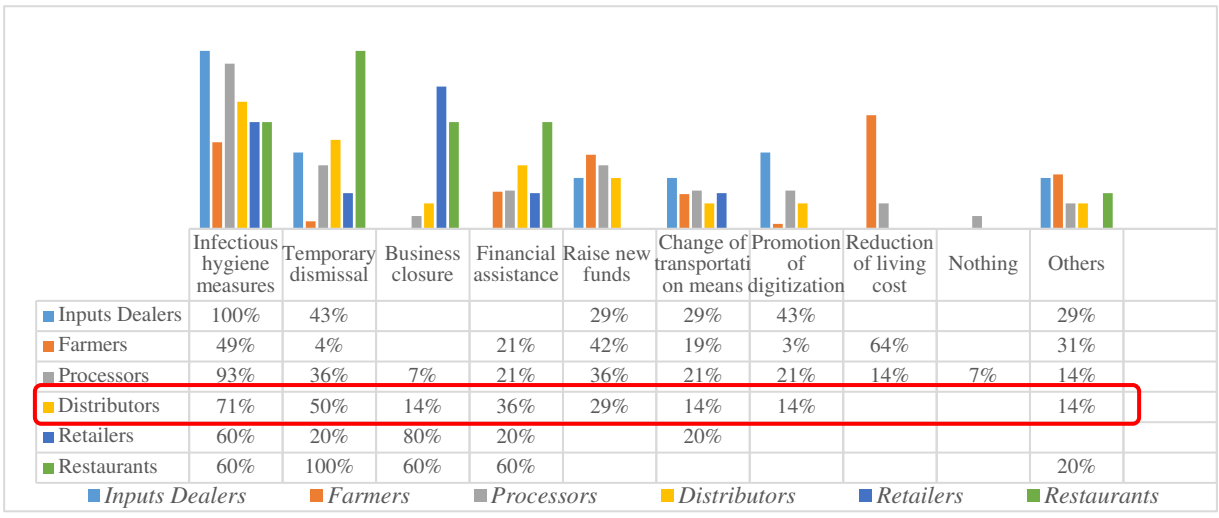
Inputs Dealers Farmers Processors Distributors Retailers Restaurants

Figure 3.4.74 Measures taken against COVID-19 in terms of sales for distributors

Source: VC survey

Figure 3.4.75 Measures taken against COVID-19 in terms of procurement for distributors

Source: VC survey



	Infectious hygiene measures	Temporary dismissal	Business closure	Financial assistance	Raise new funds	Change of transportation means	Promotion of digitization	Reduction of living cost	Nothing	Others
Inputs Dealers	100%	43%			29%	29%	43%			29%
Farmers	49%	4%		21%	42%	19%	3%	64%		31%
Processors	93%	36%	7%	21%	36%	21%	21%	14%	7%	14%
Distributors	71%	50%	14%	36%	29%	14%	14%			14%
Retailers	60%	20%	80%	20%		20%				
Restaurants	60%	100%	60%	60%						20%

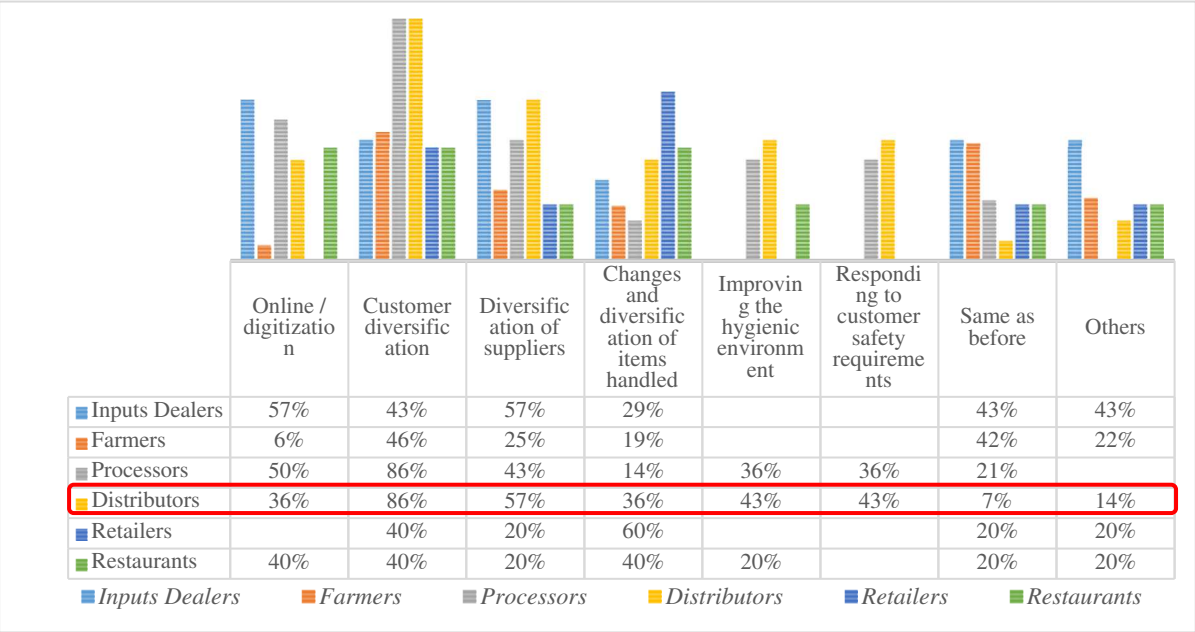
Inputs Dealers Farmers Processors Distributors Retailers Restaurants

Figure 3.4.76 Measures taken against COVID-19 in terms of business for distributors

Source: VC survey

5) Change of business environment

Under the impact of COVID-19, distributors have seen changes such as diversification of customers (86%), diversification of suppliers (57%) and improvement of sanitary environment (43%) and that they would like to continue the measures. Some distributors said that they will develop infrastructure such as vegetable refrigeration rooms.



	Online / digitization	Customer diversification	Diversification of suppliers	Changes and diversification of items handled	Improving the hygienic environment	Responding to customer safety requirements	Same as before	Others
Inputs Dealers	57%	43%	57%	29%			43%	43%
Farmers	6%	46%	25%	19%			42%	22%
Processors	50%	86%	43%	14%	36%	36%	21%	
Distributors	36%	86%	57%	36%	43%	43%	7%	14%
Retailers		40%	20%	60%			20%	20%
Restaurants	40%	40%	20%	40%	20%		20%	20%

Figure 3.4.77 Changes of business environment

Source: VC survey

6) Support

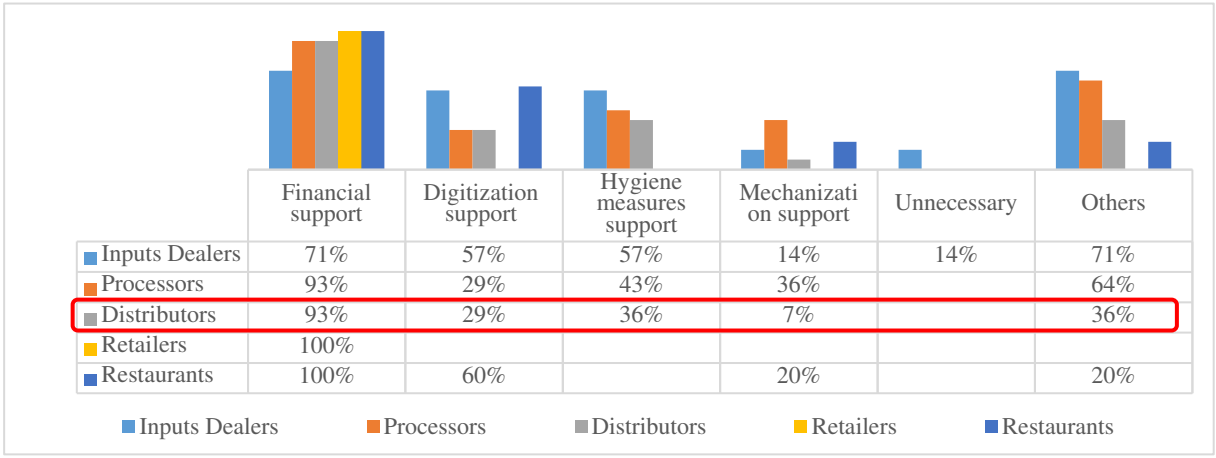
All distributors did not receive government support.

7) Challenges, Needs and Perspective

The major procurement issues were the increase in transportation costs and the small number of raw materials to be transported due to the impact of COVID-19, which had the greatest impact in April to June 2020. Sales issues include fewer buyers, restricted access to the market, fewer products for sale, lower sales price compared to production cost, and lower demand since April to June 2020. The impact continues as of December 2021.

To overcome this challenge, the most common needs for distributors was financial support (93%). Many distributors requested support for entry into domestic and international markets, support for improving distribution means, infrastructure development such as crop storage rooms, and elimination of short-time business.

The perspective for distributors is generally positive, and they will adopt change. As the situation is recovering, they will continue their business by trying to diversify their customers, diversify their suppliers, and improve the sanitary environment. In the near future, they believe the COVID-19 virus will disappear and their business will be restored.



	Financial support	Digitization support	Hygiene measures support	Mechanization support	Unnecessary	Others
Inputs Dealers	71%	57%	57%	14%	14%	71%
Processors	93%	29%	43%	36%		64%
Distributors	93%	29%	36%	7%		36%
Retailers	100%					
Restaurants	100%	60%		20%		20%

Figure 3.4.78 Needs by distributors

Source: VC survey

(6) Impacts on Sales Stage and Underlying Factors

Retailer

1) Overview

The regional distribution of the 5 retailers surveyed was 4 in Kigali City and 1 in Northern Province. As for the service area, 4 retailers work within the county and 1 retailer work within the province. The target crops are plantain, potato, tomato, onion, and coffee.

In Rwanda's retail sector, small retailors play an important role, usually transporting goods by public transport or motorbike taxi. However, from April to June 2020, immediately after the outbreak of COVID-19, due to strict movement restrictions, public transportation between cities and within the city was suspended, and the price of motorbike taxi was raised due to the high demand. It forced retailers to make very tough transactions. In addition, local retailers were in a more difficult situation as transportation to Kigali for purchasing goods was restricted. In addition, sales were affected, and revenues declined due to shorter sales hours and shrinking markets.

Nyabugogo market. Main vegetable market in Kigali city.

Hand wash at the market entrance for infection prevention measure

Temperature measurement for infection prevention measure

Photo 3.4.8 Market in Rwanda

2) Change of sales

Of the 5 retailers surveyed, the sales volume of all retailers decreased significantly. Sales declined in April to June 2020 for coffee, potato and onion, and July to September 2020 for plantain and tomato. It seems to have had a greatest impact from immediately after the outbreak of COVID-19 to half a year.

Regarding the factors of decrease in sales volume, retailers think reduced demand (5), movement restrictions (5), sales restrictions (5), customer sales restrictions (5), decreased funds (1), and a decline in logistics means (1).

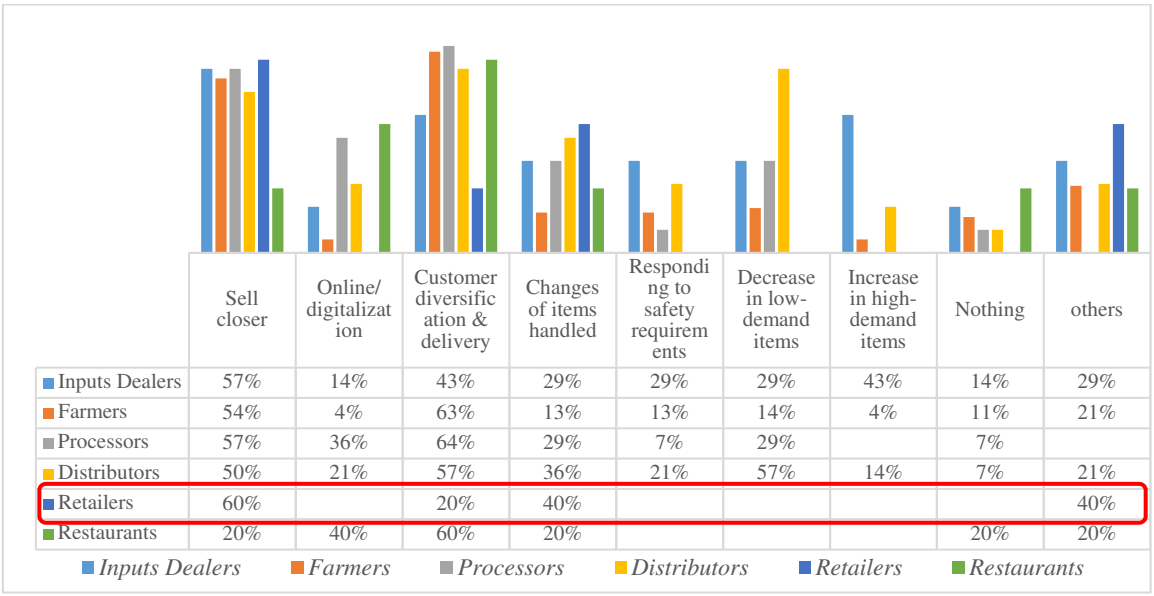
The change of crop sales price was significantly decreased for 2 retailers, decreased, unchanged, and significantly increased for 1 retailer, respectively. The period of impact depended on the crop, with potato and onion declined in April to June 2020, and tomato and plantain declined in July-September 2020. It seems to have had a greatest impact from immediately after the outbreak of COVID-19 to half a year.

3) Change of procurement

The impact on crop procurement and the impact on sales are correlated, and as mentioned above, the crop procurement volume decreased and the sales volume decreased due to demand reduction, movement restrictions, sales restrictions, and customer sales restrictions.

4) Measures taken against COVID-19

The response to COVID-19 in sales, procurement, and business is as follows. In terms of sales, nearly 60% sell in close location, 40% changed in the products handled, which is measures against movement restriction and a measure to maintain a balance between supply and demand. In terms of procurement, 40% procure in close location, and 40% did not take specific measures. In terms of business, 80% stopped their business and 60% took infectious hygiene measures.



	Sell closer	Online/ digitalization	Customer diversification & delivery	Changes of items handled	Responding to safety requirements	Decrease in low-demand items	Increase in high-demand items	Nothing	others
Inputs Dealers	57%	14%	43%	29%	29%	29%	43%	14%	29%
Farmers	54%	4%	63%	13%	13%	14%	4%	11%	21%
Processors	57%	36%	64%	29%	7%	29%		7%	
Distributors	50%	21%	57%	36%	21%	57%	14%	7%	21%
Retailers	60%		20%	40%					40%
Restaurants	20%	40%	60%	20%				20%	20%

Figure 3.4.79 Measures taken against COVID-19 in terms of sales for retailers

Source: VC survey

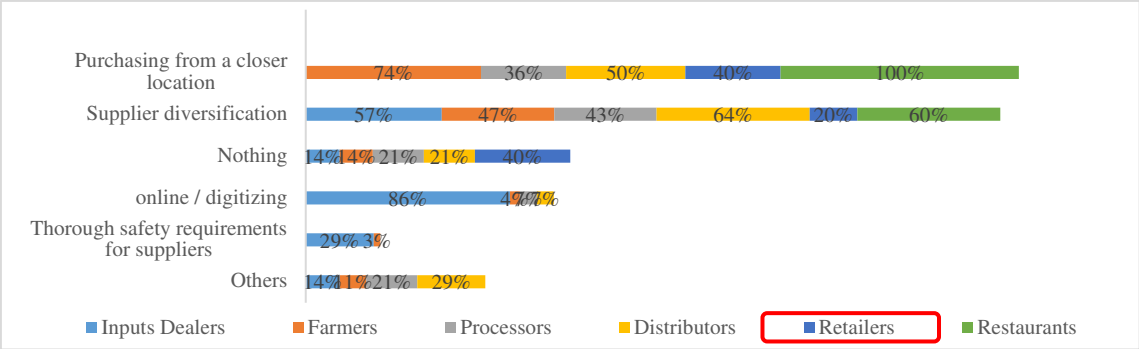
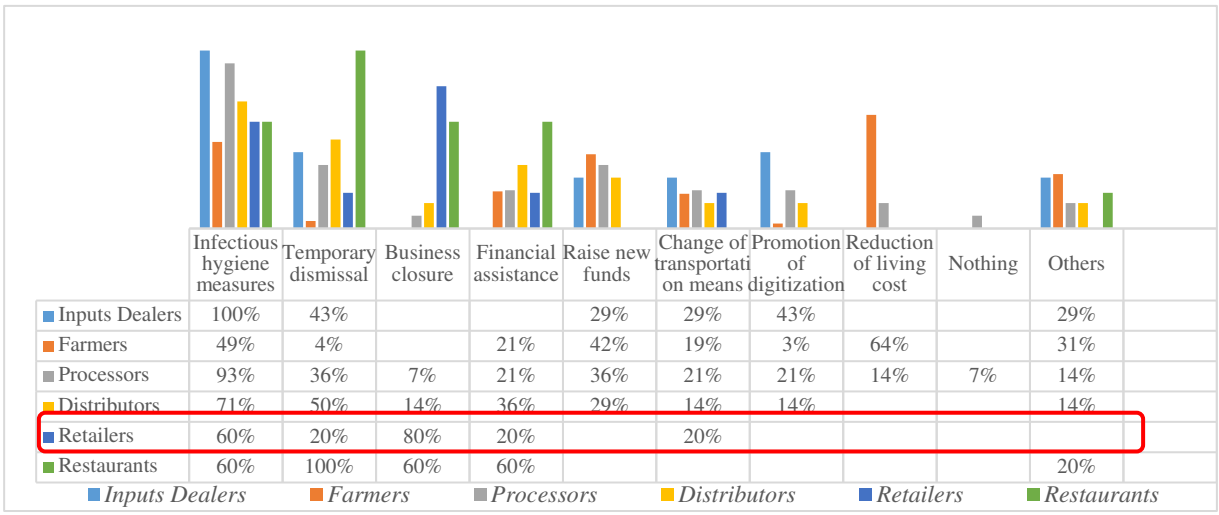


Figure 3.4.80 Measures taken against COVID-19 in terms of procurement for retailers

Source: VC survey



	Infectious hygiene measures	Temporary dismissal	Business closure	Financial assistance	Raise new funds	Change of transportation means	Promotion of digitization	Reduction of living cost	Nothing	Others
Inputs Dealers	100%	43%			29%	29%	43%			29%
Farmers	49%	4%		21%	42%	19%	3%	64%		31%
Processors	93%	36%	7%	21%	36%	21%	21%	14%	7%	14%
Distributors	71%	50%	14%	36%	29%	14%	14%			14%
Retailers	60%	20%	80%	20%		20%				
Restaurants	60%	100%	60%	60%						20%

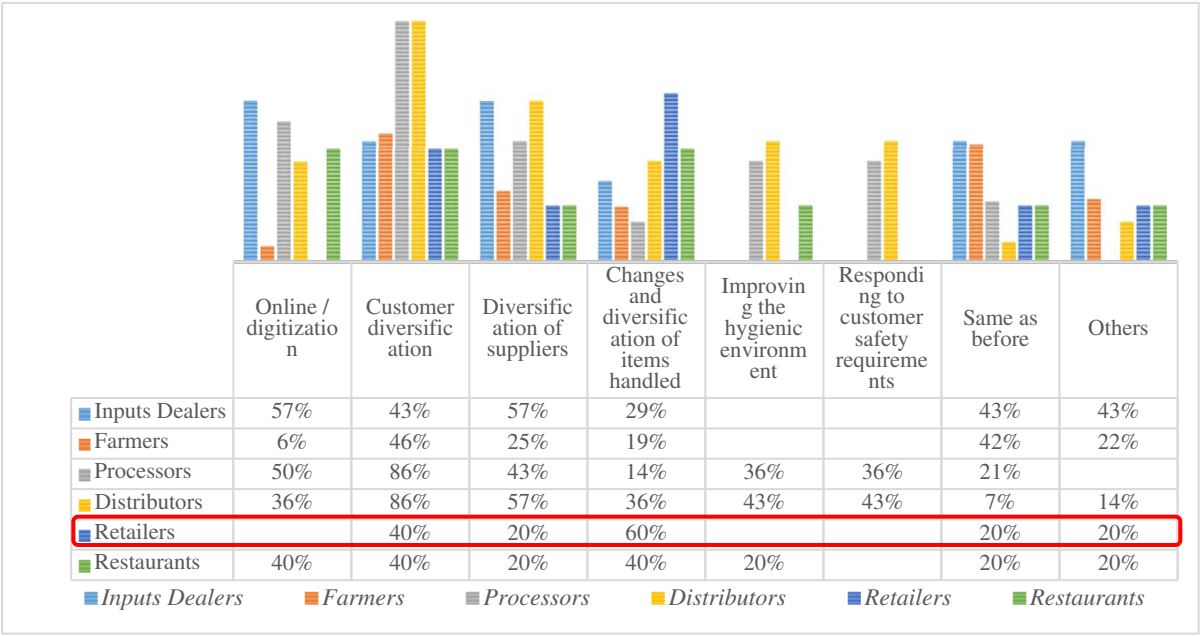
Inputs Dealers *Farmers* *Processors* *Distributors* *Retailers* *Restaurants*

Figure 3.4.81 Measures taken against COVID-19 in terms of business for retailers

Source: VC survey

5) Change of business environment

Under the impact of COVID-19, retailers have seen changes such as changes and diversification of items handled (60%) and diversification of customers (40%) and that they would like to continue the measures.



	Online / digitization	Customer diversification	Diversification of suppliers	Changes and diversification of items handled	Improving the hygienic environment	Responding to customer safety requirements	Same as before	Others
Inputs Dealers	57%	43%	57%	29%			43%	43%
Farmers	6%	46%	25%	19%			42%	22%
Processors	50%	86%	43%	14%	36%	36%	21%	
Distributors	36%	86%	57%	36%	43%	43%	7%	14%
Retailers		40%	20%	60%			20%	20%
Restaurants	40%	40%	20%	40%	20%		20%	20%

Figure 3.4.82 Changes of business environment

Source: VC survey

6) Support

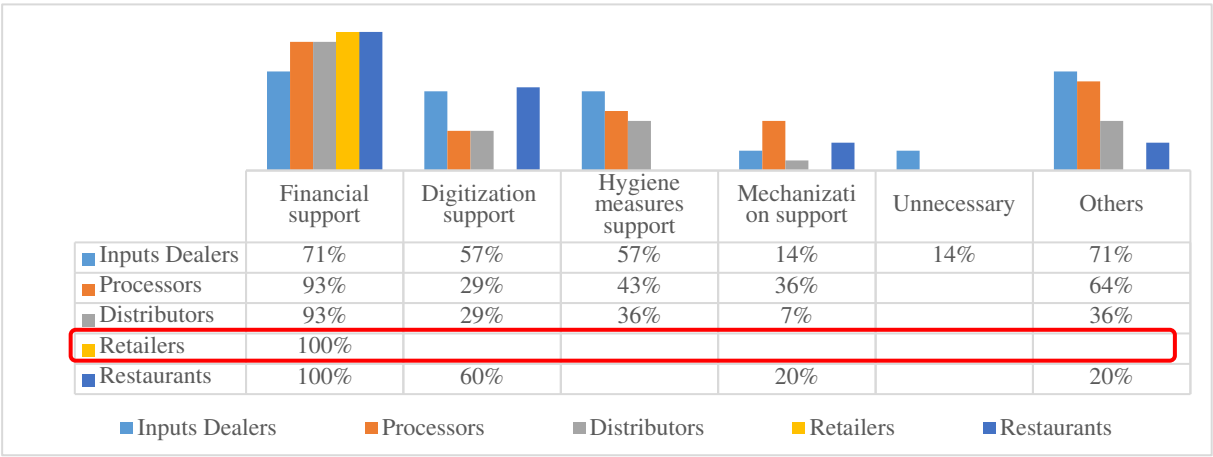
All retailers did not receive government support.

7) Challenges, Needs and Perspective

Procurement issues were difficulty of procurement due to movement restrictions, and sales issues were decrease in sales volume and a decrease in the number of customers due to a decrease in purchasing power of consumers. The impact was great until around September 2020.

To overcome that challenge, need of retailers are financial support for all retailers. However, they are accepting the changes due to COVID-19 and is demanding the ending of short-time business.

The perspective for retailers is generally positive, and they will adopt change. As the situation is recovering and vaccination is progressing, they have a positive mindset towards future life continuing their business by trying to change and diversify their products and diversify their customers.



	Financial support	Digitization support	Hygiene measures support	Mechanization support	Unnecessary	Others
Inputs Dealers	71%	57%	57%	14%	14%	71%
Processors	93%	29%	43%	36%		64%
Distributors	93%	29%	36%	7%		36%
Retailers	100%					
Restaurants	100%	60%		20%		20%

Figure 3.4.83 Needs by retailers

Source: VC survey

Restaurant

1) Overview

The 5 restaurants surveyed were all in urban areas, with 3 in Kigali city, 1 in the Western Province, and 1 in Northern Province. The target customers were 3 within the prefecture and 2 within the county. Of the 5restaurants, rice, potato, onion, and tomato were offered at 5 restaurants, maize and plantain were offered at 4 restaurants, and coffee was offered at 1 restaurant.

From April to June 2020, immediately after the occurrence of COVID-19, short-time business and movement restriction had an impact on purchasing and sales, so that income decreased.

IHADIDJA restaurant in the Nyabugogo market (Kigali city). Closed for 3 months during lockdown. In the meantime, delivered to existing customers.

Photo 3.4.9 Restaurant in Rwanda

2) Change of sales

COVID-19 adversely affected sales of food served at restaurants, with 3 restaurants decreased and 2 restaurants decreased significantly. Many of them declined during the lockdown in 2020.

Regarding the factors behind the decrease in sales, the perception of restaurants is that reduced demand (5), movement restriction (4), business restriction (4), customer decline (4), and customer business restriction (3).

3) Change of procurement

The volume of raw material procured by restaurants was adversely affected by COVID-19, and all of the target crops showed a decrease in the volume of raw material procured, and no restaurant answered that there was no change or an increase (Fig. 3.4.84). The decreased period was April to September 2020, and it was concentrated in half a year immediately after the outbreak of COVID-19. The reasons for the change in procurement volume were movement restriction (2), decrease in customers, increase in procurement price, and business restriction (1 each).

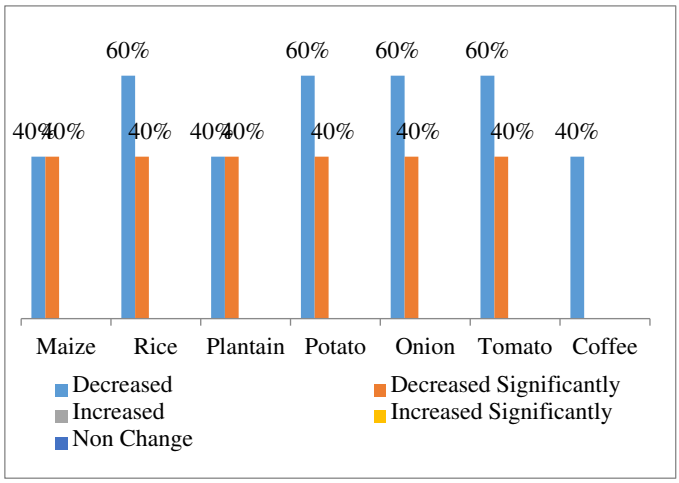


Figure 3.4.84 Change of procurement volume of restaurants

Source: VC survey

Regarding procurement prices, 2 restaurants said that plantain and potato rose, while 2 to 3 restaurants said that maize, rice, onion, and tomato remained unchanged. In addition, 1 restaurant replied that maize, rice, potato and plantain increased significantly. The price changes are said to have been seen in April to September 2020 and July to September 2021. The former is from immediately after the outbreak of COVID-19 to half a year, and the latter is the time when the third wave of infection spread, lockdown measures were taken in many areas, and the number of newly infected people exceeded 3,000 / day which was a period when the flow of people was hindered.

4) Change of customers

Regarding change in the customer segment, it is reported that the number of middle-income to low-income customers and business customers has decreased (Figure 3.4.).

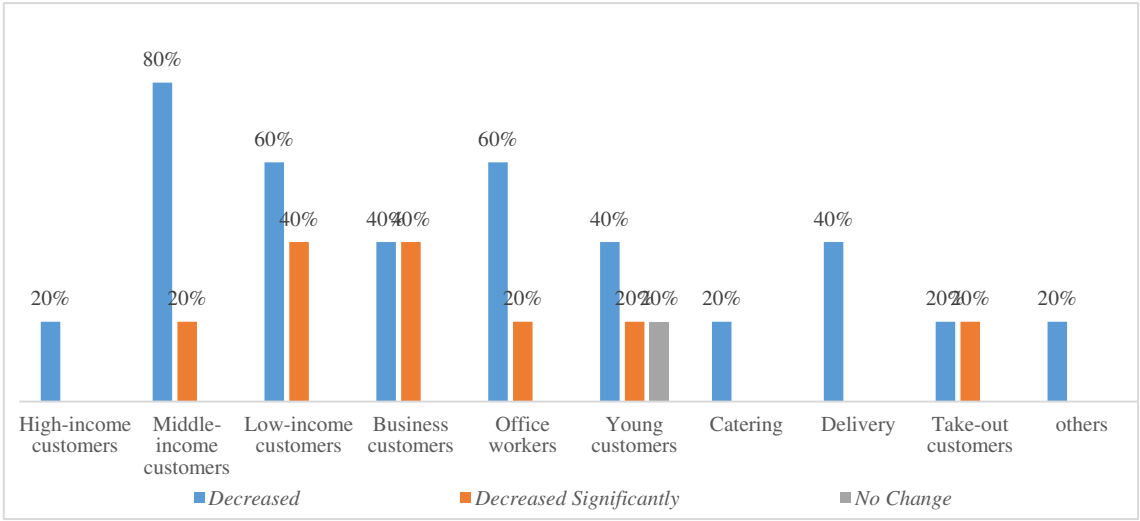


Figure 3.4.85 Change in customer segment of restaurants

Source: VC survey

The frequency of customer visits has decreased, and the total number of customers has decreased significantly. Of the restaurants surveyed, 3 out of 5 reported a decrease, and 2 reported a significant decrease in customer visit frequency. The 3 restaurants also stated that it was clear that the total number of regular customers had decreased significantly (Figure 3.4.86).

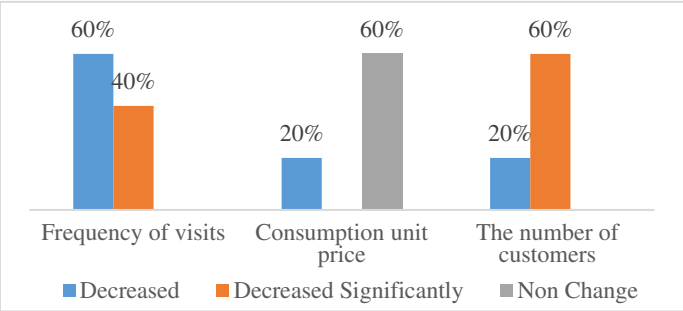
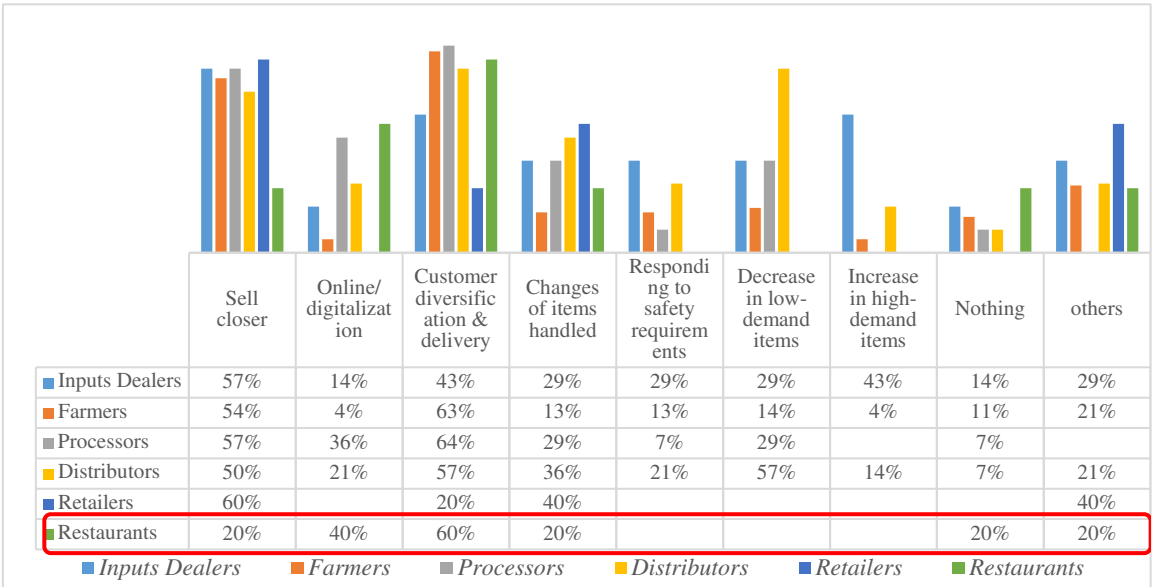


Figure 3.4.86 Change in behavior of customers of restaurant

Source: VC survey

5) Measures taken against COVID-19

The response to COVID-19 in sales, procurement, and business is as follows. In terms of sales, 60% took measure of customer diversification/ delivery, 40% took measure of online/ digitalization, which is measures against customers who cannot visit the restaurants. In terms of procurement, all restaurants took measures to purchase from close location and 60% took measures to diversify suppliers. In terms of business, all restaurants took measure of temporary dismissal and 60% took measures of infectious hygiene measures, business closure and raised new funds.



	Sell closer	Online/ digitalization	Customer diversification & delivery	Changes of items handled	Responding to safety requirements	Decrease in low-demand items	Increase in high-demand items	Nothing	others
Inputs Dealers	57%	14%	43%	29%	29%	29%	43%	14%	29%
Farmers	54%	4%	63%	13%	13%	14%	4%	11%	21%
Processors	57%	36%	64%	29%	7%	29%		7%	
Distributors	50%	21%	57%	36%	21%	57%	14%	7%	21%
Retailers	60%		20%	40%					40%
Restaurants	20%	40%	60%	20%				20%	20%

Figure 3.4.87 Measures taken against COVID-19 in terms of sales for restaurants

Source: VC survey

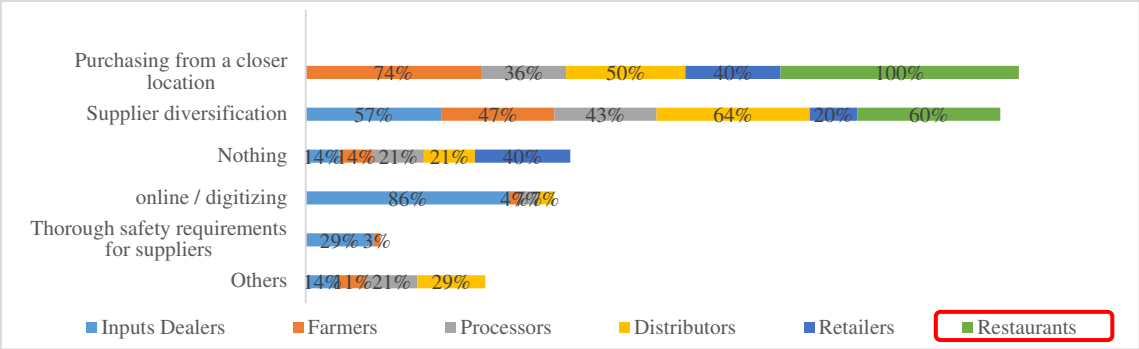
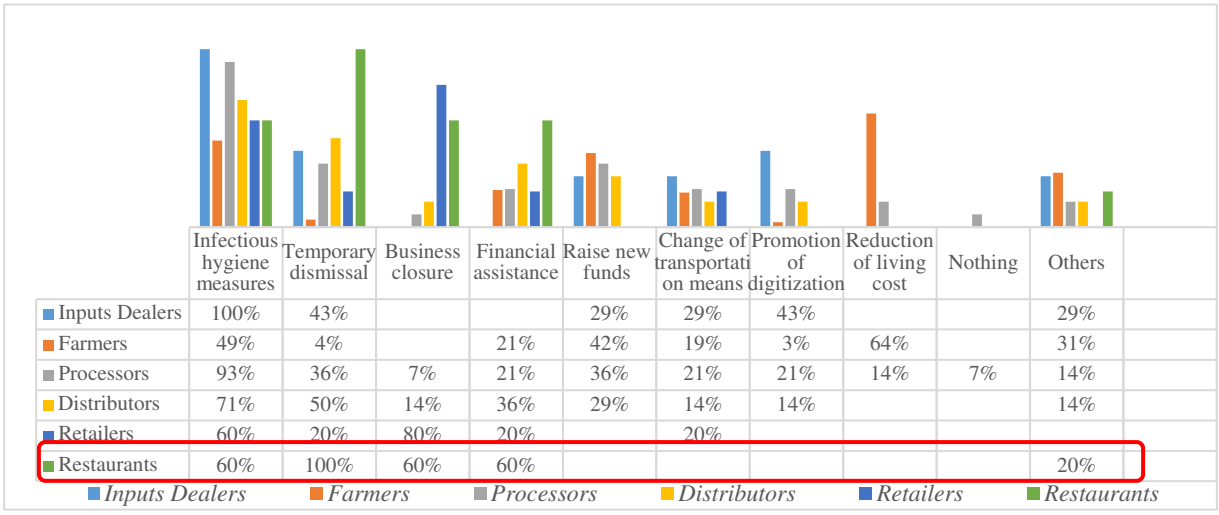


Figure 3.4.88 Measures taken against COVID-19 in terms of procurement for restaurants

Source: VC survey



	Infectious hygiene measures	Temporary dismissal	Business closure	Financial assistance	Raise new funds	Change of transportation means	Promotion of digitization	Reduction of living cost	Nothing	Others
Inputs Dealers	100%	43%			29%	29%	43%			29%
Farmers	49%	4%		21%	42%	19%	3%	64%		31%
Processors	93%	36%	7%	21%	36%	21%	21%	14%	7%	14%
Distributors	71%	50%	14%	36%	29%	14%	14%			14%
Retailers	60%	20%	80%	20%		20%				
Restaurants	60%	100%	60%	60%						20%

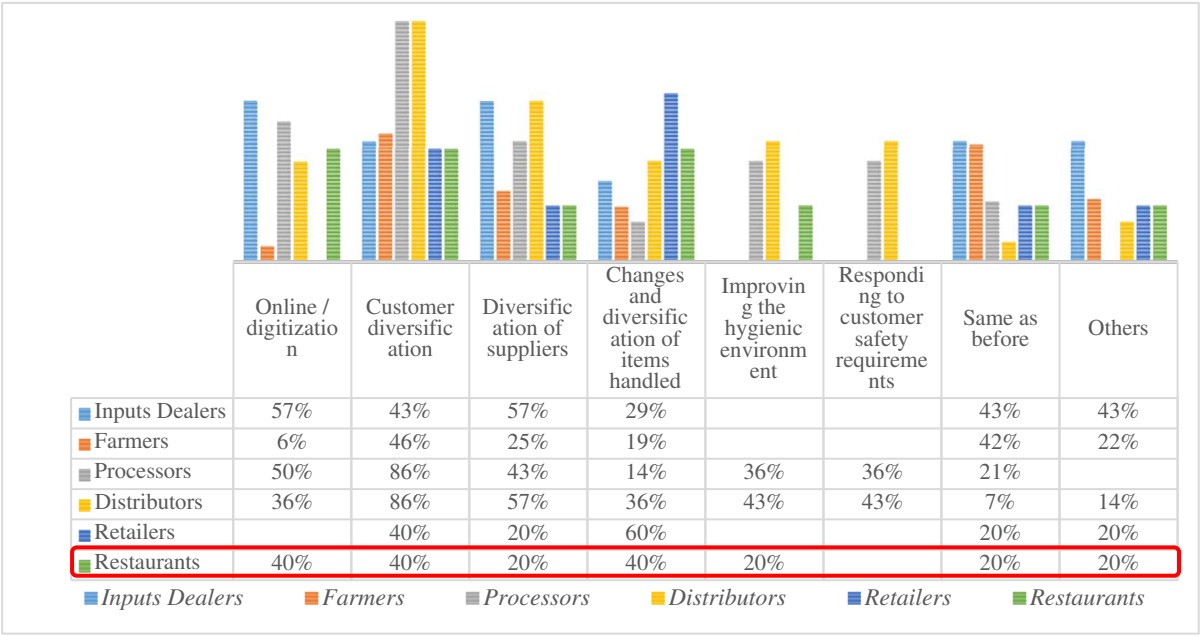
Inputs Dealers *Farmers* *Processors* *Distributors* *Retailers* *Restaurants*

Figure 3.4.89 Measures taken against COVID-19 in terms of business for restaurants

Source: VC survey

6) Change of business environment

Under the impact of COVID-19, restaurants have seen changes such as online/ digitization (40%), changes and diversification of items handled (40%) and diversification of customers (40%) and that they would like to continue the measures.



	Online / digitization	Customer diversification	Diversification of suppliers	Changes and diversification of items handled	Improving the hygienic environment	Responding to customer safety requirements	Same as before	Others
Inputs Dealers	57%	43%	57%	29%			43%	43%
Farmers	6%	46%	25%	19%			42%	22%
Processors	50%	86%	43%	14%	36%	36%	21%	
Distributors	36%	86%	57%	36%	43%	43%	7%	14%
Retailers		40%	20%	60%			20%	20%
Restaurants	40%	40%	20%	40%	20%		20%	20%

Figure 3.4.90 Changes of business environment

Source: VC survey

7) Support

All restaurants did not receive government support.

8) Challenges, Needs and Perspective

Procurement issues were difficulty of procurement due to movement restrictions, and sales issues were decrease in sales due to decrease in the number of customers. The impact was great until around September 2020.

To overcome that challenge, need of restaurants are financial support for all restaurants, digitization support for 3 restaurants. There was a mindset of finding new customers.

The perspective for restaurants is generally positive, and they will adopt change. They believe that the situation will recover once normal business is resumed. While trying to online / digitize, change and diversify their products, and diversify customers, they will continue their business and have a positive mindset toward their future life.

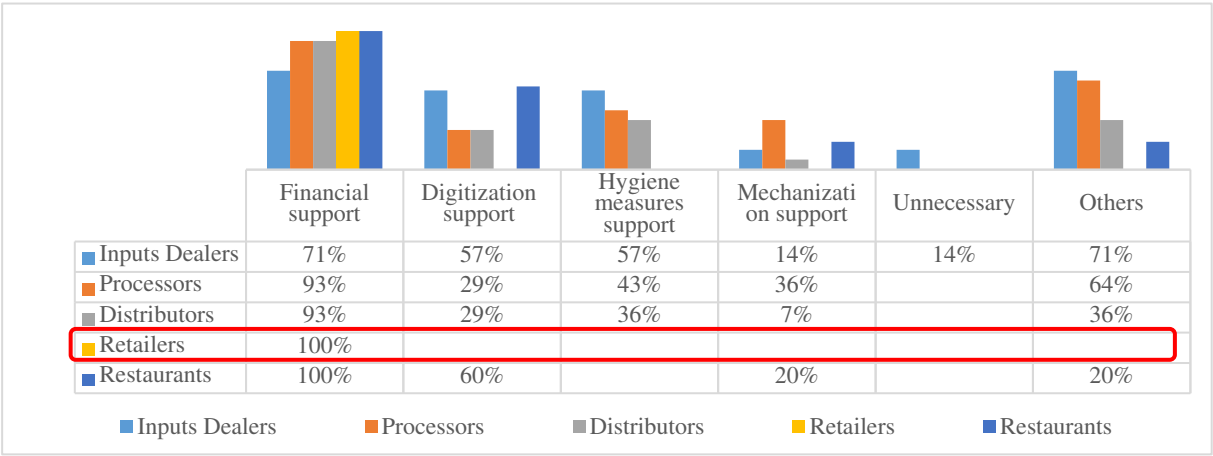


Figure 3.4.91 Needs by restaurants

Source: VC survey

(7) Impacts on Consumption Stage and Underlying Factors

1) Overview

The value chain survey of the impact and background of COVID-19 on consumers was conducted on the following 21 people (Figure 3.4.92).

Lifestyles have changed due to the decline in incomes of many consumers from April to June 2020. The change which most consumers experienced were food life such as increased food costs, change in eating place to home, and change in eating habits. The background to this is that food price has risen, home consumption has increased, income has decreased, and food expenses have been saved. Many consumers have adopted change and continued to live without the support of government and development partners. Currently, the situation of COVID-19 is improving, so they have a good prospect for their future life.

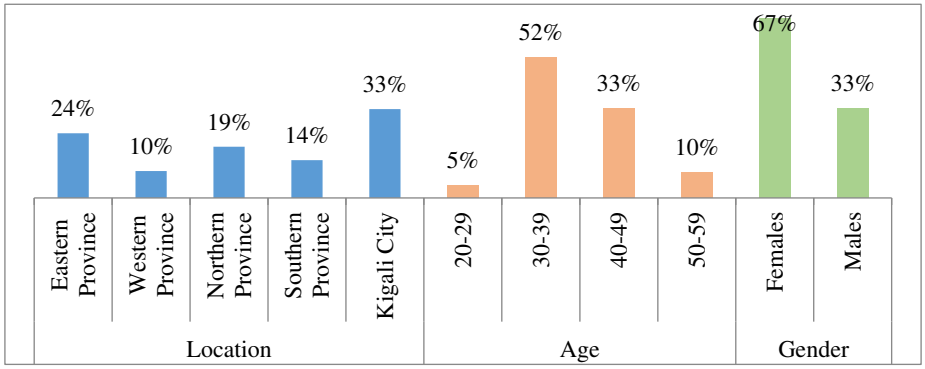


Figure 3.4.92 Basic information of consumers

Source: VC survey

2) Change of Consumption of respective crops

Significant reduction in consumption were seen in tomato, rice and potato in April to June 2020 ((Figure 3.4.93). Background of the decrease in consumption was a decrease in consumer income (17 people), increase in tomato, potato and rice prices (13 people), and decrease in consumption of high-priced

products (5 people). On the other hand, consumption of maize and plantain tended to increase. Background if the increase in consumption was decrease in prices (9 people) and increase in consumption of low-priced products (5 people). In addition, along with the decrease in consumption, the frequency of purchases decreased by 14 people and decreased significantly by 5 people.

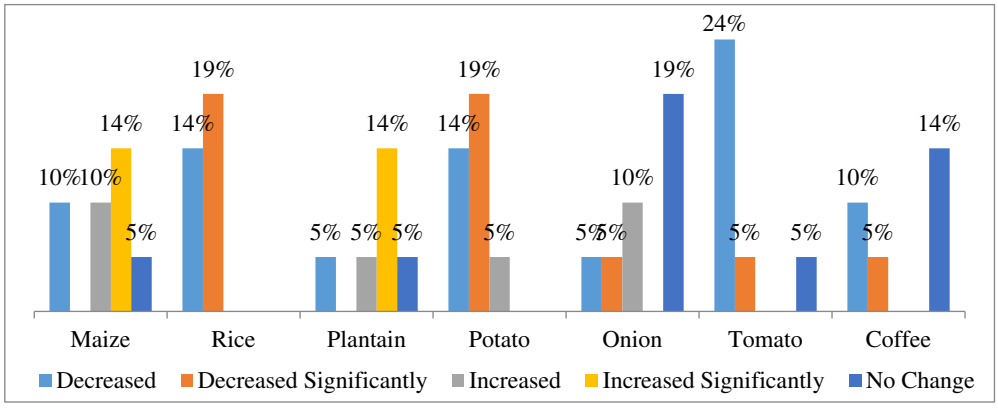


Figure 3.4.93 Change of consumption volume of consumers

Source: VC survey

Regarding changes in the unit price of purchased crops, 4 out of 21 people reported that the unit price of maize decreased, and the unit price of rice decreased. Meanwhile, another 4 said that the unit price of maize has risen significantly. The difference in the unit price of maize is presumed to be due to the location, but the increase / decrease in the purchase unit price of all crops occurred mainly in April to June 2020 (Figure 3.4.94).

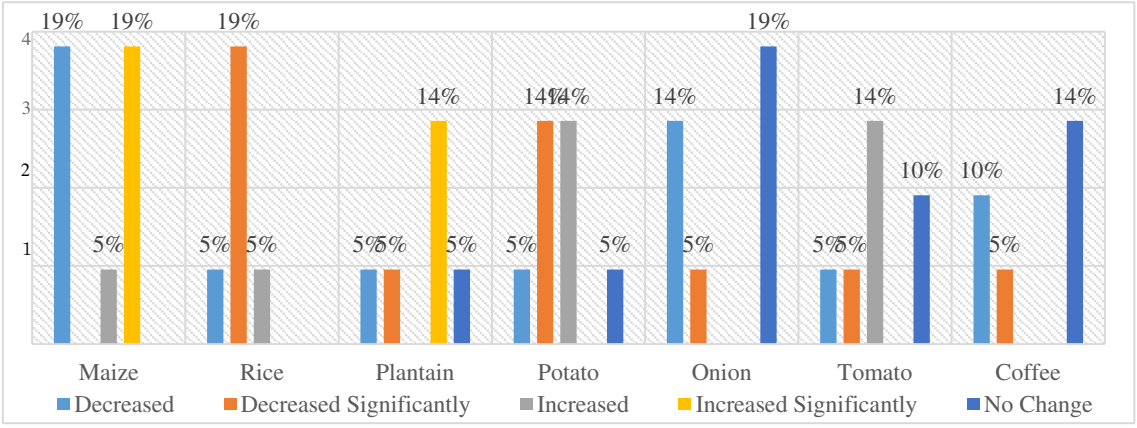


Figure 3.4.94 Change of purchase unit price of consumers

Source: VC survey

3) Changes in household income, period of change

All consumers surveyed reported a decline in income. Of the 21 consumers, 7 (33%) had a decline in income and 14 had a significant decline in income.

4) Measures taken against COVID-19

As for changes in consumer behavior due to the impact of COVID-19, stay home (90%), purchase cheap food (43%), purchase easy-to-purchase food (33%), reduce meal amount (5%) and change jobs (5%). Shopping behavior has also changed dramatically. Due to the decrease in household income, new measures were taken to live, such as reduction in purchase frequency (91%), reduction in shopping unit price (57%), and reduction of cash payment (43%) (Figure 3.4.95).

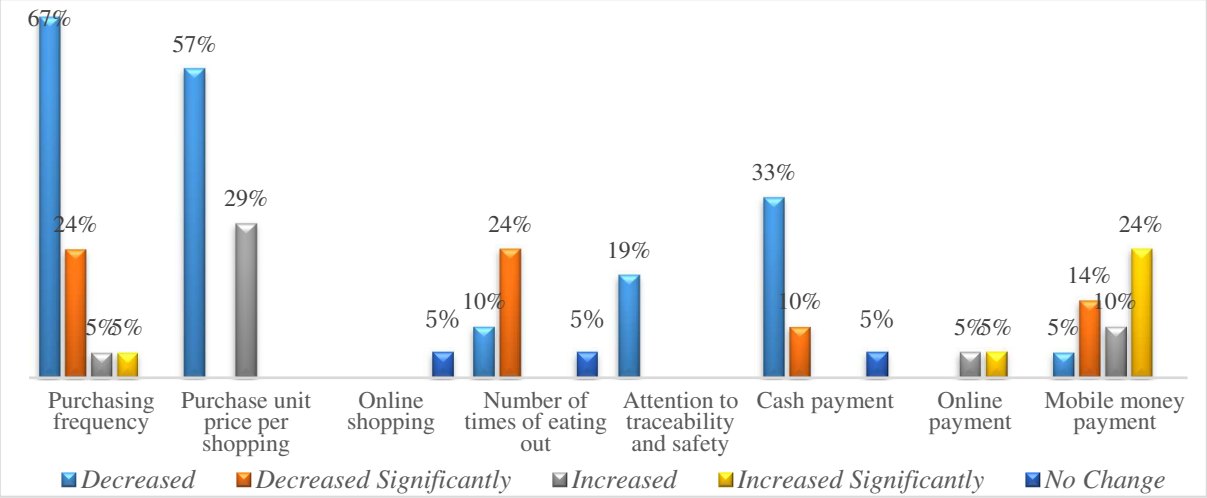


Figure 3.4.95 Change of consumer behavior

Source: VC survey

5) Support

Of the 21 consumers, 17 did not receive government support, but development partners provided 2 consumers with infection control support, one with income compensation, and one with rice and maize flour.

6) Challenges, Needs and Perspective

Consumers say that the risk of COVID-19 infection, financial risk, psychological impact, and life-threatening impact had adverse or minor adverse effects. Most of the respondents answered that they had the most adverse effects on their lives in April to June 2020 and January to March 2021.

The number of infected people is declining, many people have been vaccinated, and the situation of COVID-19 has improved, but food prices have not returned to before COVID-19, and all respondents answered income compensation is necessary. In addition, there was one consumer who wanted support for infection control and one who wanted removal of movement restrictions.

Many had a slightly better perspective for the future. For consumption preference kept in mind by consumers in the future, consumers answered to shop with an emphasis on cheapness (60%), the same as before COVID-19 (28%), and to use delivery services (8%) (Figure 3.4.96).

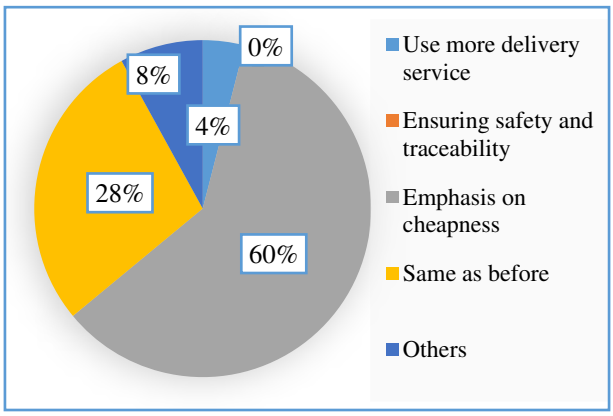


Figure 3.4.96 Consumption preferences kept in mind by consumers in the future

Source: VC survey

(8) Impacts on the relationship between VC Stages and Factors

Input - Production

Planting delay due to input delay. Due to lack of seeds, the amount of planting decreased. Fertility decreased due to lack of fertilizer. Outbreak of pests due to lack of pesticides.

Production - processing

Shortage of processing raw materials due to a decrease in production. Shortage of imported processing raw materials due to restrictions on imports of products. Processing capacity declined due to import restrictions on processing materials and equipment.

Production, processing - distribution

Due to the decrease in production and processing, the distribution volume decreased. Falling producer price. Transportation of produced and processed products is hindered. Post-harvest loss due to lack of refrigerating room for storing products. Distribution within the region (especially imports and exports with DRC) decreased due to the obstruction of illegal trade.

Distribution - Sales

Sales prices rose due to rising distribution costs. Sales volume decreased due to decrease in distribution volume.

Sale - consumption

Due to the rise in sales price and the decline in consumer income, the purchase volume of general consumers decreased, and consuming products changed. Purchase volume decreased due to decreased demand from large customers.

3.1.5 Impacts on FVC in the Country

(1) Common and Differentiated Effects by Crops and Underlying Factors

The extent of impact of 7 target crops in Rwanda at each VC stage are shown in Table 3.4.22.

Table 3.4.22 Distribution type and extent of impact of target crops by COVID-19

VC stage	Crop						
	Distribution among corridor		Distribution within corridor			Domestic distribution	Outside regional distribution
	Cereals/staple food	Cereals/staple food	Horticultural crop	Horticultural crop	Horticultural crop	Cereals/staple food	Export / industrial crop
	Rice	Maize	Potato	Onion	Tomato	Plantain	Coffee
Input	Large	Small	Large	Large	Large	Small	Large
Production	Middle	Small	Small	Large	Large	Small	Small
Processing	Large	Small	Large	-	Large	-	Small
Distribution	Large	Large	Large	Large	Large	Middle	Small
Sales	Large	Large	Large	Large	Large	Middle	Middle
Consumption	Large	Large	Large	Large	Large	Middle	Small

Source: VC survey

- **Common Effects across Crops**

The common effect of crops is that the distribution volume of input materials and agricultural products has decreased, and the background is that distribution has been hindered by movement restrictions, border closure, and export restrictions. At the time of lockdown in the spring of 2020, the government issued a travel pass, which made it possible to move from one place to another for legal trader. However, due to infection control between international borders and prefectural borders, strict management system, more complicated customs clearance procedures, and disruption of logistics, it was not a normal logistics. In addition, in terms of agricultural products, illegal trade was vanished, which is said to account for 40% of Rwanda before COVID-19 pandemic occurred.

Due to the confusion in distribution, the price of input materials increased, and the production cost of farmers rose, but the producer price of agricultural products did not rise so much, the distribution cost rose, and the selling price also increased. This is the effect that occurred in common. From this fact, it can be inferred that the producer was in a weak position, and even though the production cost was high, the price of agricultural products could not be raised due to the pressure from wholesalers and distributors. Moreover, it was thought that the consumer, who is the final actor in the VC stage, also had a negative impact on price increases. The greatest impact was in April-June 2020, and as the restrictions were gradually eased, the distribution volume and sales volume are returning to their original level, and the price at each VC stage are also settling down. However, final consumer price have not returned to their original level and have continued to have long-term effects.

- **Differentiate Effects across Crops**

Looking at Table 3.4.22, it can be said that the area with the most blanks are plantain and coffee, and the impact of COVID-19 was small. The common point of these crops is that they are perennial crop and do not require an initial investment each year, so the impact of the first stage of VC input was small. Therefore, apart from causes other than COVID-19 for plantain, there was almost no effect of COVID-19 on the production and processing stages. As mentioned above, distribution has had an impact on all crops, and the distribution of both plantain and coffee has decreased. However, since plantain are

distributed domestically, there is no illegal trade, and there are many self-consumption and transactions in rural areas. Thus, there was no significant impact on distribution-sales-consumption. Coffee is an export crop, but its supply chain is established compared to other crops, and distribution stagnated immediately after the outbreak of COVID-19, but it can be said that it was a short-term effect and recovered in 2021.

Tomato, onion, and potato are horticultural crops that are mainly distributed within the region. Horticultural crop is annual crop and require an initial investment each year, which has been adversely affected by the first stage of VC input. Since it is a fresh product and the cold chain is not developed, the product cannot be stored for a long period of time so that no sales destination can be found, and many post-harvest losses occurred. As mentioned above, the distribution volume and sales volume decreased, post-harvest loss occurred in the process, the selling price increased, and consumers with reduced income demanded staple food products. That is, the purchase volume of horticultural crops, which are relatively expensive and do not give a feeling of fullness, has decreased. As of September 2021, consumer income is gradually returning to COVID-19, but consumer prices for tomato and onion have not returned to their original levels, and consumer demand has not risen so that value chain of sales remains stagnant. It is reported that the consumer price of potato did not fluctuate around COVID-19, but the Rwandans recognize that the feeling of fullness per weight is higher in maize, and the demand for potatoes has not risen.

Rice and maize are annual grains / staple foods distributed in the region. These crops were adversely affected by the first stage of VC input due to the initial investment required each year, but since they are not fresh produce, they are less affected than horticultural crops due to their good storage. After the outbreak of COVID-19, the rice cultivated area of small-scale farmers decreased significantly, probably due to the large inflow of cheap Tanzanian rice, and domestic rice processing, distribution, and sales industries stagnated. Consumers have less opportunity to consume expensive and rarely distributed domestic rice, while consumption of cheap and high-volume imported rice increased. As of September 2021, the inflow of Tanzanian rice has continued, and the distribution of domestic rice has stagnated, and the impact has been prolonged. Although the distribution and sales volumes of maize have stagnated, maize is said to have a high sense of fullness per weight, according to the Rwandan people's perception. In addition, because it is cheaper than other staple crops, the demand in COVID-19 situation is high, the number of producers has increased, and the consumption of general consumers has also increased. In 2021, as consumer income improved, demand is returning to normal, and producers also returned to their original cultivated crops, returned to their original occupation instead of agriculture, and had short-term effects.

(2) Trends and Underlying Factors in the Country

1) Trends by Crop types

The VC stage most affected by COVID-19 was distribution (input materials, products, processed products). For this fact, plantain, and coffee, which are perennial crops that do not need input materials every year, had little effect. In addition, plantain is mainly distributed domestically, and border trade is low, and coffee is mainly exported, and the supply chain has already been built compared to other crops.

Thus, the impact was small.

On the other hand, since horticultural crops are fresh products, when distribution was stagnant, many post-harvest losses occurred, which had been greatly affected. Maize and rice are preservable, but for rice, Tanzanian rice inflowed, which had some effect.

Table 3.4.23 Trends in impact by crop / distribution type

VC type	Cereals/ staple food	Horticultural crop	Export crop
Domestic distribution	Plantain		
Regional distribution			
Neighboring country			Coffee
Within corridor		Potato, onion, tomato	
Among corridor	Maize, rice		
Outside region			Coffee

Green: small impact, blue: middle impact, gray: large impact
Source: VC survey

2) Change of Crop Flow

- Rice: Import restriction from Asia → Inflow from Tanzania
- Maize: Increased demand of general consumers → Increase sales volume of general consumers
- Plantain: No change
- Horticultural crops: Decrease in demand of general consumers → Decrease in distribution and processing → Decrease in sales volume of general consumers
- Coffee: No change

(3) Underlying Factors of Vulnerability in FVC in the Country

- Domestic distribution: plantain, Distribution outside region: coffee
  - ✓ Permanent crops do not require an annual initial investment.
  - ✓ Plantain is often consumed by themselves and traded in rural areas, and there are few illegal trades.
  - ✓ Coffee is an industry that receives generous government support, has a well-established supply chain, and has few illegal trades.

- Distribution among corridors: rice, maize
  - ✓ Annual crops require an initial investment each year (as well as horticultural crops).
  - ✓ Since illegal trade was carried out before COVID-19 pandemic, it had a great impact on distribution and sales (same for horticultural crops).
  - ✓ It is a crop that can be stored for a long time, and it is easy to distribute among corridors, and the distribution channel of rice changed.
  - ✓ Demand for staple food is increasing, and consumption is increasing, especially the conversion of cultivated crops to maize.

- Distribution within corridor: tomato, onion, potato

✓ Horticultural crops are poorly preserved and are lost due to disposal by producers, distributors and distributors.

✓ Demand for horticultural crops declined, consumption declined, and farmers are shifting from horticultural crop cultivation to other crops.

✓ Originally, farmers practice fragile business which find buyers after production.

Table 3.4.24 Factors and background of the impact

Crop/VC	Impact	Direct factor	Background (existence of vulnerability)
General	・Decrease in distribution of input materials and products ・Price increase except production stage ・Price decrease of farmers ・Price increase of consumers ・Post-harvest loss ・Upstream supply chain (production-processing) recovered, downstream (distribution-consumption) continue the impact of consumption reduction ・Economic impact of farmers: low-medium level, distributor/sales : medium-high level	・Distribution obstruction (movement restriction, border closure, export restrictions)	・illegal trade ・Vulnerable business
By crop			
Rice	・Decrease in cultivation of small-scale farmers ・Decrease in distribution and consumption of domestic rice ・Increase in distribution and consumption of imported rice	・Distribution obstruction ・Movement restriction ・Import restriction from Asia ・Import of cheap Tanzanian rice	・Unstable price of domestic rice ・Vulnerable business ・Good preservability
Maize	・Increase of farmers (conversion from other crop) ・Decrease in processing and distribution volume ・Post-harvest loss ・Increase in demand and consumption of general consumers ・Consumption change from potato to maize	・Distribution obstruction ・Movement restriction ・Increase in demand for staple food ・Income decline	・Illegal trade ・Good preservability
Plantain	・Increase in smartphone app users ・Decrease in distribution volume	・Distribution obstruction ・Movement restriction ・Major training by face-to-face	・Mainly domestic distribution ・Perennial crop does not need input every year.
Tomato	・Post-harvest loss ・Decrease in distribution volume ・Decrease of export ・Processing industry stagnation ・Price increase of consumers ・Decrease in demand and consumption ・Lack of nutrition	・Distribution obstruction, logistics quality ・Movement restriction ・Insufficient processing material ・Income decline	・Illegal trade ・Vulnerable business ・Bad preservability ・Annual crop need input every year Annual crops ・Low level of processing
Onion	・Post-harvest loss ・Decrease in distribution volume	・Distribution obstruction, logistics quality	・Illegal trade ・Vulnerable business

	・Decrease of export ・Price increase of consumers ・Decrease in demand and consumption ・Lack of nutrition	・Movement restriction ・Income decline	・Bad preservability ・Annual crop need input every year Annual crops
Potato	・Post-harvest loss ・Decrease in distribution volume ・Decrease of export ・Processing industry stagnation ・Price increase of consumers ・Decrease in demand and consumption ・Lack of nutrition ・Consumption change from potato to maize	・Distribution obstruction, logistics quality ・Movement restriction ・Insufficient processing material ・Income decline	・Illegal trade ・Vulnerable business ・Bad preservability ・Annual crop need input every year Annual crops ・Low level of processing
Coffee	・Decrease of export ・Increase in online transaction	・Distribution obstruction, logistics quality ・Movement restriction ・Major training by face-to-face	・Perennial crop does not need input every year. ・Supply chain establishment
By stage			
Input	・Decrease in supply ・Supply delay	・Distribution obstruction ・Movement restriction ・Import restriction ・Price increase of input material	・Bilateral transaction ・Overseas dependence
Production	Decrease in production volume Yield reduction Crop conversion Post-harvest loss Decrease of producer price	・Supply of input material restriction ・Change in demand ・Decrease in distribution volume ・Movement restriction	・Delayed modernization ・Weak position of producers ・Lack of funds
Processing	Decrease in processing volume	・Distribution obstruction ・Insufficient raw material (especially imports) ・Insufficient processing equipment (import goods) ・Movement restriction ・Compliance with social distance	・Import dependence ・Preservability ・Value added ・Hygienic quality
Distribution	Decrease in distribution volume Decrease in distribution of domestic products Decrease of illegal trade Post-harvest loss	Distribution obstruction Import restriction Movement restriction	・Bilateral transaction ・Distribution efficiency / compatibility / hygiene ・Preservability ・Illegal trade
Sales	Decrease in sales Increase of waste volume Increase of retail price Post-harvest loss	Decrease in demand Movement restriction Distribution obstruction Decrease in supply	・Many long traditional transactions of VC
Consumption	Decrease in consumption of horticultural crops (potato → maize, etc.) Increase in consumption of low-priced crops Decrease in consumption by large customers	Income decline, decrease in demand Movement restriction Compliance with social distance	・Lack of nutritional knowledge

By type			
Domestic distribution (plantain)	・Increase in smartphone app users ・Decrease in distribution volume	・Distribution obstruction ・Movement restriction ・Major training by face-to-face	・Mainly domestic distribution ・Perennial crop does not need input every year.
Neighboring country distribution (coffee)	・Decrease of export ・Increase in online transaction	・Distribution obstruction, logistics quality ・Movement restriction ・Major training by face-to-face	・Perennial crop does not need input every year. ・Supply chain establishment
Within corridor distribution (potato, onion, tomato)	・Decrease in distribution volume ・Decrease of export ・Processing industry stagnation ・Post-harvest loss ・Price decrease of farmers ・Price increase of consumers ・Decrease in consumption ・Lack of nutrition	・Distribution obstruction ・Movement restriction ・Insufficient processing raw material ・unable to stand long VC	・Illegal trade ・Vulnerable business
Among corridor distribution (maize, rice)	・ Decrease of rice cultivation area by small-scale farmers ・ Decrease in distribution and consumption of domestic rice ・ Increase in distribution and consumption of imported rice ・ Decrease in processing and distribution volume ・ Decrease in producer price ・ Increase in maize consumption by general consumers	・Distribution obstruction ・Movement restriction ・Inflow of cheap imported rice ・Increase in demand for staple food	・Unstable price of domestic rice ・Vulnerable business ・Illegal trade
Outside regional distribution (coffee)	・Decrease of export ・Increase in online transaction	・Distribution obstruction, logistics quality ・Movement restriction ・Major training by face-to-face	・Perennial crop does not need input every year. ・Supply chain establishment

(4) How Resilient FVC Should be in the Country

With reference to the above survey results and good practices shown below, the ideal form of FVC with high resilience is shown as follows.

- Development of coordinating mechanism

  Currently, there is no coordination between VC actors, so the impact of COVID-19 has caused the VC to be interrupted, so that the coordination mechanism between VC actors should be strengthened.

- Realization of smart logistics

  Non-regular transactions, which account for 40% of Rwanda's agricultural trade, decreased by 72.5% compared to January-November 2019 and the same month of the following year (IGC, 2021). Improve input materials, smooth distribution of crops, and non-regular transactions.

- Farming based on commercial flow

Originally, farmers practiced agriculture by securing sales destinations after producing, but due to the impact of COVID-19, they could not secure sales destinations more than usual, and surplus products were generated. Farmers should shift to produce crops after ascertaining market trends and securing sales destinations.

- Development of ICT

  The e-commerce platform introduces a system that allows farmers to interact directly with buyers, consumers and exporters without relying on intermediaries. The shorter the value chain, the higher the resilience. Expectations for cultivation apps and online training.

- Infrastructure development

  Due to the lack of sufficient cold chain distribution network, post-harvest loss, in which agricultural, forestry and fishery products and processed foods are spoiled in the process of storage and distribution, mainly for perishable horticultural crops, has become a major issue during COVID-19 situation. Along with the development of refrigeration facilities and storage, it is also important to create a mechanism that does not disconnect the cold chain when crossing VC stage.

The following are examples of ongoing/completed projects/measures in Rwanda toward resilient FVC.

Table 3.4.25 (Reference) Ongoing/completed projects/measures in Rwanda toward resilient FVC

Good practice	Practitioner (VC stage)	Contents, background, factors, etc. referred to as good practice
Creation of agro-business clusters	USAID Learning, Evaluation, and Analysis Project (LEAPIII) (Input, Production, Distribution)	This is a 5-year project underway in 2017-2022. One of the goals is to increase the resilience of agriculture and food systems, and one of the methods is to establish 30 agro-business clusters (platforms) that connect producers' cooperatives and buyers. According to the 2021 mid-term evaluation, these platforms have connected input dealers, co-operatives, processors, aggregators, logistics companies, financial institutions, and equipment dealers among districts. And created competition, the agricultural district office established partnerships among input dealers, producers, and buyers to support business deals. On the other hand, in some clusters, the number of purchasers of specific products was small so that the concerns in cluster management by private sectors was weak, and the continuous operation of the cluster depended on the authorities of the district, which is a challenging difficulty. Furthermore, the cluster is currently raising operating funds from the project, but in the future, the issue will be how the members of the cluster will take the initiative and how the members themselves will generate the operating costs of the cluster. Also, at the agro-business cluster meeting at the beginning of the season, producers shared production forecasts and informed buyers of the quantity and quality they were trying to buy. However, selling price negotiations were not held until after the harvest. Stakeholders were unable to set prices in advance for products for the domestic and regional markets due to the large price fluctuations. Price negotiations in advance restrict farmers in a sales contract. This was because if a farmer sold it elsewhere at a high price, it would be a breach of contract. (In agro-business cluster activities, USAID did not intervene in contract support). https://pdf.usaid.gov/pdf_docs/PA00XDMN.pdf
Facilitation of contract	Same as above	This is a 5-year project underway in 2017-2022. One of the goals is to increase the resilience of agriculture and food systems, and one of the methods is to

farming		promote contract cultivation. Under contract farming arrangements, buyers and producers agree on contract terms before the start of the season. Buyers usually provide input material and may also provide extension services to ensure that the quality and yield of the crop meets the buyer's criteria. The project focused on contract farming at irrigation sites that have the potential to produce high value-added crops for the export market, ideal for contract farming arrangements. In the 2021 mid-term evaluation, farmers who made contract farming arrangements improved their profits through contract farming. They cultivated and sold higher value-added crops, increased yields with superior input materials and extension services provided by buyers, sold at better prices, and reduced post-harvest losses. The project helped implement contract farming arrangements (contract between farmer groups and exporters) by educating farmers groups on how contractual obligations and contract farming arrangements are structured.
Establishment of VC platform	RIU (Research into Use) Programme of Government of United Kingdom (All VC stages)	With the support of the RIU program, the maize platform, cassava platform, potato platform, and rural platform were established in 2008-2010. The aim was to deal with production, processing, and market-related constraints, to have many stakeholders use new knowledge to improve profitability at each VC stage, and to develop organizational coordination between VCs. In the cassava platform example, platform members from all VCs get together for comprehensive and lively discussions, identifying production constraints and solutions, developing and breeding cassava mosaic virus resistant varieties, an investment group for processing was formed, a partner who was responsible for developing a new market appeared, and VCs were flowing smoothly. It was functioning when RIU directly supported, but after that, the activity gradually decreased due to the lack of a clear business plan, the fact that the role of each VC was not known to the people concerned, and the failure in the processing stage of cassava discouraged the people concerned. https://assets.publishing.service.gov.uk/media/57a08b7b40f0b64974000ba4/riu09rw-cassava-ph-out-plat.pdf
Establishment of Logistics platform	DP World (Distribution, sales)	UAE's DP World launched the Kigali Logistics Platform in 2019. Since the start of operations, the turnaround time (the time from when trucks start lining up in front of the gate to the completion of container loading / unloading work) has been reduced from 10 to 14 days on average to 3 days. It serves as a gateway to central Africa, connecting Rwanda with neighboring countries such as the DRC, Burundi, Uganda, Tanzania and Kenya, and access to the port of Mombasa in Kenya and Dar es Salaam in Tanzania to the sea. The facility utilizes state-of-the-art technology to ensure maximum security and transparency for its customers. Customers can access real-time tracking via their smartphones and online portals. With the development of highly transparent logistics, it is expected that illegal transactions will decrease. https://www.dpworld.com/news/releases/kigali-logistics-platform-opens-with-the-potential-to-benefit-rwandan-businesses-with-up-to-50-million-in-logistics-savings/
Smart logistics and e-commerce business	DMM.HEHE (Distribution)	DMM.HEHE was grouped in 2017 after the Japanese DMM Group acquired Rwanda's IT company HEHE Labs. They are working to develop cutting-edge technology solutions such as a comprehensive e-commerce platform, digital payment integration, marketing services, and end-user logistics services for local and global delivery. Since COVID-19, DMM.HEHE has partnered with two major retailers (supermarkets) in Rwanda to provide customers with groceries and other necessities using DMM.HEHE's smart logistics. https://techbuild.africa/smart-logistics-ecommerce-rwandan-startup-dmm-hehe-digitising-africas-trade-ecosystem/
Pyrethrum project	SC Johnson, USAID, Texas A & M	From 2007 to 2015, the project aimed to improve farmers' profits and living standards by increasing the production of pyrethrum and improving the quality of pyrethrum. As a result, 1) cooperatives were established to promote best practices for harvesting and transporting pyrethrum, 2) groups of farmers were

	University (Production, Sales)	reorganized within the cooperatives. Then, the middleman who was sucking up money from the pyrethrum value chain was excluded, and the profit of the farmer was secured, 3) agricultural technology was taught, and the income per unit area increased. Marketing by cooperatives is the keyword. https://www.scjohnson.com/en-gb/our-purpose/social-responsibility-news/community-and-economic-development/sustainable-farming-and-economic-development-in-rwanda-sc-johnson-supports-pyrethrum-flower-farming
The FO4ACP programme	IFAD, OACPS (Organization of African, Caribbean and Pacific States), EU (Production / Sales)	In Rwanda, there is an organization called "Ingabo Syndicate", which is a group of agricultural cooperatives, which supports each VC stage of about 15,000 small-scale farmers, strengthens their technical and economic capabilities, and supports to become a powerful market actor. More than half of the syndicate members produce cassava, and there are many cassava VC services. The most important initiative is to promote partnerships between co-operatives and downstream businesses. In other words, contract cultivation brings long-term and fair profits to individual farmers. However, the agreement (delivery time, quantity, price, etc.) between the cooperative and the processing company and the agreement between the cooperative and the farmer were not formal and there was no contract. Farmers sold to other high-priced buyers, co-operatives couldn't sell enough to processing companies due to insufficient deliveries, processing companies bought from cooperatives at low prices, and many other problems arose. Syndicates have intervened in these cases, making it possible to build good relationships between cooperatives and processing companies, sell the right amount at the right time, and make timely payments. IFAD, the OACPS and the European Union – helps it go the extra mile, allowing it to further extend the technical support it provides to cooperatives and individual farmers. https://www.ifad.org/en/web/latest/-/ingabo-syndicate
Online ToT and farmer training	International NPO (CABI) (production)	CABI developed a maize production digital learning solution in 2021. Digital learning solutions are web-based management portals and android apps. The aim is to update the agricultural knowledge of the extension workers by effectively using the digital tools of maize production and developing the skills of the extension workers. It can also be used by farmer groups. Face-to-face training that distributes paper-based content is worn out over time, inconvenient, and can be bulky depending on the format. Online training has the advantage of preventing infectious diseases and managing the latest information with only app. https://blog.cabi.org/2021/03/16/strengthening-extension-trainings-through-digital-tools-in-rwanda/
Support for launching cold chain development base	Department for Environment, Food & Rural Affairs of UK government (DEFRA) (Distribution)	As of March 2021, Kigali's African Center of Excellence for Sustainable Cooling and Cold Chain (ACES) has begun to be established with US $ 3.5 million (£ 2.4 million) in funding from DEFRA. ACES will help African farmers bring their produce to market quickly and efficiently and will reduce food loss, increase farm profits, and create jobs. Moreover, it aims to improve the cold chain to enable the proper management of vaccines, which are globally recognized as an important challenge for COVID-19 prevention. Along with the establishment of the base, a lab will also be set up to provide on-site technical and business support as an environment that enables the spread of sustainable cold chains. It is important not only to develop infrastructure but also to develop cold chain logistics techniques and operational know-how. https://www.cranfield.ac.uk/press/news-2021/africas-sustainable-cooling-centre-gets-multi-million-funding-boost

(5) Adaptation and Counter Measures in the Country and Potential Cooperation

The following are the measures to deal with the factors of impact (direct factors) and the existence of vulnerabilities (background: medium- to long-term) (Table 3.4.24).

Table 3.4.26 Adaptation / Overcoming Measures and Support Measures

Affecting factors / VC vulnerabilities	Objectives	Period	Countermeasure	Necessary action	Target crop	Target VC
Illegal trade	Decrease of illegal trade	Long	Realization of smart logistics	Forming a healthy market	Reginal distributed crop	Distribution
Vulnerable business	Strengthening links with farmers and distributors	Medium Long	Farming based on commercial flow	Providing market information, Reform of farmer's consciousness, contract farming, Strengthening agricultural insurance	All crop	Production
Post-harvest loss	Improvement of distribution network	Medium Long	Development of cold chain	Infrastructure development, system development of cold chain	Horticultural crop	Production-Sales
Low producer price	Improvement of life for farmers	Medium Long	Optimization of producer prices	Strengthening the price bargaining power of farmers	All crops	Production-Distribution
Unstable price of domestic rice	Improvement of domestic rice value chain	Short	Strengthening production of domestic rice	Improvement of domestic rice production technology, post-harvest processing technology, restrictions on imported rice	Rice	All VC
Bilateral transaction	Activation of ICT use	Medium	Development of e-commerce platform, cultivation app, online training	Popularization of smartphones, maintenance of shared smartphones and tablets, strengthening of information systems	All crops	Production, distribution, sales
Lack of nutrition	Improvement of nutrition	Medium	Enlightenment of the importance of nutrition intake	Awareness-raising activities for horticultural crop intake, training for Ministry of Agriculture officers,	Horticultural crop	Consumption

				dissemination of horticultural crop cooking methods		
Coordination among actors	Coordination	Medium Long	Strengthening VC platform	How to utilize platform	All crops	All VC
Food safety	Improvement of food safety	Medium	Introduction of organic agriculture	Organic farming, organic certificate	Horticultural crop	Production, processing

3.5 Tanzania

In Tanzania, after the first case of infection was confirmed in March 2020, preventive measures such as were quickly implemented. However, in June 2020, the country COVID-19 free was declared and all preventive measures against COVID-19 were lifted. After that, the COVID-19 policies was reviewed and the Government restarted to report the cases. As of January 2022, more than 30,000 cases have been reported.

The negative impact of COVID-19 on FVC on input, production, distribution and sales stages was observed due to the disruption of domestic and international logistics and human flows. Although no strict measures such as lockdown were taken in Tanzania, logistics problem was often observed at each VC stage in 2020. It is thought that voluntary refraining from movement occurred among VC stakeholders in the first half of 2020 for fear of spreading the infection. As a result of the border closure by neighboring countries, trade in grains and horticultural crops exported to neighboring countries stagnated, and farmgate price fell due to the imbalance between supply and demand in the domestic market.

. The volume of distribution decreased due to factors such as movement restrictions, shrinking market access and demand of the crop, difficulties in accessing suppliers, falling wholesale prices, rising transportation costs, unstable supply of agricultural products, and insufficient means of transportation. At the sales stage, retail sales volume declined due to lower demand and market access. Food service sales fell sharply in the first half of 2020 due to people refraining from going to eat out. In the consumption stage, the decrease in income due to changes in the work environment had a significant impact on people's lives, changing their eating habits, spending, and social activities. In 2021, as awareness of infection control measures increased, economic activity has resume and the negative impact on each VC process showed signs of recovery.

As a factor of vulnerability, the input relies heavily on imports. Input accessibility was greatly affected by exporting countries where took strict preventive measures against COVID-19. As a result of limited accessibility of inputs, soaring prices of inputs have put pressure on farmers' production costs, and its impact has been long-lasting. At the production stage, most of small-scale farmers sell their produce to buyers/traders who come to farmgate, and their access to market information is limited, making them vulnerable to changes in the market environment.

Measures to deal with these are 1) stabilization of input supply, 2) introduction of market-oriented agriculture, and 3) utilization of ICT to promote e-commerce.

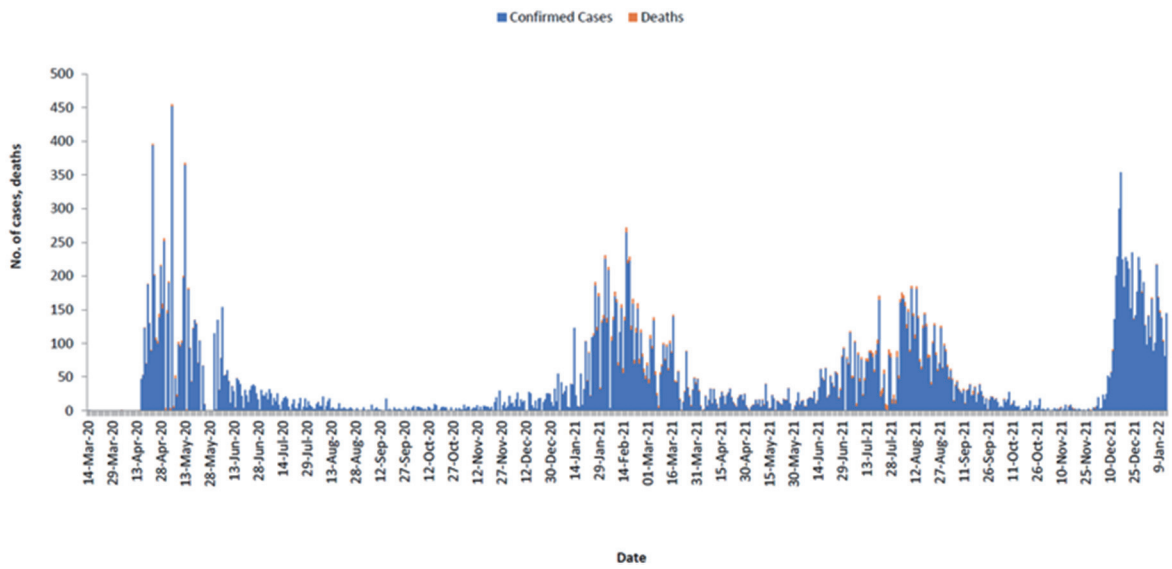
3.5.1 Status of COVID-19 and Development Partners' Initiatives

(1) Status of COVID-19

After the first COVID-19 case was confirmed in March 2020, Tanzania Government promptly implemented the measures such as gathering ban and closing schools and then announced that all incoming travelers from COVID-19 affected countries be placed in quarantine. After the first death recorded, all international passenger flights were suspended. However, the other confinement measures

to prevent the spread of COVID-19 such as curfew, lockdown, or restriction on interstate travel were not taken, as implemented in neighboring countries. In May, the Government stopped releasing aggregate numbers on COVID-19 cases and deaths in the country. The President declared Tanzania to be free of COVID-19 on 8th June and all restriction measures were lifted.

The new President was appointed in March 2021 and slowly reversing the COVID-19 policies then organized a committee of experts to review the measures against COVID-19 infection in April. The Government announced the change in the entry requirements effective from 4th May based on the global epidemiological situation and emergence of new variants of COVID-19. In June, for the first time in more than a year, the Government released figures on COVID-19 cases. As of January 14, 2022, 32,393 people were infected and 753 died. By region, Dar es Salaam has the highest number of new infections, followed by Mwanza, Arusha, and urban areas. The total number of tests to date is 420,637, with a positive rate of 7.7%. The Government is also working on vaccination and so far a total of 1,668,287 people have been vaccinated. The figure below shows the number of people infected and the number of deaths in Tanzania.



Source: Ministry of Health, Community Development, Gender, Elderly and Children, COVID-19 Situation Report No.18 (Jan. 2022)

Figure 3.5.1 Number of confirmed cases and deaths in Tanzania

Table 3.5.1 COVID-19 Infection Status and Countermeasures in Tanzania

Time	Spread	Preventive Measures against COVID-19
2020/3/16	First case was confirmed in Arusha	
2020/3/17		Gathering ban (lifted as of 1st June), Closing schools (re-opened as of 29th June)
2020/3/22		All incoming travelers from COVID affected countries be placed in quarantine for 14 days（lifted as of 27th May）
2020/3/31	First death was reported in Dar es Salaam	
2020/4/12		All international passenger flights were suspended (resumed as of 27th May）
May 2020	Stopped reporting case numbers	

2020/6/8		Declared the country Covid-19 free
2021/4/6		National Covid-19 committee was formed
2021/5/4	Travel advisory No.7	Negative PCR test certificate is required, On-arrival screening, Mandatory 14-days quarantine for travelers from India All flights to and from India are banned.
2021/6/4		Announced importing COVID-19 vaccine
2021/6/19	The third wave	Remind all precautions be taken including wearing masks, using sanitizers and hand washing with soap and running water
2021/6/28	Restarted reporting case numbers. Confirming 100 cases	
2021/9/14	Travel advisory No.8	Negative PCR test certificate is required, On-arrival screening for travelers from countries experiencing variants of concern
2021/12/24	Travel advisory No.9	Departing travelers to UAE are required Rapid PCR, and those who to India, Rwanda, Congo and part of Europe are required Rapid Antigen Test in addition to a valid RT-PCR certificate.

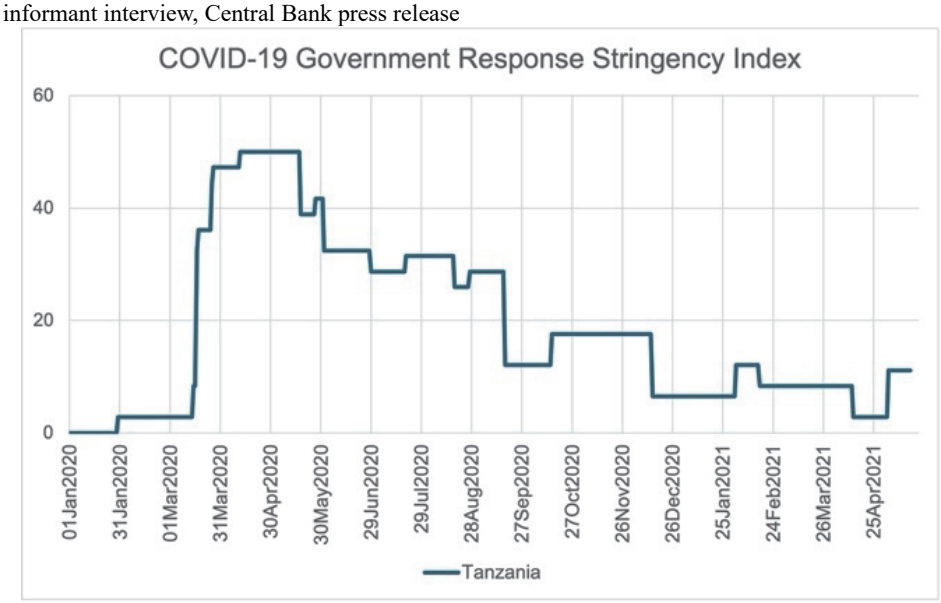
Source: Ministry of Health, Community Development, Gender, Elderly and Children, U.S. Embassy in Tanzania and several published newspaper articles

(2) Government Polices and Measures against COVID-19

Table 3.5.2 Major Government Policies and Measures in Tanzania

Institution	Policies and Measures (Target, VC process, Time)	Results
Ministry of Finance	VC process: Finance Time: May 2020	In early May of 2020, the central bank took various policy measures which aimed at providing additional liquidity to financial institutions and relief for businesses which have loans with various financial institutions in the country.
Central Bank	VC process: Finance	Rescheduled loan payment period, Relief to borrowers reduction of defaulters of loans
	VC process: Finance Time: July 2021	1 trillion shilling ($432 million) loan to commercial banks for lending to the private sector
Government of Tanzania	Target: Traders VC process: Distribution Time: May 2020	A meeting between Kenyan and Tanzanian ministries took place on 22nd of May, 2020. The meetings' main agenda was on free movement of goods at the border posts, held at Namanga one stop border post. The meeting ended up with both countries signing a memorandum of understanding for free movement of goods and people but with all necessary precautions concerning the COVID-19 pandemic taken in place.

Source: Key informant interview, Central Bank press release



Source: Oxford, COVID-19 GOVERNMENT RESPONSE TRACKER

Figure 3.5.2 COVID-19 Government Response Stringency Index

(3) Initiatives by Development Partners

Table 3.5.3 Cooperation of Key Development Partners in Tanzania

Institution	Support (Target, VC process, Time)	Results
USAID	Support: USD 5.75 million Time: June 2020	The assistance is for: strengthening laboratory capacity for optimal diagnostics; communications about health risks; water and sanitation; the prevention and control of infections; public health messaging; virtual training for educators, and youth; and civil society support to monitor human rights issues.
WFP	Support: Target: 540,000 people Time: July-September 2020	− Cash transfer to cover the food gap for 500,000 urban food poor in the 10 highest COVID-19 risk regions − Nutrition support to 45,000 vulnerable women − COVID-19 preventive measures continue to be in place
AfDB	Support: USD 50.7 million loan Time: October 2020	Joint support to the national COVID-19 response plan
TAHA	Support: Collaborative efforts with MoA to find airfreight solution Time:	Ethiopian Air cargo freighter that landed 3 times a week and shipped horticultural commodities to overseas markets.

Source: Publications from each institution

3.5.2 Agriculture and Crops to Study

(1) Production and Trade

1) State of Agriculture

In Tanzania, the agriculture is an important sector accounts for 29.4% of GDP and share in total employment at 56.5% (National Five Year Development Plan 2021/22-2025/26). A total of 7,837,405 households engaged in agriculture (National Sample Census of Agriculture (NSCA) 2019/20).

The Government of Tanzania and Development Partners have been implementing Agriculture Sector Development Programme (ASDP) since 2003/04. In ASDP (2003-2016), the basket fund has been used since 2006/07, and 75% of the basket fund has been allocated to the District Agricultural Development Plan, with a focus on the development of basic infrastructure such as irrigation and market facilities in rural areas. In ASDP2 starting in June 2018, the Government designates priority crops such as maize, rice, and horticultural crops for each Agricultural Ecological Zone (AEZ) in order to promote the development of value chains at cluster level. Maze, rice, oil crops (sunflower, sesame), horticultural crops, and traditional cash crops (cashew nuts, coffee, etc.) are selected as priority crops.

a. Main Crops and Dietary Life

The important cereal crops produced in Tanzania are maize, paddy, sorghum, finger millet, bulrush millet and wheat. Maize occupies 74%, the largest portion of the planted area for cereals (Annual Agricultural Sample Survey (AASS) 2016/17). Maize is the most important staple food and between 85-90% of Tanzania's population eat maize. Maize self-sufficiency rate is over 100%, and the surplus is exported to neighboring countries. Rice is the second widely grown cereal crop and accounts for 17% of domestic cereal production area (AASS 2016/17). In addition, the annual consumption of rice in Tanzania is 25 kg per capita, which is the highest among East African countries. Sorghum is highly drought tolerant crop and mainly produced in semi-arid regions. Sorghum is the third with 10% of the cereal production area (AASS 2016/17) and consumed mainly in rural area.

Ugali is a staple of the Tanzanian diet and eaten by many on a daily basis. *Ugali* is made from maize

flour, sorghum flour and cassava flour. Rice (*wali*) is usually cooked with small salt and oil, and sometimes cooked with coconut milk especially in the coastal areas in Tanzania. *Pilau* is common rice recipe for celebratory occasions, in which Rice is flavored with spices and cooked in a well seasoned broth of meat, poultry or fish. *Ugali* and rice are eaten with side dishes such as beans stew (*maharage*), sautéed vegetables and tomato meat stew. Tomatoes and onions are essential when cooking side dishes. Local vegetables such as amaranths (*mchicha*), English giant (*loshuu*), black nightshade (*mnafu*), sweet potato leaf (*tembele*), African eggplant (*ngogwe/nyanya chungu*), and okra are often eaten in rural area. In addition, sweet peppers, cabbage, carrots, green peas, Chinese cabbage etc. are also popular in the Tanzanian diet. French fries are common menu at restaurants, bars and street food vendor.

For breakfast, snacks made from wheat flour such as *chapati* and *mandazi* are often eat along with tea, as well as pancakes made from rice flour (*kitumbuwa*). Porridge made from sorghum flour and millet flour (*uji*), boiled taro, boiled cassava, boiled sweet potato and boiled pumpkin are also eaten as breakfast.

			
Amaranthus (*Mchicha*)	English Giant (*Loshuu*)	Black Nightshade (*Mnafu*)	Sweet potato leaf (*Tembele*)

Source: JICA study team

Figure 3.5.3 Popular local vegetables in rural area Tanzania

	
Maize *ugali* with side dishes	Sorghum *ugali* with side dishes

Plain rice with side dishes

Pilau

Donuts (*Mandazi*)

Rice flour pancakes (*Kitumbuwa*)

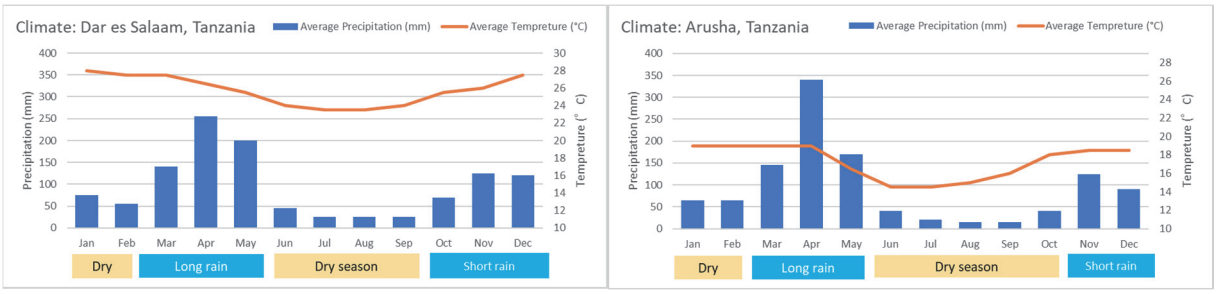
Source: JICA study team

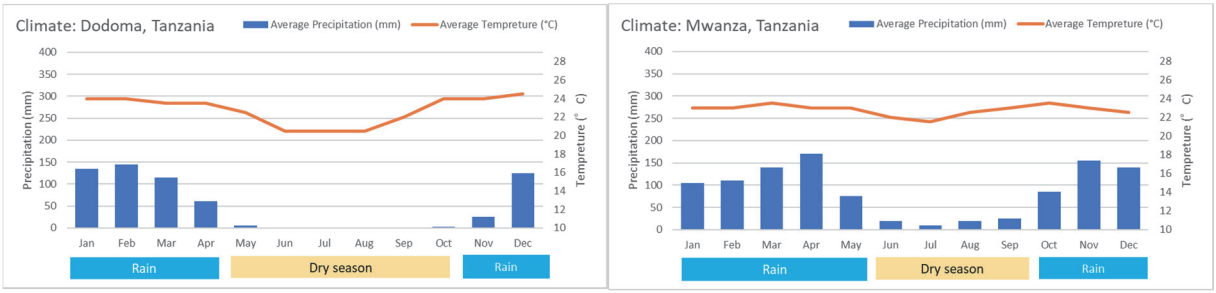
Figure 3.5.4 Popular food in Tanzania

b. Main Cropping Seasons and Agricultural Zones

The topography of Tanzania is broadly divided into the Central plateau, the Southern highlands, the Northern highlands, and the coastal plains. The climate is subtropical in most areas except for high altitude areas.

The mean annual rainfall varies from 500 millimeters to 2,500 millimeters and above. The average duration of the dry season is 5 to 6 months. Tanzania's rainfall follows two regimes namely unimodal and bimodal patterns. Coastal plains, Northern highlands and Lake Victoria basin have two rainy seasons with long rains between March and May (*Masika*) and short rains between October and December (*Vuli*). Central plateau, Southern highlands and western parts of the country have a single rainfall season between November and April. The below graph shows the average precipitation and average temperature in the main areas in Tanzania.





Source: https://www.climatestotravel.com/climate/tanzania

Figure 3.5.5 Precipitation and temperature in main areas in Tanzania

Tanzania is divided into seven Agro-Ecological Zone (AEZ). ASDP2 focuses on priority commodity value chain development in each AEZ for the purpose of commercialization of the agricultural sector. The selected priority crops of each AEZ are as shown in the table below.

Table 3.5.4 Priority commodities in the AEZ Tanzania

Agro-Ecological Zone (AEZ)	Priority commodities in ASDP2	
	Crop	Cash crop
Central zone	Sunflower, maize, sorghum, millet, groundnut	Cotton
Lake zone	Rice, maize, cassava	Cotton
Northern Highland zone	Maize, beans, horticulture	Coffee
Eastern Coast zone	Cassava, rice, maize, oil seeds	Cashew, sugarcane
Western zone	Maize, banana, legumes/pulses, rice	Coffee
Southern Highland zone	Maize, rice, horticulture	Tea, coffee
Southern zone	Cassava, sim-sim, rice	Cashew, palm oil

Source: Agricultural Sector Development Program phase2 (Ministry of Agriculture, September 2016)

2) Main Crop Production

The total area of land on farms used in crop production is 17,120,571 ha whereby 53.8% are planted in the long rainy season, 28.3% in the short rainy season and 17.9% are planted with permanent crops. The total planted area under irrigation is 351,831 ha (2.5%) and majority of farmlands are rain-fed. The total area planted with cereals was 8,638,771 ha of which 6,067,996 ha are planted maize, followed by paddy 1,455,564 ha and sorghum 124,361 ha. (AASS 2016/17)

Main crop production is summarized in the table below. Top produced crops are cassava, maize, sweet potatoes, rice, beans, potatoes, and sorghum.

Table 3.5.5 Main crop production (ton) in Tanzania

Crop		2017	2018	2019	Average
Cereal crop	Cassava	4,025,265	8,372,217	8,184,093	6,860,525
	Maize	6,680,758	6,273,151	5,652,005	6,201,971
	Rice, paddy	2,451,707	3,414,815	3,474,766	3,113,763
	Sorghum	755,041	672,235	731,877	719,718
	Millet	308,897	316,194	385,962	337,018
	Wheat	50,467	56,651	63,388	56,835

Horticultural crop	Sweet potatoes	5,440,824	3,744,093	3,921,590	4,368,836
	Beans, dry	1,428,434	1,096,930	1,197,489	1,240,951
	Potatoes	583,082	1,080,144	1,013,408	892,211
	Tomatoes	555,979	591,883	627,788	591,883
	Onions, dry	236,077	253,436	270,796	253,436
	Cabbages	87,540	89,808	91,573	89,640
Other crops	Sugar cane	3,060,610	3,117,812	3,589,459	3,255,960
	Cashew nuts, with shell	265,238	313,826	225,106	268,057
	Coffee, green	47,693	43,193	51,529	47,472
	Groundnuts, with shell	650,000	670,000	680,000	666,667
	Sesame seed	620,000	640,000	680,000	646,667
	Sunflower seed	990,000	1,000,000	1,040,000	1,010,000

Source: FAO STAT

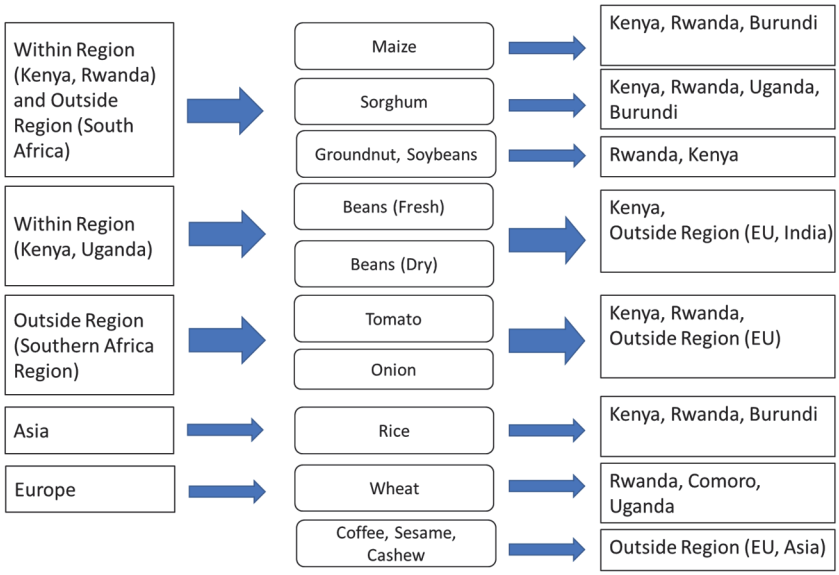
3) Trade and Distribution

The traditional cash crops such as cashew nuts, sim-sim, coffee, tea and cacao are the top exports commodity. The major food crops such as maize, sorghum and beans are imported from the countries of Eastern and Southern African region and exported to Kenya, Rwanda, Burundi and Uganda, while rice is imported from Asia and exported to Kenya, Rwanda and Burundi.

Table 3.5.6 Top 20 exported crops on Tanzania

Item	2017		2018		2019	
	(1,000 $)	(ton)	(1,000 $)	(ton)	(1,000 $)	(ton)
Cashew nuts, with shell	528,985	329,060	210,550	127,339	197,676	154,178
Sesame seed	74,143	80,396	100,693	71,696	169,433	124,382
Coffee, green	124,055	41,363	4,091	56,347	139,817	65,075
Flour, wheat	54,648	36,373	74,553	39,006	39,000	33,200
Tea	48,946	27,548	47,332	26,909	32,057	19,663
Maize	3,918	24,280	64,228	191,894	59,913	279,167
Chick peas	17,876	23,834	8,424	23,831	61,969	111,459
Beans, dry	33,983	54,965	6,083	44,699	32,577	68,189
Cocoa, beans	16,752	10,085	3,461	10,157	20,701	8,702
Avocados	4,642	4,374	1,973	5,477	17,219	7,286
Cloves	8,310	1,044	8,789	1,478	5,901	891
Cashew nuts, shelled	12,165	1,561	189	2,466	9,014	1,466
Groundnuts, shelled	550	698	2,495	2,860	17,556	29,505
Rice, paddy (rice milled equivalent)	98	368	5,046	30,185	12,393	18,872
Cassava dried	1,783	17,496	11	730	13,877	63,685
Rice, milled	75	243	2,491	15,518	10,813	14,797
Beans, green	5,863	2,696	236	5,127	2,351	2,198
Sorghum	10	278	222	6,336	6,035	31,584
Oranges	1,502	21,200	2,000	22,070	1,797	3,209
Onions, dry	2,786	5,068	477		948	

Source: FAO STAT



Source: JICA study team based on FAO STAT

Figure 3.5.6 Tanzania's major trading countries

4) Distribution Structure

The traditional distribution structure in Tanzania is disaggregated and disorganized. Agricultural products are mostly purchased at farm gate by middleman and transported to wholesale market in the local/urban city and then distributed to retailers. Wholesalers and retailers who do the business at the market are charged levies according to the transaction volume, which is a valuable source of income for local governments as well as operating costs for the market. The market opens every day in city center while the market opens periodically in rural areas (e.g. every Monday and Thursday etc. depends on the area). Most of consumers in Tanzania buy food at Kiosk at open-air market.

Large cities like Dar es Salaam and Arusha have modern shopping malls and supermarkets. High-quality agricultural products are stably distributed to them through the contract farming or direct trading with farmers' associations, however, such distribution is not common.

Major challenges on distribution in Tanzania are as follows;

- Measurements are not standardized. The type of measurements changes when the products are in hands on the middlemen. In worse case, there is a practice so called "*rumbesa*" to sow two packaging bags to make larger loads. This system is especially disadvantages for farmers.
- Due to improper packaging, overweight loading, lack of cool truck, and rough road in rural area, crops are easily damaged during transportation, and resulting in many losses.

(2) Selecting Crops to Study

For the target crops of this study, it is selected that crops have a large production volume in Tanzania and are distributed not only domestically but also within the eastern region of Africa. From cereals, maize and rice are selected, which have high production volumes and have achieved self-sufficiency

hence are exported to neighboring countries. Sorghum is also one of the major cereal crops and is listed as a priority commodity in ASDP 2. From horticultural crops, onion, tomato, and Irish potato were selected as they are consumed domestically as well as distributed within the region. Coffee was selected as an export crop distributed outside region.

Regarding horticultural crops, cabbage was included at the time of ICR, but some concerns were raised through the Key informant survey that it was not commonly distributed in the eastern region of Africa, therefore, Irish potatoes is selected instead of cabbage.

Table 3.5.7 Selection background of target crop to study in Tanzania

Category	Crop	Distribution type	Background
Cereal crops	Maize	Staple food: distributed within the region	First place in production area (2019), 70% of Cereal production, self-sufficiency rate: over 100%. Import: Zambia, South Africa, Uganda, Kenya Export: Kenya、Rwanda, Zimbabwe, Burundi, DRC
	Rice	CARD: distributed within the region	2nd place in production area (2019), 17% of cereal production, 25% of cereal consumption Import: Asia → Export: Rwanda, Kenya, Burundi, DRC
	Sorghum	Distributed within the region/ domestic distribution	8th place in production area (2019), 10% of cereal production, high consumption in rural areas Import: South Africa, India, Uganda Export: Rwanda, Kenya, Burundi, Uganda
Horticultural crops	Onion	Distributed within and outside the region	The self-sufficiency rate is over 100%, and the surplus is distributed in east African region. Import: India, South Africa, Malawi, Middle East Export: Netherlands, Kenya, Israel, Rwanda
	Tomato	Distributed within the region	Among horticultural crops. The production volume is outstandingly high. Import: South Africa, Italy, Kenya, Mozambique Export: Kenya, Rwanda, Comoros, Europe
	Potato	Distributed within and outside the region	Import' Kenya, Uganda Export' Malawi, Rwanda, Comoro, Kenya
Others	Coffee	Distributed outside the region	Third largest export volume (2019). Selected as a priority crop for VC development in cash crops by policy. Export: Japan, Germany, Italy, USA

(3) Setting Hypothesis

In Tanzania, domestic distribution was not restricted due to the declaration of COVID-19 free in early 2020. However, the measures taken by the other countries in East Africa region such as border blockage, lockdown, and travel ban etc., affected the stagnation of logistics in Tanzania as well.

The following hypothesis is assumed;

- Decreased income of farmers due to oversupply in the domestic market and cheaper market prices caused by hindered border transactions,
- Since the number of departures and arrivals of international passenger flights were reduced, the export channel for horticultural crops also negatively affected. Agricultural products that could not be exported were distributed domestically and oversupplied, leading to decline market prices and hence decrease income for farmers.

- Due to the sharp decrease in tourists, the number of customers to the hotels and restaurants has decreased. Farmers and traders who were deal with foodstuffs and did the business with them had to look for alternative market, resulting in oversupply and lower market prices at local market.

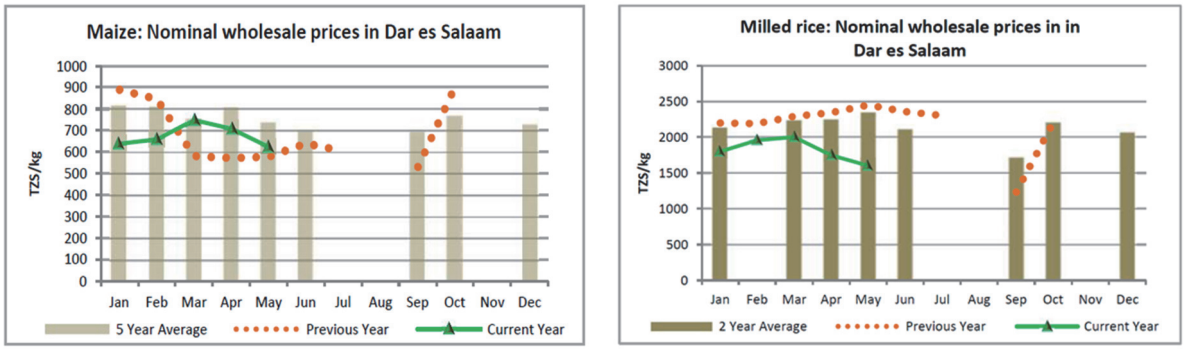
3.5.3 Impacts of COVID-19 on FVC and Underlying Factors

(1) FVC and its Impacts by COVID-19

According to the country report of APRA (Agricultural Policy Research in Africa), following the onset of the COVID-19 pandemic, as of July and October, farm labor had become more available and hiring cost had gone down. This was because people lost their jobs in off-farm sectors and returned to rural areas to seek short-term employment. Agricultural inputs were also available, but some reported an increase in their input prices.

In the aspect of sales, the number of paddy/rice traders had decreased by 70% since the start of COVID-19, sales were significantly declined at both farmgate and local market. This situation caused an over-supply of rice and, consequently, a decline in the price of paddy/rice and leading to a drop in household incomes.

As for the consumption, farmers had experienced a decline in their purchasing power and a rise in the cost of living during the COVID-19 pandemic. Tomatoes and onions, key ingredients of daily meals, had become scarce and their prices had increased in local markets. The availability of maize, the local staple, had also decreased and market prices had increased.



FEWS NET, Tanzania Price Bulletin (June 2021)

Figure 3.5.7 Trends of food prices in Tanzania

(2) Impacts on Respective Crop FVC: Maize

1) Overview of FVC

Across the country, maize is the most widely produced in Tanzania, and 80% of Maze production is produced by smallholders. 85% to 90% of Tanzanian population eat maize, and 80% of Tanzanian maize is consumed and traded locally. After harvesting, maize is bought by middlemen, aggregated at collection centers in local cities, sold to wholesalers and processors, and delivered to consumers via retailers. Maze has achieved self-sufficiency and exports surplus to neighboring countries. On the other

hand, maize is imported from Uganda, due to the disparity in production between regions and the underdeveloped transportation infrastructure in rural areas which may lead to food shortages in some regions.

a. Cropping Season of Respective Crop

Maize is cultivated twice a year in accordance with the rainy season. 60.4% of maze farmers produce in the long rain season and 39.6% in the short rain season.

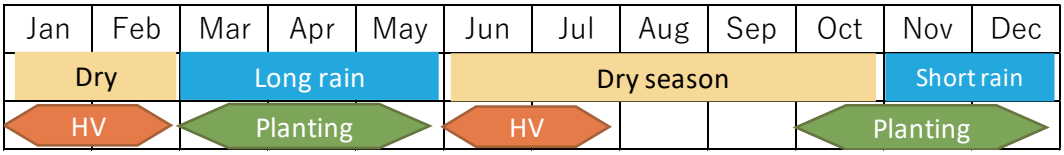


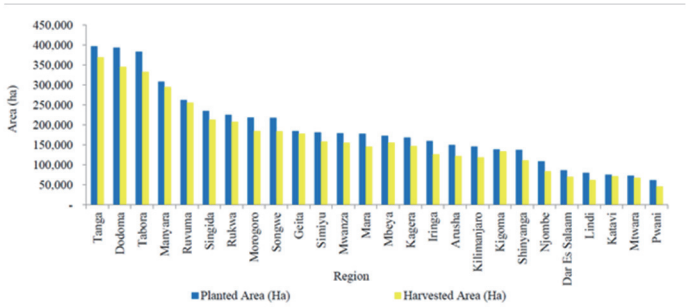
Figure 3.5.8 Maize Cropping Calendar

b. Production Area

Main maize producing areas are Tanga, Dodoma, and Tabora regions. Amongst regions, Tanga had the largest production area for maize in 397,028 ha followed by Dodoma 393,822 ha based on NSCA 2019/20. Ruvuma Region recorded the highest maize production of 498,685 tons with crop yield of 2.0 tons/ha, followed by Manyara (369,037 tons) with yield of 1.5 tons/ha.

Source: NSCA 2019/20

Figure 3.5.9 Production (t) of maize



Source: NSCA 2019/20

Figure 3.5.10 Area planted(ha) by region

c. Supply Chain

There are four recognized market channels for national market:

- A myriad of small-scale farmers who sell to local traders and millers mainly in the rural areas and nearby cities,
- Medium-sized grain traders and millers who serve rural and urban centers,
- A few well-established, large-scale millers and traders based in Dar es Salaam, operating in both national and export markets,
- Institutional buyers including The National Food Reserve Agency (NFRA), the World Food Programme (WFP), prisons, the armed forces, hospitals and schools.

In addition, a Warehouse Receipt System (WRS) has been established to allow farmers to store their

produce until the market price rises and sell it under better conditions, rather than selling it at a low price immediately after harvest.

Warehouse Receipt System (WRS) is one of the of financing systems in which loans can be obtained using goods stored in a warehouse as collateral. Warehouse receipts (WR) are securities issued by warehouse operators (WO) as proof of receipt when depositors deposit goods. It is a legal guarantee of the quality and quantity of goods in the warehouse. The benefits of WRS are mainly improved access to finance for farmers and improved marketing efficiency for agricultural markets.

In Tanzania, Warehouse Receipt Act was passed through parliamentary debate and the Warehouse Licensing Board (WLB) was established in 2001, after succeeded the pilot implementation of cotton and coffee WRS. Maize and rice were added to the list of target crops of WRS in 2009.

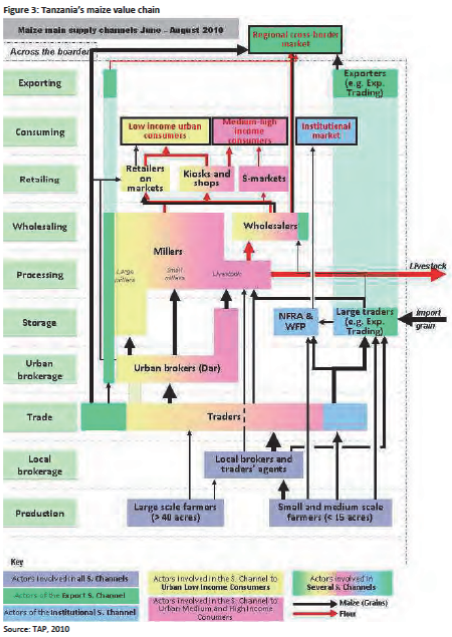
In Tanzania, the use of WRS is expected to (1) make it easier to obtain loans from financial institutions, (2) minimize transaction risks and costs between small-scale farmers and buyers, (3) streamline the supply chain between small-scale farmers, buyers and processors, (4) guarantee quality, (5) provide market information, (6) increase value addition, and (7) enhance access to storage facilities and reduce post-harvest losses.

Recent maize exports show increasing trend and recorded USD 59 million and 279,166 ton pin 2019. The countries receiving Tanzania maize are Zambia, Malawi, Rwanda, Burundi, the Democratic Republic of Congo (DRC) and Kenya.

Table 3.5.8 Export of maize in the past 3 years

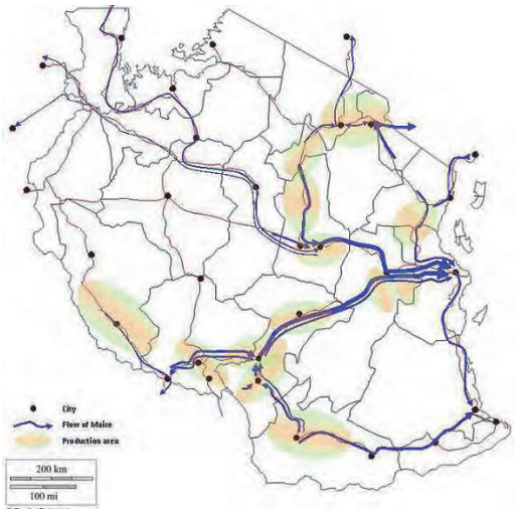
Country	Export value (1000 US$)				Export quantity (Ton)			
	2017	2018	2019	Average	2017	2018	2019	Average
Kenya	2,008	62,401	37,651	34,020	16,368	84,999	192,589	97,985
Rwanda	650	2	12,289	4,314	3,804	390	55,340	19,845
Zimbabwe			6,231	6,231			14,993	14,993
Burundi	221	1,140	3,562	1,641	1,591	10,973	15,944	9,503
DRC	1,000	371		686	2,500	1,676		2,088
Uganda		11		11		93,736		93,736
Malawi			20	20			200	200
Total	3,917	64,227	59,914		24,281	191,894	279,166	

Source: FAO STAT



Source: FAO (2015)

Figure 3.5.11 Maize supply chain



Source: FAO (2015)

Figure 3.5.12 Market flow of maize

d. Main Stakeholders

Cereal and Other Products Board (CPB): a business entity enacted in Tanzania by the Cereals and Other Produce Act No. 19 of 2009. There are two main functions of the Board; namely Commercial and Promotional functions. The Commercial functions include 1) Purchasing and selling cereals and other produce at a competitive price, 2) Import or export cereals and other produce, and 3) Provision of services for cereals and other produce such as storage facilities, cleaning, drying, weighing, grading and packaging services according to market standards. Promotional functions of the Board are shared with other stakeholders in the cereals and other produce industry such as 1) Facilitating research on cereals and other produce, 2) Providing extension service to growers and dealers of cereals and other produce, 3) Disseminating information or data to stakeholders in the cereals and other produce subsector, and 4) Providing assistance in the formation of farmer cooperatives and/or organizations. CPB has branch offices in Mwanza, Arusha, Dodoma, Iringa and Dar es Salaam. The Branch Offices have storage facilities with the capacity to store more than 100,000 tons of produce at once.

National Food Reserve Agency (NFRA): Public Institution established as Executive Agency under the Ministry of Agriculture, by the Executive Agencies No. 30 of 1997 and came into effect 1st July 2008. The purpose is to guarantee national food security during food shortage. NFRA own storage facility with the capacity to store 254,000 tons of cereal.

Farmer: Small-scale farmers contribute over 80 percent of Tanzania's total production. Most of small-scale farmers are producing maize for home consumption with an average area planted 0.7 ha

Kibaigwa Maize Market: an international grain market where over 100,000 tons of maize is traded each year. Peak trade is from May to August. The market employs 13 permanent staff and 6 temporary staff during peak season and they collect the market levies (Ths 2.5/kg), perform quality checks on the

maize for sale. Market information is sent out via text message (SMS) every morning to farmers, and traders can decide whether to take their goods to market.

Processor: State owned enterprises dominated in the milling and distribution of maize flour between 1967 and late 1980s, later privatized. Currently there are three private sector giants in grain marketing and milling; namely Salim Salim Bakhresa, Mohamed Enterprises Tanzania Ltd, and Export Trading Group.

2) Impacts on FVC of Respective Crop

Table 3.5.9 Impact on each VC stage on maize

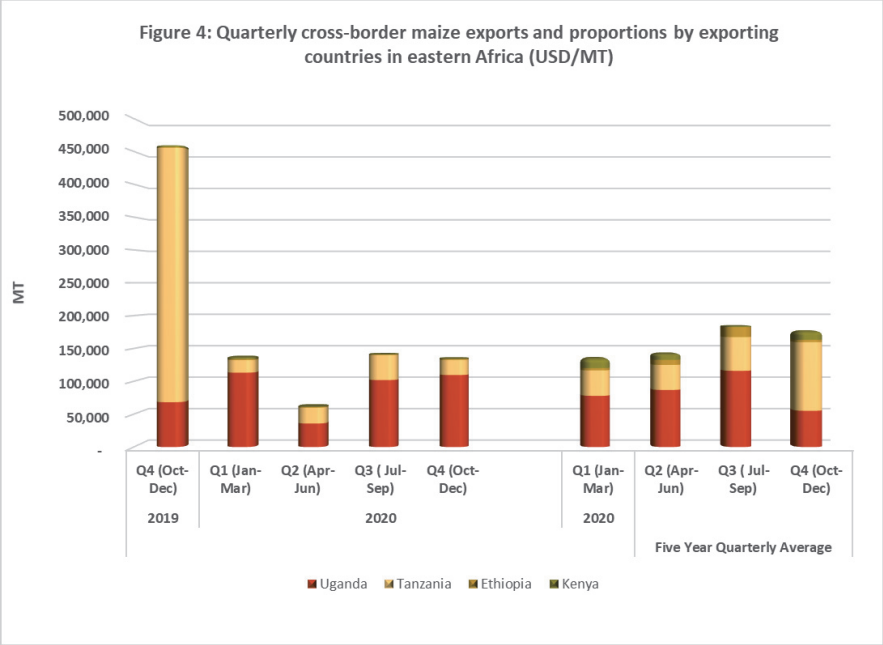
VC stage	2020		2021		Background and factors	Period
	Extent of impact	Impact	Extent of impact	Impact		
Input	Medium	Unavailability of input	Small	Fertilizer prices remain high	Fertilizer and seed price increased.	Apr.-Dec 2020, Apr -Jun 2021
Production	Large	High production cost, Price decreased	Large	High production cost, Price decreased	Production volume was not significantly affected, Profits declined due to higher production costs and lower producer prices.	1st season 2020, 1st season 2021
Processing	Medium	Processing volume decreased	Medium	Processing volume decreased	Slump in prices. Increase imported maize flour.	Jan -Mar 2020
Distribution	Medium	Distribution volume decreased, high cost	Small	High cost	Decreased exports due to the closure of the Kenyan border and quarantine of truck drivers, resulting in a decrease in distribution volume.	Apr – Sep 2020
Sales	Small	Sales volume decreased	Small	Sales price decreased	The business hours were shortened. Procured directly from farmers instead of middlemen. Handling volume and revenue declined in 2020, but recover in 2021.	Jan -Sep 2020
Consumption	Small	Increase of domestic maize consumption	Small	Increase of domestic maize consumption	Sales price decreased.	Jul -Dec 2020

Note: Large: Large negative impact, Medium: Negative impact, Small: No impact or minor impact, -: Not applicable. The extent of impact was rated based on the results of the key informant survey, the questionnaire survey, and the results of the field survey

The status of cross border trade is as follows. In 2019, Tanzania exported large amounts of maize in cross-border trade with countries in the region. On the other hands, in 2020, the first quarter (Jan-Mar), supplies from Uganda to Northern regions of Tanzania increased significantly as domestic supplies in Tanzania tightened. This is because it was more economical to promote imports from the adjacent region between Uganda and Tanzania than to transport from the remote southern region of Maze's main production in Tanzania. Exports from Tanzania to Kenya declined seasonably but were exacerbated by rejection due to high levels of aflatoxin in the maize, with the reason of not dried enough due to early harvest and ongoing rains.

In the first quarter (Jan-Mar) and the second quarter (Apr-Jun), the volume traded was decreased. The reduced volume was attributed to delayed effects of COVID-19 measures to control infections enacted

in the first quarter, especially significant reduction of informal cross border trade with closure of borders except for formal trade, and the screening of track drivers that delayed and increased the costs of transport. In the third quarter (Jul-Sep), trade volumes increased due to maize harvest season. In the forth quarter (Oct-Dec), the volume similar to the previous quarter. Recorded exports recovered because of recovery of cross-border trade as relative calm continued to prevail in most areas of the country, opening up trade routes and improving market functionality.

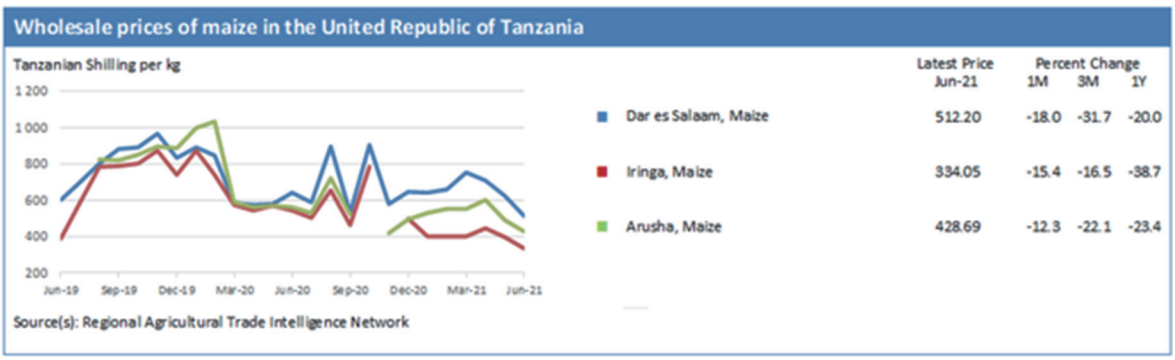


Source: East Africa Cross Border Trade Bulletin, FEWS NET (January 2021)
Note: Five year quarterly average: 2015-2019

Figure 3.5.13 Quartely cross-border maize exports (ton)

In 2021 season, domestic supply of maize increased from June after maize harvest season, therefore, the prices have been declining, falling below the previous year's level. Maize prices in some areas of the country dropped to levels that are below production costs. The Government tried to stabilize prices through purchases by the National Food Reserve Agency.

Compared to the 2020 season, intra-regional trade volume increased. In the third quarter (July-September) 2021, demand from Kenya increased.



Source: FAO Food Price and Analysis (http://www.fao.org/giews/food-prices/regional-roundups/detail/en/c/1416040/)

Figure 3.5.14 Trend of maize price in Tanzania

(3) Impacts on Respective Crop FVC: Rice

1) Overview of FVC

a. Cropping Season of Respective Crop

71% of rice is cultivated under rain-fed condition, 9% under irrigation scheme, and 20% in upland condition (NRDS2). Therefore, rice cropping season depends on the rainy season. Most of production areas, sowing in January and harvesting in June along with the long rain season. Irrigation schemes that can always secure a water source are cultivated rice twice a year.

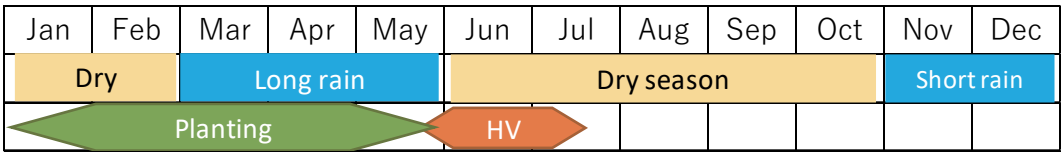
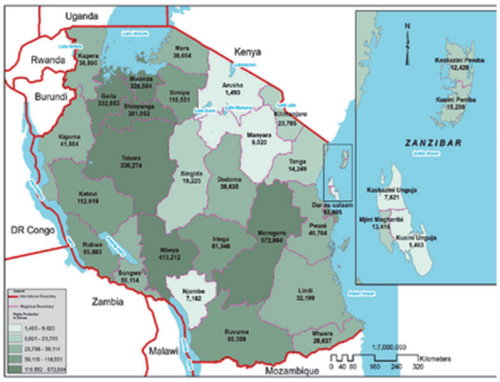


Figure 3.5.15 Rice cropping calender

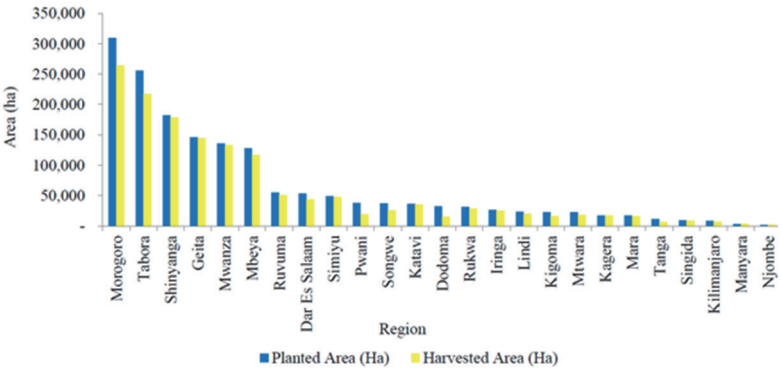
b. Production Area

Rice is cultivated across the country and total area of production is 1,700,701 ha. More than 70 percent of rice production in the country originates from six leading rice producing regions: Shinyanga, Geita, Tabora, Mwanza, Mbeya, and Morogoro. The average paddy yields in 2019/20 cropping season was 2.3 t/ha and the highest in the country was recorded 4.4 t/ha.



Source: NSCA 2019/20

Figure 3.5.16 Production of paddy (t)



Source: NSCA 2019/20

Figure 3.5.17 Area harvested (ha) of paddy

c. Supply Chain

Around 42% of all rice produced is traded in the market, which is higher than other grains (28% maize, 18% sorghum).

There are two type of seeds which are categorized as indigenous varieties and improved varieties. Local rice is very tasty but cannot harvest more, therefore the local rice is produced for home consumption but not for business. In Tanzania, more than 100 varieties of indigenous rice are cultivated by small-scale farmers. The indigenous varieties have a good taste but are not very productive, so they are mostly grown for home consumption. The indigenous varieties include Mbawa mbili, Beenge, Kalamata, Super Zambia and Super Mbeya etc. Seeds of the indigenous varieties are self-collected. On the other hand, improved varieties are more productive and are grown for commercial purposes. SARO 5, a high yielding aromatic rice variety, is one of the recommended seeds by Ministry of Agriculture.

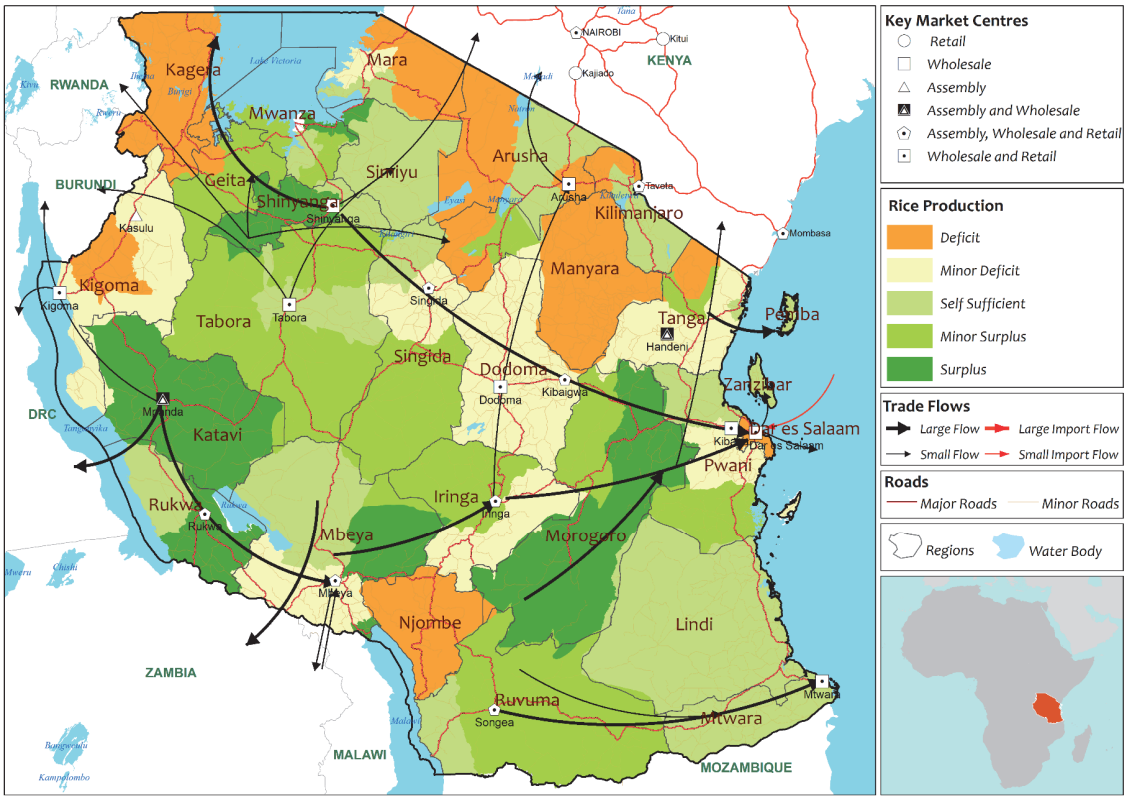
Farmgate, wholesale and retail prices vary within a year and between locations. Within year prices are lowest in the harvest and postharvest period, and highest in the period when supply is low but demand high.

Most of small-scale farmers tend to sell immediately after harvesting, but they can also store properly until the market price rises and then sell with satisfactory price. Collective sales is not common. Some farmers carry the paddy to a miller, and then mill and sell the rice to buyers. Most of the rice produced in the Southern Highlands is shipped to Dar es Salaam for delivery to consumers. Some of the rice produced in the western region is exported to neighboring countries.

Table 3.5.10 Price at various VC stages at different seasons (case of Morogoro MC)

Location (commodity)	Price per kg (Tsh)	
	High season (Jun-Aug)	Low season (Sep-May)
Farm gate (paddy)	650	750
Miller (paddy)	1,200	1,400
Wholesale market (rice)	1,350	1,550
Retail market (rice)	1,450	1,700

Source: Interview by study team (2021)



Source: Tanzania Market Fundamentals Summary (FEWSNET 2018)

Figure 3.5.18 Tanzania production area and trade flow map

Source: Rice Value Chain in Tanzania (FAO 2015)

Figure 3.5.19 Rice supply chain in Tanzania

d. Main Stakeholders

Input supplier: Improved seeds, fertilizers, chemicals and finance are all critical inputs, yet there is limited use of traditional cropping systems in Tanzania. Many farmers recycle their seed instead of purchasing.

Agricultural Seed Agency (ASA): produces 'Quality Declared Production' seeds of improved varieties. Recommended variety is the variety TXD 306 commonly known as "SARO5" ('saro' = semi-aromatic rice). which is a high-yielding cultivar developed by the Ifakara Research Centre.

Farmer: Most of rice farmers are small-scale farmers with the range of 0.5ha to 3ha and sell their produce excluding their own consumption. Compared to other cereal crops such as maize and sorghum, rice is more marketable due to seasonal fluctuations in price.

Miller: Processors (millers) are located in most of the production areas and range from small to medium scale ones. Medium scale processors are located in urban centers near production areas and produce about 10-12 t/day. Most milling is carried out as a service function. Large scale processors include: Kapunga and Madibira rice farm in Mbeya region can produce 120-300 t/day.

Source: field survey

Figure 3.5.20 Small scale miller

Source: Murzah Wilmar Rice Millers Ltd

Figure 3.5.21 Large scale miller

Trader: Traders in paddy and milled rice are scattered throughout the country. Paddy trade is concentrated in production areas, while trade in milled rice is usually done at wholesale and retail levels in production and distant markets.

Retailer: Rice sold at retail shops and open markets is usually put into jute bags. Export trade of milled rice is commonly sold to neighboring countries. Retail price of rice is related to quality which is determined by the appearance of the rice and percentage of broken grains in the product.

Consumer: Rice consumers in Tanzania are very keen on the grain size, color, flavor and aroma. Majority of the consumers prefer long slender, translucent, intermediate amylose content and aromatic to semi-aromatic.

2) Impacts on FVC of Respective Crop

Table 3.5.11 Impact on each VC stage on rice

VC stage	2020		2021		Background and factors	Period
	Extent of impact	Impact	Extent of impact	Impact		
Input	Large	Sales volume of inputs decreased	Large	Sales volume of inputs decreased	Family members who went to work in the city lost their jobs due to the influence of COVID-19, and the remittance decreased. As a result, there was a shortage of resources to purchase input.	Mar -Apr 2020, Jan -Sep 2021
Production	Medium	High production cost,	Medium	High production cost, Price increased	Amount used of improved seeds and chemical fertilizer. Yield become lower.	Jan -Oct 2020, Jan -Sep 2021
Processing	Medium	Processing volume decreased	Medium	Processing volume increased	Milling speed was reduced by the falling demand	Mar -Jun 2020 Oct -Dec 2021
Distribution	Medium	Distribution volume decreased, high cost	Small	Distribution volume increased	Border closed, delayed cross border trade, After lifted restriction, customers from Kenya and Uganda increased	Jan -Jun 2020
Sales	Large	Customers decreased	Large	Suppliers diversified	Purchasing power reduced, went for low cost food alternative.	Mar 2020 – Jun 2021
Consumption	Small	Increase of domestic rice consumption	Small	Increase of domestic rice consumption	Prices fell and low cost/cheap rice was consumed	Mar 2020 – Jun 2021

Note: Large: Large negative impact, Medium: Negative impact, Small: No impact or minor impact, -: Not applicable. The extent of impact was rated based on the results of the key informant survey, the questionnaire survey, and the results of the field survey

(4) Impacts on Respective Crop FVC: Sorghum

1) Overview of FVC

a. Cropping Season of Respective Crop

Sorghum is cultivated in accordance with the rainy season twice a year. 69.2% of maze farmers produce in the long rain season and 30.8% in the short rain season.

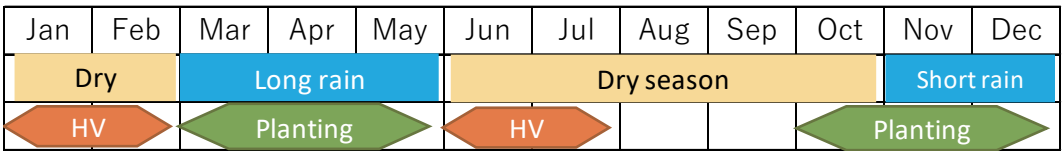
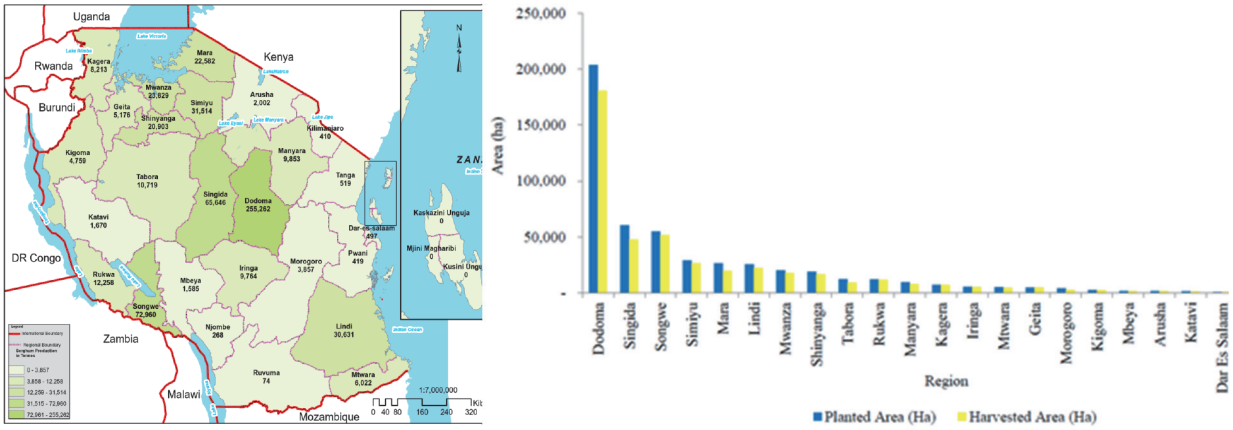


Figure 3.5.22 Sorghum cropping calendar

b. Production Area

Sorghum is important cereal crops for farmers in semi-arid areas of Tanzania. It is drought-tolerance crop and usually grown where maize cultivation is risky because of high temperatures and low rainfall. Total area planted for Sorghum is 514,435 ha in 2019/20. Major production area is central zone; Dodoma, Singida and Songwe regions.

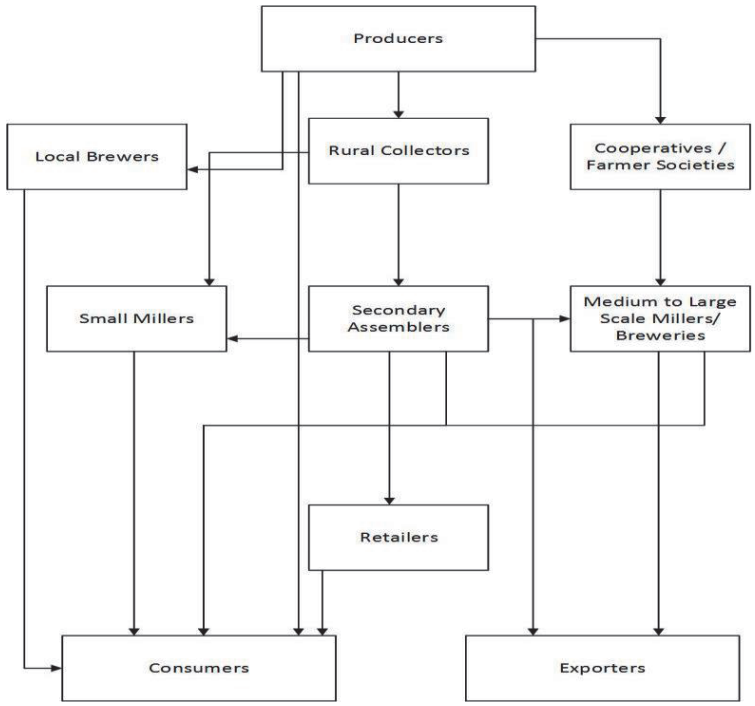


Source: NSSA 2019/20

Figure 3.5.23 Planted area (ha) and production (ton) of Sorghum

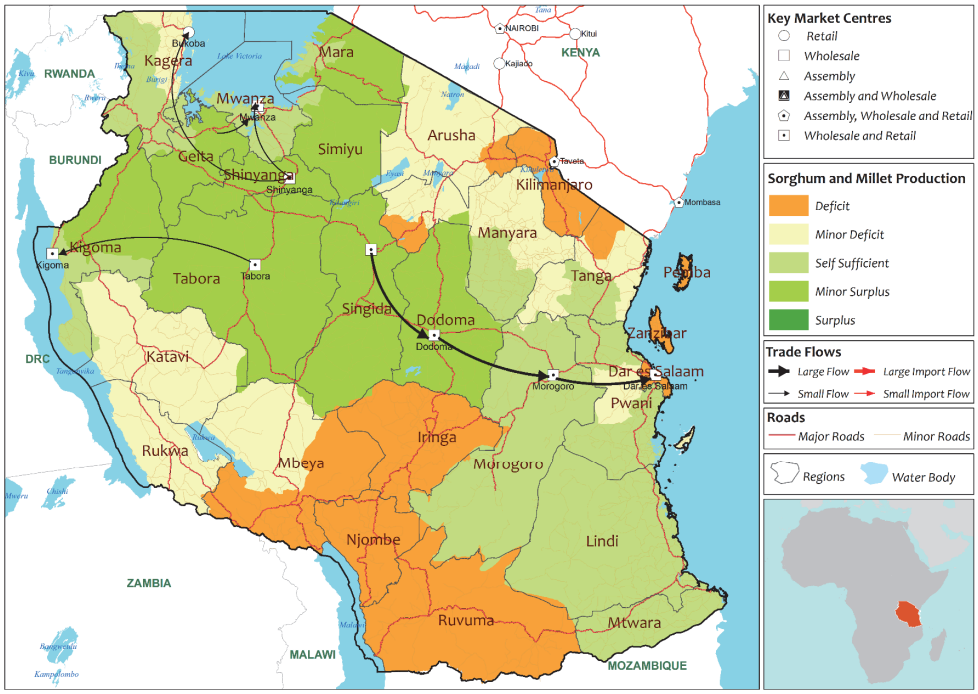
c. Supply Chain

Sorghum is also almost self-sufficient. Sorghum is mainly consumed within the production areas of Dodoma, Singida, Tabora and Kigoma in the Central zone and Mara, Simiyu, Mwanza, Geita, Kagera and Shinyanga in the Lake zone. In addition, it will be distributed to Dar es Salaam. Sorghum is also used in processes such as milling and brewing.



Source: Tanzania Market Fundamentals Summary (FEWSNET 2018)

Figure 3.5.24 Sorghum supply chain in Tanzania



Source: Tanzania Market Fundamentals Summary (FEWSNET 2018)

Figure 3.5.25 Sorghum production area and Trade flow map

d. Main Stakeholders

Farmer: Most of sorghum farmers also plant maize. If early-season rains are favorable, a larger area may be planted to maize. If early-season rains are poor, relatively more land may be planted to sorghum.

Processor: Medium scale millers in Arusha, Moshi and Dar es Salaam process sorghum flour and mix

flour (known as *lishe* which is nutritious flour containing finger millet, soya or groundnut etc.) and sell to wholesaler or retailer.

Brewer: Sorghum is also used for beer. The majority of sorghum grain being traded is destined for the informal, small-scale opaque beer.

Consumer: Blended finger millet and sorghum flours are mostly used to prepare thin porridge consumed for breakfast because of their high nutritional value. Also sorghum flour is promoted as alternative for wheat flour for cooking bred and cake etc.

2) Impacts on FVC of Respective Crop

Table 3.5.12 Impact on each VC stage on sorghum

VC stage	2020		2021		Background and factors	Period
	Extent of impact	Impact	Extent of impact	Impact		
Input	Small	Unavailability of seeds	Small	No impact	There was a slight impact on seed availability, but the impact was not significant because not much input material was used.	Mar -Apr 2020, Jan -Sep 2021
Production	Small	High production cost,	Small	No impact	There was no change in production volume. Disruptions in the local market resulted lower selling prices. Difficult to find buyers.	Apr – Sep 2020
Processing	-	-	-	-	-	-
Distribution	Small	Distribution volume decreased, high cost	Small	No impact	Difficult to find suppliers, transportation measures and buyers.	Jan -Mar 2020
Sales	Small	Sales volume decreased	Small	Sales price decreased	The business hours were shortened. When distribution decreased, they started to procure directly from farmers instead of middlemen. Handling volume and revenue declined in 2020, but are on track to recover in 2021.	Jan -Sep 2020
Consumption	Small	No impact	Small	No impact	Consumption didn't increased as alternative of maize and rice.	-

Note: Large: Large negative impact, Medium: Negative impact, Small: No impact or minor impact, -: Not applicable. The extent of impact was rated based on the results of the key informant survey, the questionnaire survey, and the results of the field survey

(5) Impacts on Respective Crop FVC: Onion

1) Overview of FVC

a. Cropping Season of Respective Crop

Onion has two production seasons namely long rain season (*Masika*) when planting January growing up to April and harvesting May to June, and dry season (*Kiangazi*) when planting June growing up to September harvesting October to March. Most farmers do not like to grow onions during *Masika* season due to the high risks of flooding. However, this is the season that has very good prices.

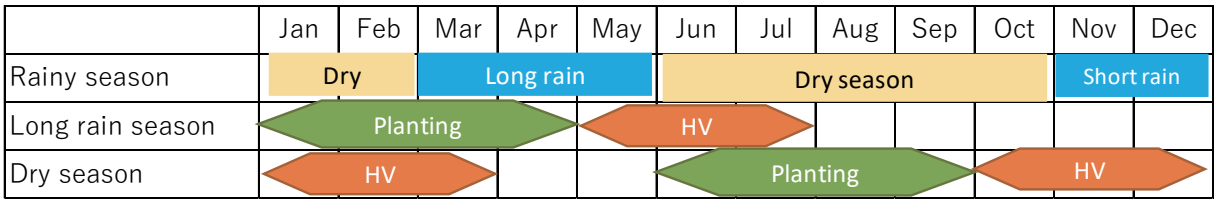


Figure 3.5.26 Onion cropping calender

b. Production Area

In 2016/17, the total production was 117,882 tons, and the main production areas were Morogoro 43,570 tons, Kilimanjaro 19,359 tons, Dodoma 13,669 tons and Arusha 7,250 tons.

Table 3.5.13 Planted area (ha) and production (ton) on major production areas

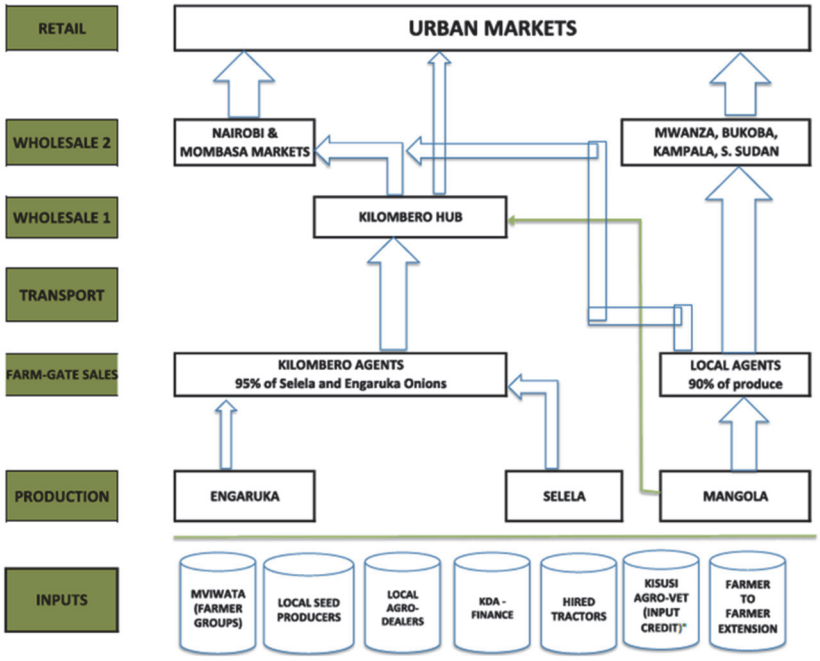
Region	Planted Area (ha)			Qty Harvest (ton)		
	Short rain	Long rain	Total	Short rain	Long rain	Total
Morogoro	6,272	-	6,272	43,570	-	43,570
Kilimanjaro	1,407	3,142	4,549	6,630	12,729	19,359
Dodoma	2,062	-	2,062	13,669	-	13,669
Arusha	820	423	1,243	5,144	2,106	7,250
Tabora	1,228	-	1,228	6,333	-	6,333
Lindi	-	2,428	2,428	-	5,387	5,387
Singida	-	3,117	3,117	-	4,213	4,213
Mbeya	-	773	773	-	1,833	1,833
Manyara	-	213	213	-	1,038	1,038

Source: FAO STAT

c. Supply Chain

Red bulb onions, largely a commercial crop, are grown in many counties in East Africa region and traded between areas of surplus and deficit within and between countries. Onions produced in Tanzania are known to be higher quality than other countries in terms of well dried, medium size, cured, and long shelf life. There are 3 grades of onion as recognized by trader; namely grade 1, 2, and 3. Grade 1 is characterized by big/medium sized onion with completely dry outer layer and well rounded. Grade 2 is regarded as smaller than grade 1 and the smallest sized onions become Grade 3. Grade 1 medium sized onions are preferred by households and mainly traded in the market.

Most of onion farmers sell their products at farm gate. 66% of wholesalers procure onions from individual smallholder farmers. For example, onions produced in Northern region are brought to collected at the Kilombero market in Arusha and shipped to wholesale markets in Nairobi, Mombasa and other cities in the country. Kilombero market has an agent for connecting farmers and wholesalers. 40% of retailers procure onions from wholesalers and 60% from middlemen.



Source: The onion and garlic value chains (TAHA)

Figure 3.5.27 Onion supply chain

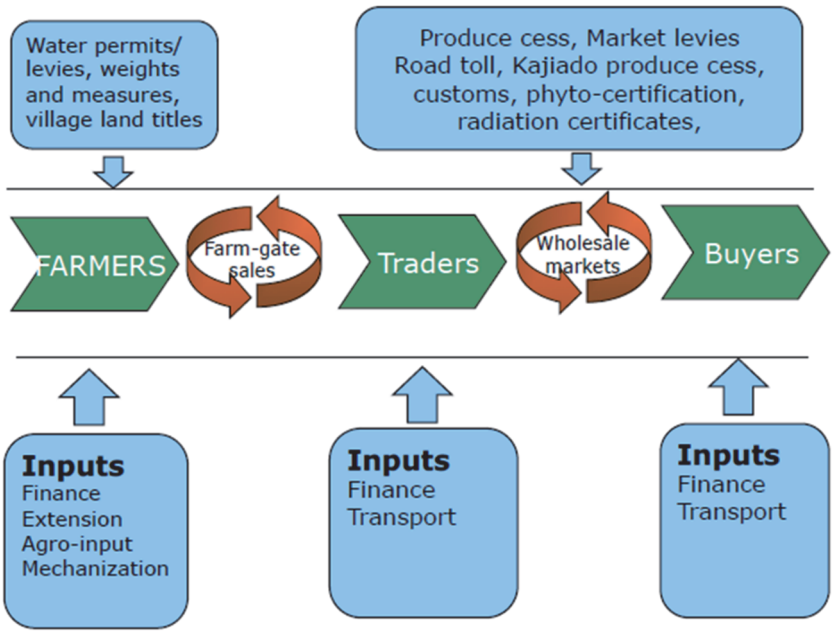
d. Main Stakeholders

Input supplier: Onion farmers are supplied different inputs by different actors. Most of the onion farmers buy fertilizers and pesticides from the local agro-dealers in the village or nearest town. The agro-dealers sell fertilizers in small measurement of 1kg for those who cannot afford a whole bag-50kg. For pesticides, farmers buy more insecticides than other pesticide. Not many farmers purchase improved varieties of seeds. 23% of farmers use their own/recycled seed and 71% purchase it from neighbouring farmers. This is because farmers do not trust the quality of seed in terms of its germination rate and also the high cost of purchase the improved variety seed.

Farmer: Onions are grown by three major types of farmers.

Farmer type	Farm size	Farmer characteristics
Large	5 acres and above	- Can afford adequate inputs for the farm sizes - Mostly own machinery like tractors and trucks - Can afford to store their produce since most of them own their storage facility - Usually have their own market channels
Medium	1～3 acres	- Can afford adequate inputs for their farms - Hire machinery like tractors and trucks - Don't own storage facility but can afford hire storage space - Depend on the markets by the middlemen
Small	0.25～0.5 acre	- Cannot afford adequate inputs for their farms - Don't use tractors - Don't prefer to store their onions and store them in their homesteads if they must - Greatly depends on the middlemen

Source: The onion and garlic value chains (TAHA)



Source: The onion and garlic value chains (TAHA)

Figure 3.5.28 Functional perspective of main actors in onion value chain

2) Impacts on FVC of Respective Crop

The export volume in 2020 was 42,000 tons, which is not affected by the decrease in export volume compared to 39,000 tons in 2019. Due to delays in transactions at the Kenyan border, exports to Kenya decreased, exports to Uganda increased, and export destinations diversified. At the farmer level, sales to the domestic market have increased, but income has decreased due to lower purchase prices than the export market, and there are concerns about the impact of lack of funds to invest in the next season.

Table 3.5.14 Impact on each VC stage on onion

VC stage	2020		2021		Background and factors	Period
	Extent of impact	Impact	Extent of impact	Impact		
Input	Large	Decrease seed sales, fertilizer price increase	Medium	Fertilizer price increase	Agro-delaers and farmers experienced hiked prices and delay of inputs distribution, High cost of transportation.	May -Aug 2020, Jan -Jun 2021
Production	Large	High production cost,	Medium	High production cost,		1st season 2020 1st season 2021
Processing	-	-	-	-	-	-
Distribution	Large	Distribution volume decreased, high cost	Small	Customer decreased	Delays at crossing the border to Kenya might have impacted traders by causing post-harvest loss and delays, Few buyers come from outside of country.	Mar -Sep 2020
Sales	Large	Sales volume decreased	Small	Sales price decreased	Shortening of business hours. Decreasing number of customers due to movement restrictions. In 2021, customers returned due to the lifting of restrictions, and purchase prices fell and sales volume recovered	Jul -Sep 2020
Consumption	Small	No impact	Small	No impact	There was no significant change in consumption due to the fact that these ingredients are essential for cooking.	Jan - Jun 2020 Jan – Mar 2021

Note: Large: Large negative impact, Medium: Negative impact, Small: No impact or minor impact, -: Not applicable. The extent of impact was rated based on the results of the key informant survey, the questionnaire survey, and the results of the field survey

(6) Impacts on Respective Crop FVC: Tomato

1) Overview of FVC

a. Cropping Season of Respective Crop

There are three production seasons for tomatoes; the first is the main season that follows the long rain season. The season commences planting in March and harvesting is between July and September. The second (short rain) season starts in October and harvesting takes place in April through June. Irrigated tomatoes are planted during the dry season (July – October), harvesting takes place in April through June. However, it depends on irrigation potential of an area.

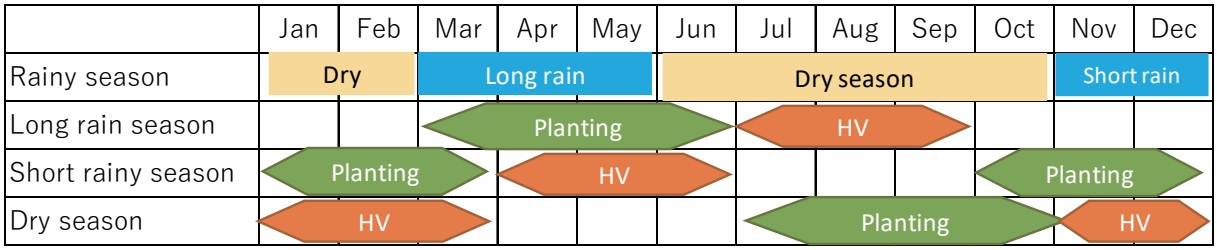
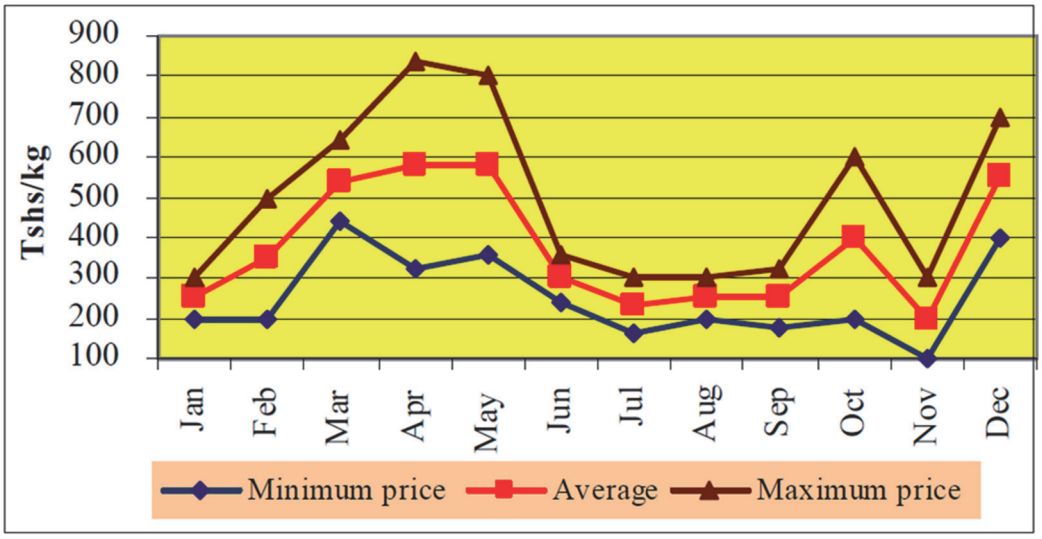


Figure 3.5.29 Tomato cropping calender

Reflecting seasonality of supply of Tomato in the market, prices do fluctuate significantly, higher prices between March and May and a trough (low) from June through September. The spike in December is assumed to be caused by year-end festivals when consumption is highest.



Source: Iringa Tomato Value Chain Analysis for Local Market (Ministry of Industries, September 2009)

Figure 3.5.30 Trend of tomato price in Kariakoo market (2018)

b. Production Area

Tomatoes are widely cultivated throughout the country, and the potential is high in the Southern

Highlands and Northern regions. According to the Annual Agricultural Sample Survey 2016/17, the areas with the highest tomato production in Tanzania were Morogoro, followed by Kilimanjaro, Mtwara and Iringa regions.

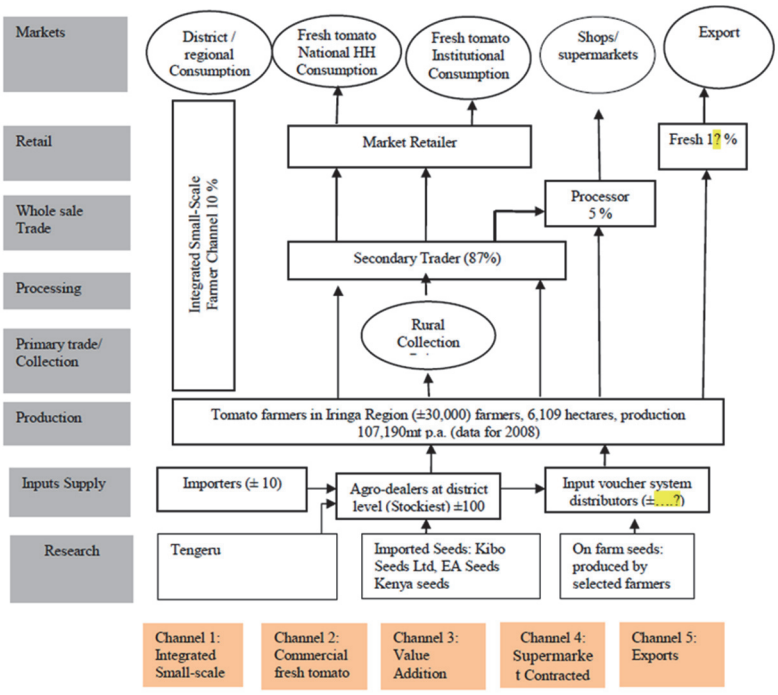
Table 3.5.15 Planted area (ha) and production (ton) of tomato in main producing regions

Region	Planted Area (ha)			Qty Harvest (ton)		
	Short rain	Long rain	Total	Short rain	Long rain	Total
Morogoro	9,897	9,298	19,195	82,908	72,837	155,745
Kilimanjaro	2,098	1,293	3,391	6,940	11,691	18,631
Mtwara	-	3,105	3,105	-	13,336	13,336
Iringa	199	3,691	3,890	865	6,680	7,545
Shinyanga	1,369	222	1,591	3,818	2,044	5,862
Arusha	-	1,203	1,203	-	4,775	4,775
Geita	944	1,175	2,119	3,116	1,619	4,735
Mara	1,031	591	1,622	587	3,720	4,307
Tanga	926	927	1,853	2,171	1,108	3,279
Kigoma	2,321	526	2,847	1,521	1,708	3,229
Mwanza	582	905	1,487	2,664	561	3,225
Njombe	430	183	613	1,642	67	1,709
Katavi	-	250	250	-	1,494	1,494
Rukwa	80	316	396	174	1,201	1,375
Manyara	-	466	466	-	1,218	1,218

Source: AASS 2016/17

c. Supply Chain

87% of tomatoes traded in the market are purchased from farmers by middleman and sold to the wholesale market. Kariakoo and Mabibo markets in Dar es Salaam, are important trading hubs for horticultural crops. It is estimated that about 15,000 ton are traded annually for processing, most of which are supplied when the market is saturated.



Source: Iringa Tomato Value Chain Analysis for Local Market (Ministry of Industries, September 2009)

Figure 3.5.31 Tomato supply chain

d. Main Stakeholders

Input suppliers: Tomato production is relatively input intensive, composed to other crops, including seeds, fertilizers and pesticides. Most major seed companies in Tanzania sell various varieties of hybrid tomato seeds. These seeds can be purchased from input dealers in local cities, where they may advise farmers on cultivation, especially seedling management. In addition, fertilizers and pesticides required for tomato cultivation are available at local retail stores near the production area.

Farmers: Most of the tomato farmers are small-scale farmers, and the average cultivation area is 0.1ha. Almost no systematic group production and collective sales by farmer groups are implemented.

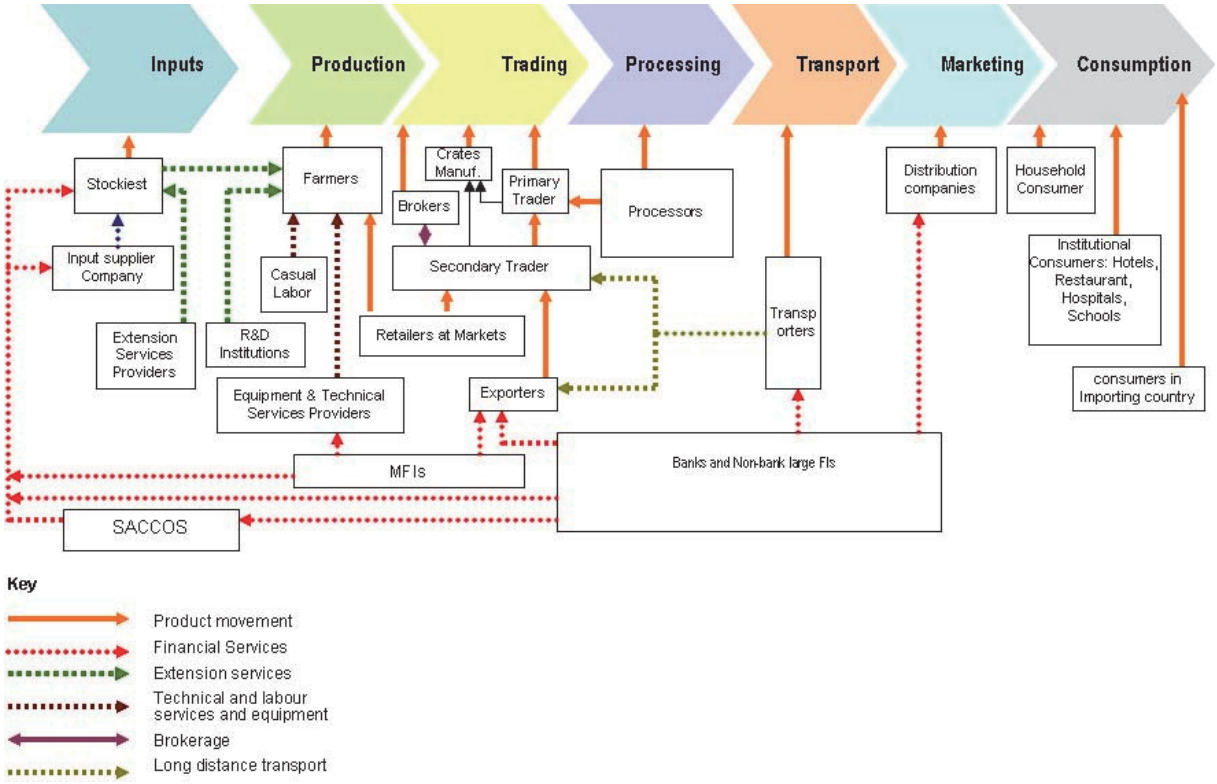
Processors: Darsh Industries Limited in Arusha and Dabagas Industries and Ivori Industries in Iringa are emerging as major processing companies for tomato processing. Tomatoes are processed into ketchup, tomato sauce, tomato, juice, etc.

Middleman/Trader: Main player of tomato trade, there is a broker who does not own the product at any point in the transaction loop, role is to connect buyers and sellers and in some cases to negotiate prices either in the name of the buyer or the seller. He is paid a commission by either party. In contrast to brokers, buyers (both primary and secondary) take ownership of the product at the time they pay for it.

Wholesaler/Trader: Most traders in the tomato value chain are wholesalers. They purchase tomatoes from farmers or collection centers, and send to the end market at Dar es Salaam, Zanzibar etc.

Retailer: There are sellers on open-air markets, roadside sellers with small wooden kiosks and vendor (hawkers). The latter sell at the roadside without a stand (booth), walking around and approaching potential customers. While the first two operate in the formal sector the hawkers work in the informal one. In addition, supermarkets are part of the formal retail sector but they do not play an important role for the supply of tomatoes.

Consumer: About 99% of consumers purchase tomatoes in open-air markets, kiosks and vendors. Less than 1% of customers purchase in supermarkets. Consumers are not aware of the different varieties and decisive criteria when choosing the seller are cheap prices, quality of products, proximity to the vendor, and trust.



Source: Iringa Tomato Value Chain Analysis for Local Market (Ministry of Industries, September 2009)

Figure 3.5.32 Stakeholders in Tomato supply chain

2) Impacts on FVC of Respective Crop

Table 3.5.16 Impact on each VC stage on tomato

VC stage	2020		2021		Background and factors	Period
	Extent of impact	Impact	Extent of impact	Impact		
Input	Large	Decrease seed sales	Medium	Sales volume decreased	Agro-delaers and farmers experienced hiked prices and delay of inputs distribution.	May -Aug 2020, Jan -Jun 2021
Production	Large	High production cost, Sales volume decreased	Medium	High production cost,	Production volume decreased. Increase in production costs due to higher prices of inputs. Decline in farmgate prices. Difficulty in finding buyers due to movement restrictions.	Apr -Dec 2020, Jan -Jun 2021
Processing	Medium	Processing volume decreased	Small	Processing volume increased	Raw material procurement decreased in 2020, but recovered in 2021. There was no change in prices.	Jan – Mar 2020
Distribution	Large	Distribution volume decreased,	Small	Market price decreased	Delays at crossing the border to Kenya might have impacted traders by causing post-harvest loss and delays, Few buyers come from outside of country	Mar -Sep 2020
Sales	Medium	Sales volume decreased	Small	No impact	Shortening of business hours. Decreasing purchase frequency and amount spent by customers	Jan -Sep 2020 Jan - Mar 2021
Consumption	Small	No impact	Small	No impact	There was no significant change in consumption due to the fact that these ingredients are essential for cooking.	Jan - Jun 2020 Jan - Mar 2021

Note: Large: Large negative impact, Medium: Negative impact, Small: No impact or minor impact, -: Not applicable. The extent of impact was rated based on the results of the key informant survey, the questionnaire survey, and the results of the field survey

(7) Impacts on Respective Crop FVC: Potato

1) Overview of FVC

a. Cropping Season of Respective Crop

Tanzania's potatoes are cultivated twice a year in the Southern Highlands zone, with one planting in February and harvesting from June to July and the other planting in September and harvesting in January. In the northern region, it is cultivated once a year, planted in March and harvested in July. According to the Annual Agricultural Sample Survey 2016/17, number of farmers produced during the long rain season was 64,239, and the number of farmers produced during the short rain season was 109,533. Thus short rain season is the main cropping season for potatoes, to avoid disease-prone excessive rainfall resulting poor harvesting.

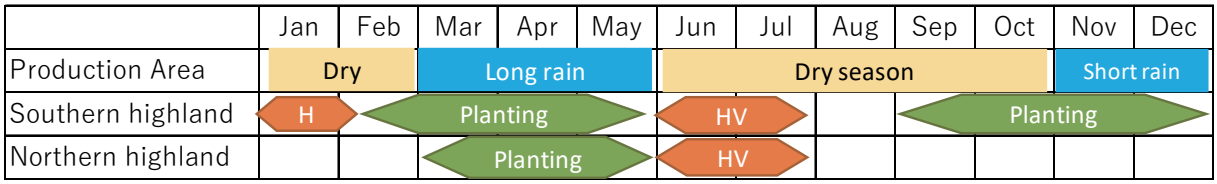


Figure 3.5.33 Potato Cropping calender

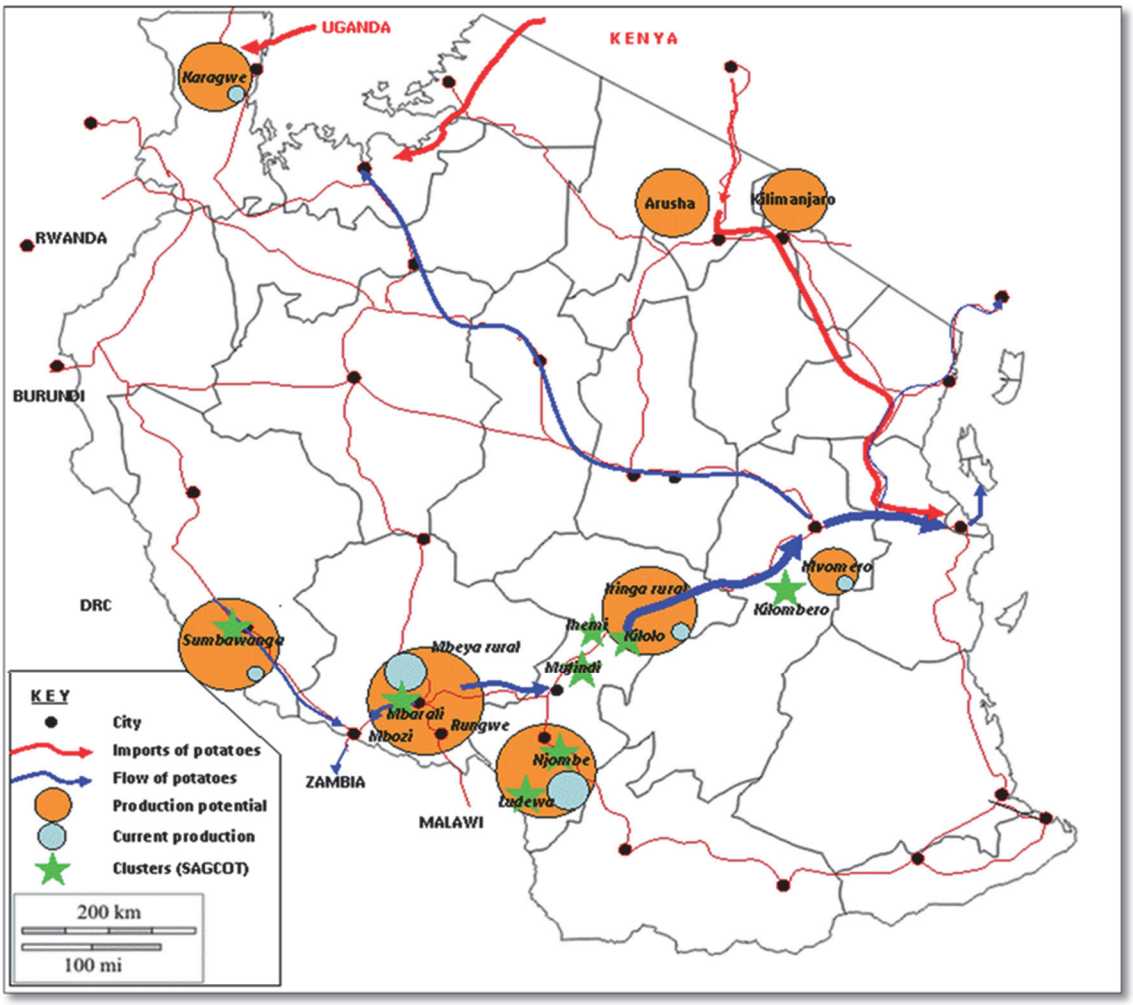
b. Production Area

Potatoes produced in Tanzania are concentrated in areas with high altitude and cool climate. The main production areas are Njombe region 26,727 ha (40% of potato production area) in the southern highlands followed by Mbeya region 18,436 ha (27.8%) and Tanga region 8,326 ha (12.5%).

Table 3.5.17 Planted area (ha) and production (ton) of potato

Zone	Region	Planted Area (ha)			Qty Harvest (ton)		
		Short rain	Long rain	Total	Short rain	Long rain	Total
Northern	Arusha	382	248	630	563	941	1,504
	Kilimanjaro	452	376	828	910	1,614	2,524
	Tanga	4,195	4,131	8,326	8,674	4,048	12,722
	Manyara		848	848		3,201	3,201
Southern highland	Iringa	37	2,404	2,441	12	7,867	7,879
	Mbeya	4,320	14,117	18,437	17,048	51,752	68,800
	Njombe	9,661	17,066	26,727	4,0202	50,445	90,647
	Rukwa		544	544		454	454
Western	Kagera	1,430	1,355	2,785	1,693	3,427	5,120
	Mwanza	155	622	777	124	44	168
	Kagera		1,355	1,355		3,427	3,427
	Kigoma		436	436		547	547
Central	Dodoma		110	110		138	138
	Tabora		145	145		492	492
	Shinyanga	742		742	86		86
Total		21,374	43,757	65,131	69,312	128,397	197,709

Source: FAO STAT



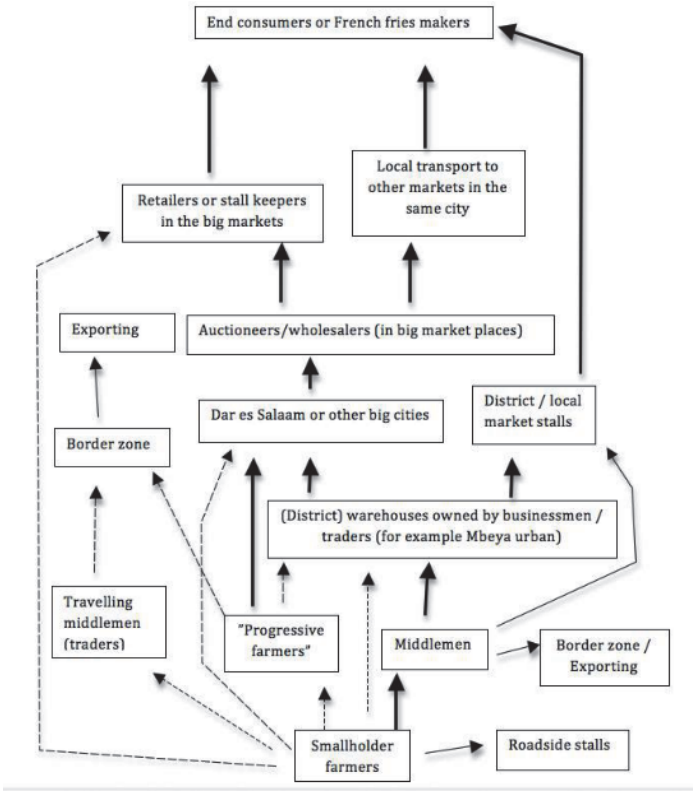
Source: Seed potatoes Tanzania（Netherlands Enterprise Agency, 2017）

Figure 3.5.34 Potato production area and trade flow map

c. Supply Chain

Potatoes are one of the major cash crops for smallholder farmers, with about 88% of the cultivated potatoes sold for cash income, making them more profitable than grains. Potato production is expanding, especially in the Southern Highlands, due to increased demand from urban consumers in particular. However, current potato production does not meet the total annual demand. In the off-season, it imports from neighboring countries to fill the needs gap. Especially in the urban areas around Lake Victoria, imports from Kenya and Uganda are the mainstream due to the lack of distribution infrastructure from the southern highlands to the northwest and the good road network on the border between Kenya and Uganda. There is. On the other hand, during peak domestic production, it exports to Kenya and neighboring countries.

Most of potato farmers sell to local traders. Through the middlemen, potatoes typically end at district warehouses which are owned by an individual trader or a group of businessmen. Warehouse owners are the ones who decide the local price. Progressive farmers can transport the potatoes to district warehouses or market places in large cities.



Source: Potato Value Chain in Tanzania (Juhani Rahko 2012)

Figure 3.5.35 Potato supply chain

d. Main Stakeholders

Seed grower: There are no specialized seed potato farms or companies in Tanzania. Farmers typically use their own seed from the previous yield or buy seed from their neighbors but there is no regular supply of certified seed. One of the key issues holding back productivity is the lack of access for local farmers to certified seed potatoes.

Farmer: Most of the farmers that cultivate potato are small scale ranging from 0.4 to 10 acres. Most of these farmers do not apply the required inputs.

Trader: Usually middlemen arrive to the farm gate and buy the potatoes straight from the field mainly because farmers do not have the means to transport the crop to the collection center. There are two types of middlemen, those who specialize in domestic distribution and those who come to buy from neighboring countries.

Processor: Most popular processed potato, French fries are fast food sold on the streets around the country. All of the hotels and restaurants also process their own French fries. French fries in hotels and restaurants are constantly increasing, forecasting growth for the whole potato industry. Other potato processor are small scale farmers groups who process crips/chips.

Consumer: Potato is expected growth in demand because of an increasing population, urbanization, an improving road network, and changing eating habits. People in the city eat more processed products, mainly French fries.

2) Impacts on FVC of Respective Crop

Table 3.5.18 Impact on each VC stage on potato

VC stage	2020		2021		Background and factors	Period
	Extent of impact	Impact	Extent of impact	Impact		
Input	Large	Price of potato seeds increased	Medium	High price of fertilizer	Agro-delaers and farmers experienced hiked prices and delay of inputs distribution.	May -Aug 2020, Apr -Jun 2021
Production	Large	High production cost, Sales price decreased	Medium	Sales price recovered	Production volume decreased. Increase in production costs due to higher prices of inputs. Difficulty in finding buyers due to movement restrictions.	Jan -Sep 2020, Jan -Sep 2021
Processing	Medium	Processing volume decreased	Small	Processing volume recovered	Increasing raw material price. Low demand, but recovered in 2021.	Jan - Jun 2020 Jan - Jun 2021
Distribution	Large	Distribution volume decreased,	Small	Market price decreased	Low demand, High cost of transportation. Closure of market	Jan -Dec 2020
Sales	Medium	Sales volume decreased	Medium	Traceability	Shortening of business hours. Decreasing customers and low demand.	Jan -Dec 2020 Jan - Sep 2021
Consumption	Small	Consumption volume decreased	Small	Consumption volume recovered	Decreasing consumption due to purchase cheaper food.	Jan - Jun 2020 Jan - Mar 2021

Note: Large: Large negative impact, Medium: Negative impact, Small: No impact or minor impact, -: Not applicable. The extent of impact was rated based on the results of the key informant survey, the questionnaire survey, and the results of the field survey

(8) Impacts on Respective Crop FVC: Coffee

1) Overview of FVC

Coffee is one of the most important crops which contributes foreign exchange earnings to average USD 100 million for over 30 years.

Tanzania's share in the world coffee market is less than 1 percent (TCB, 2017). Despite its smaller share in the world market, the Tanzanian coffee industry has a bright future because it produces Mild Arabica coffee of Colombian origin which is of higher quality and demand compared to other coffee such as Robusta. Tanzania also has the advantage of being able to begin harvesting Arabica coffee as early as May, making it available on the world market much earlier than other major producing countries.

Domestic consumption is growing at an average of between 1.5-2% a year, as the coffee-drinking culture gradually takes root in urban and peri-urban areas. Annual per capita coffee consumption in Tanzania is 0.06kg, and 7-8% of the country's total coffee production is locally processed and consumed.

a. Cropping Season of Respective Crop

Coffee is permanent crop. After planting seedlings, it takes about 3 to 5 years for coffee to become an adult tree and be economically harvested. Coffee cherries are ripened for half a year after flowering, and picked several times by hand throughout the harvesting season. The coffee production season in Tanzania differs depending on the production area as shown in the figure below.

Production Area	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Northern zone							Harvesting					
Southern zone							Harvesting					
Western zone					Harvesting							
	Auction/Sales						Auction/Sales					

Figure 3.5.36 Coffee cropping calendar

b. Production Area

In Tanzania, main coffee growing areas are divided into three; namely Northern zone (Kilimanjaro and Arusha regions), Southern highland zone (Mbeya and Ruvuma regions), and Western zone (Kigoma and Kagera regions). According to NSSA 2019/20, total production area is 159,280 ha and Kagera region has the largest production area (51.7%) and the highest production volume (59.6%) followed by Ruvuma region and Songwe region.

The coffee varieties cultivated in Tanzania are Arabica and Robusta, with Arabica in Northern and Southern highland zones and Robusta in Western zone.

Table 3.5.19 Planted area (ha) and production (ton) of coffee

Zone	Region	Planted Area (ha)		Qty Harvest (ton)	
Northern	Arusha	1,036	1.72%	512	0.85%
	Kilimanjaro	6,121	10.14%	1,952	3.23%
Southern Highland	Ruvuma	12,362	20.48%	7,171	11.88%
	Mbeya	7,996	13.25%	4,092	6.78%
	Njombe	54	0.09%	60	0.10%
Western	Kigoma	937	1.55%	802	1.33%
	Kagera	31,384	51.99%	28,170	46.66%
	Mara	478	0.79%	211	0.35%
Total		60,368		42,970	

Source: AASS 2016/17

Source: Tanzania Coffee Industry Development Strategy 2011-2021

Figure 3.5.37 Coffee growing regions in Tanzania

c. Supply Chain

Most coffee is traded at the weekly Moshi auction. Multinational companies dominate the Tanzania's

coffee auction. Direct trade between farmers and private coffee buyers is also implemented. As shown in the table below, Arabica varieties are mainly traded at auctions, and Robusta varieties are mainly distributed to 2 channels; namely direct trade with contract companies and domestic instant coffee processing companies (local roaster).

Note that major export destinations are Japan, Italy, Germany and the USA.

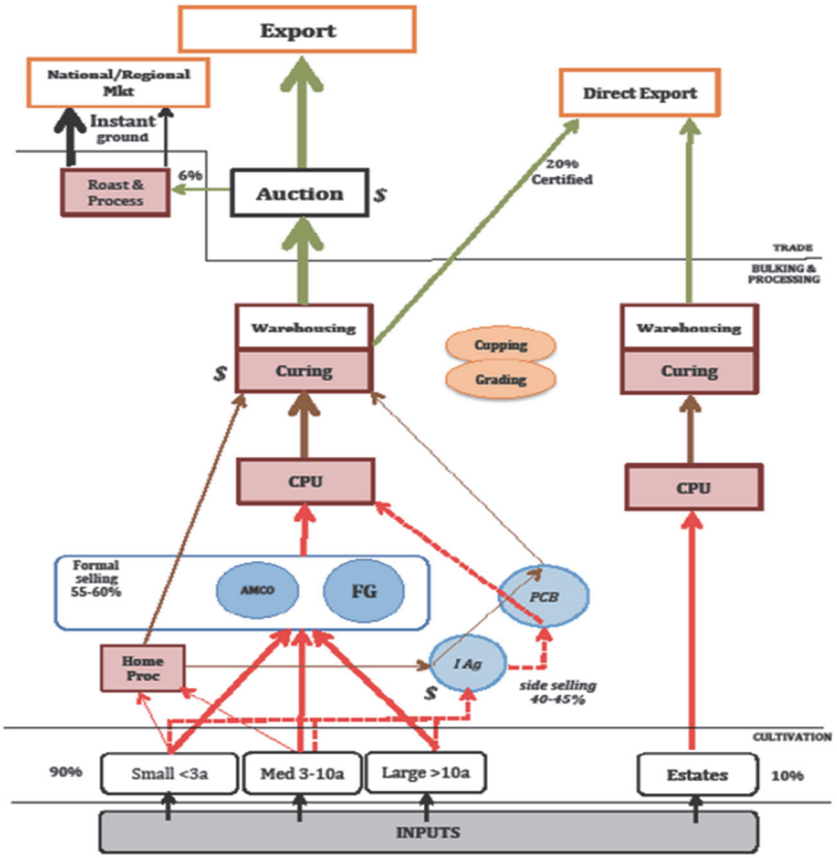
Table 3.5.20 Coffee traded in 2020

Type of Coffee	AUCTION		DIRECT EXPORTS		LOCAL ROAST		TOTAL		
	KGS	USD	KGS	USD	KGS	USD	KGS	USD	%
Mild Arabica	18,906,796	51,356,446	9,593,549	30,707,216	54,811	132,565.16	**28,555,156**	**82,196,227.15**	40.43%
Hard Arabica	145,527	291,691	2,323,620	3,678,241	16,620	15,972.00	**2,485,767**	**3,985,903.98**	3.52%
Robusta	1,524,910	2,539,431	37,694,468	49,369,183	375,192	441,839.32	**39,594,570**	**52,350,453.36**	56.05%
Total	20,577,233	54,187,568	49,611,637	83,754,640	446,623	590,376.48	70,635,493	138,532,584.49	100%

Source: Tanzania Coffee Board (2020)

The coffee value chain in Southern Tanzania is structured along four major segments:

a) Smallholder producers (< 8 acres) that process at a local CPU and sell coffee to the auction through regional curing plants;
b) Medium producers (land sizes 8-20 acres) that process coffee at a CPU and sell at the auction through regional curing plants;
c) Large producers (<20 acres) that have their own wet processing and sell at the auction through regional curing plants; and
d) Coffee estates (areas > 100 acres) that are fully engaged in direct exports.



Source: Coffee value chain analysis in the southern highlands of Tanzania (September 2018)

Figure 3.5.38 offee supply chain

d. Main Stakeholders

Tanzania Coffee Board (TCB): Tanzania Coffee Board is a government institution established by the Tanzania Coffee Industry Act No. 23 of 2001. Its main functions are to regulate the coffee industry in Tanzania such as 1) issuing licenses to distributors, exporters, processing factories, etc., 2) quality control of coffee beans, 3) hosting auctions, 4) collecting and providing information on coffee production and distribution, and Policy proposals, 5) Representatives of international organizations such as International Coffee Organization.

Tanzania Coffee Research Institute (TaCRI): A research institute that develops and disseminates breeding improved seedlings, pest and disease control, and appropriate technology. Also distributes seedlings high-yield disease-resistant variety to producers.

Input supplier: Before 1994, The Kilimanjaro Native Cooperative Union distributed input materials to member farmers and deducted expenses after harvesting. Since the liberalization, private agricultural input companies have been selling fertilizers and pesticides to farmers.

Financial institution: Private commercial banks such as NMB and CRDB provide loan to farmers. The main purpose of receiving a loan is to purchase land, input materials, and machinery.

Farmer: 90% of coffee growers are small scale farmers. Most of coffee farmers organize groups or cooperatives to secure agricultural inputs, loans and sales channels. Farmers who are under contract with a private coffee company are usually provided with agricultural inputs from the contracted company. Large-scale estate are mainly located in Kilimanjaro and Arusha regions.

Processor: Primary processing uses hand pulper machines and traditionally is operated at farmer's home. In recent years, using Central Pulpery Unit (CPU) is recommended to improve the quality of parchment. Secondary processing is usually operated at curing plants.

Local roaster: Coffee green beans are procured from farmers or at auction, and then roasted or processed into instant coffee for sale domestically.

Private Coffee Buyers: Licensed by Tanzania Coffee Board. Private coffee buyers purchase coffee from farmers and market at the auction and export.

2) Impacts on FVC of Respective Crop

Table 3.5.21 Impact on each VC stage on coffee

VC stage	2020		2021		Background and factors	Period
	Extent of impact	Impact	Extent of impact	Impact		
Input	Medium	High price of fertilizer	Small	No impact	Most of coffee companies shacked financially hence reduce supply of inputs to the Farmers as before.	Apr 2020 -Jun 2021
Production	Medium	High production cost,	Medium	High production cost,	Increase in production costs due to higher prices of inputs. Difficulty in finding buyers due to movement	Apr -Dec 2020, Apr -Jun 2021

		Production volume decreased			restrictions.	
Processing	Medium	Processing volume decreased	Small	No impact	Shortage of working capital and machines due to the change of business environment as well as Lock down for many countries which make difficult Importation of pulping machines for primary process.	Jan - Dec 2020
Distribution	Small	-	Small	-	Rise of new measures and conditions to overcome the pandemic at auction venue.	Mar 2020 – Jul 2021
Sales	Medium	Customer decreased	Small	Sales of restaurants recovered	Decrease of exportation volume due to lockdown in many countries.	Apr - Sep 2020
Consumption	Medium	Customer decreased	Small	No impact	The number of tourists has decreased, and sales of restaurants and cafes have decreased.	Apr - Sep 2020

Note: Large: Large negative impact, Medium: Negative impact, Small: No impact or minor impact, -: Not applicable. The extent of impact was rated based on the results of the key informant survey, the questionnaire survey, and the results of the field survey

3.5.4 Impacts on each VC Stage

(1) Overview of Influence on FVC

In the input stage, procurement volume decreased due to difficulties in securing suppliers, and selling prices soared due to higher procurement prices. This also had an impact on securing buyers, resulting in a decrease in sales volume. The affected period peaked from April to June 2020 and continued until December 2020. As the country relies on imports for most of its inputs, it was affected by the stagnation of global logistics and the temporary closure of factories in countries where export inputs, and was also affected by the surge in fertilizer prices in the international market.

At the production stage, input prices have risen, resulting in higher costs for production of most of the target crops. To cope with this, some farmers reduced their use of inputs. Production of rice, tomatoes, and potatoes declined. In the neighboring countries, border closures and tighter quarantines on border transactions have reduced the movement of distributors, making it difficult to secure sales channels. Domestic traders also became less willing to buy for fear of spreading the infection. The disruption of the market and lower demand had a major negative impact on producer prices, which fell.

At the processing stage, the volume of processing decreased due to difficulties in obtaining raw materials.

At the distribution stage, factors such as movement restrictions, shrinking market access and demand, difficulties in accessing suppliers, unstable supply of agricultural products, falling wholesale prices, soaring transportation costs and lack of transportation means resulted in a decrease in distribution volume. Some traders took measures to temporarily close or suspend business as a countermeasure against infection.

In the sales stage, retail sales volume declined due to lower demand and market access. Food service sales fell sharply in the first half of 2020 due to people refraining from going to eat out, but sales volume recovered in the second half of 2021 as crowds returned.

The impact of COVID-19 in the consumption stage tended to peak from April to September 2020 and then gradually decline in degree. On the lifestyle side, the decrease in income due to changes in the work environment had a significant impact, changing eating habits, expenditures, and social activities.

Table 3.5.22 Impact, background, and period of the whole FVC

VC	Impact	Background	Period
Input	Decrease of supply, Increase price	Difficulties in securing suppliers, Purchasing power declined, Decrease in farm income. Delayed arrival of imported inputs, Increased shipping costs, Price increases, high costs and falling needs. Agricultural loan borrowing decreased, Loan repayment rate decreased.	2020.4～2020.12
Production	Production is relatively stable, Crop conversion	Decrease in productivity, Reduction in agricultural material usage. (rice, horticultural crops) Increased production costs, Increase prices of agricultural materials. (Garden crop)	2020.3～2020.6
Processing	Decrease of processing	Decrease in demand, Blockage of the border, operation reduced. (rice) Changes in the business environment, Difficult to secure operating costs. (coffee)	2020.3～2020.6
Distribution	Business suspension, Temporary closure, Distribution volume decrease	Border transactions temporarily fallen, Distribution disruptions within the EAC region. (Maze) Movement restrictions, Distribution volume decreased. (rice) Transportation time increases, Stagnation of border transactions Post harvest loss (horticultural crop)	2020.1～2020.9 2021.1～2021.3
Sales	Decrease of sales	Sales volume decreased due to the impact of decreased demand and distribution volume. Price drop (rice) Due to the blockage of borders, the sales destination is changed from an exporter to a domestic one. Price drop (horticultural crops)	
Consumption	Decline in consumption, Increased consumption of low-priced crops	Purchasing power shrinks, Buying low-priced food, Sales decreased, Decrease in tourists and demand for eating out, Online purchases increased. (coffee)	2020.3 ～ 2021 to date

Source: VC survey results

(2) Impacts on Input Stage and Underlying Factors

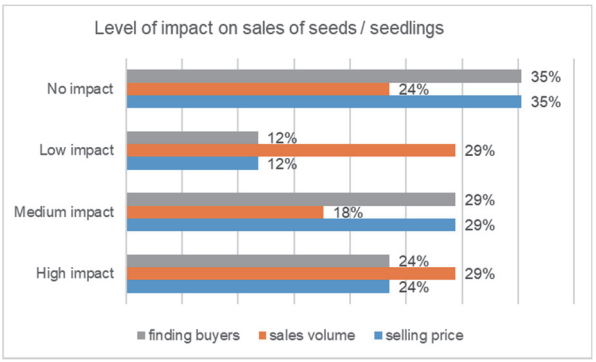
1) Overview

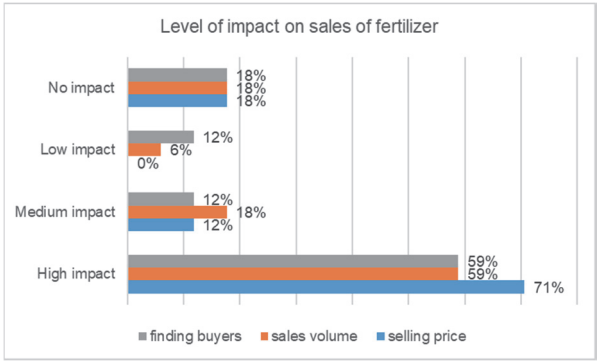
At the input stage, the selling price of the inputs increased due to the impact of movement restrictions, shortage of transportation means / distributors, increase in transportation costs, delay in delivery of imported goods etc. The sales volume decreased due to the decrease in the purchasing power and needs of the inputs by the farmers, coupled with the decrease in the income of the farmers. These impact were seen throughout 2020.

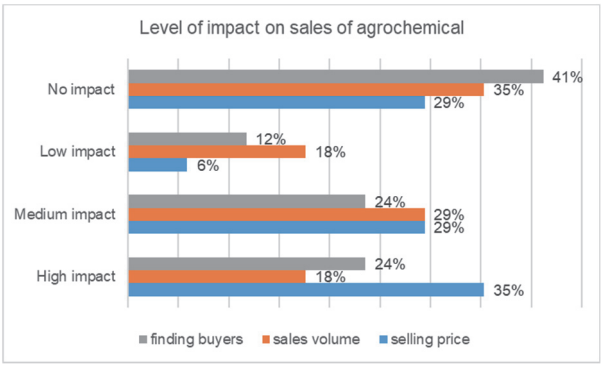
2) Change of sales

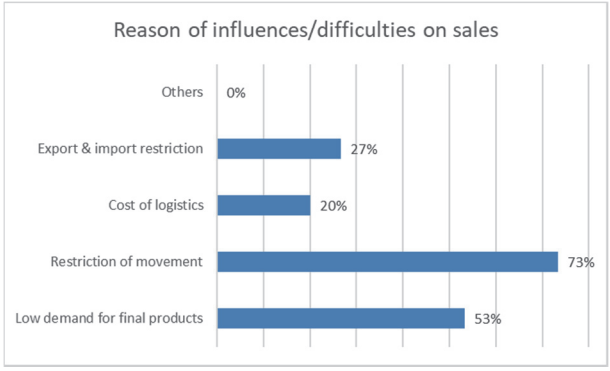
Among the input suppliers interviewed, the main customers were farmers and retailers, and there was no change in the customer base before and after COVID-19.

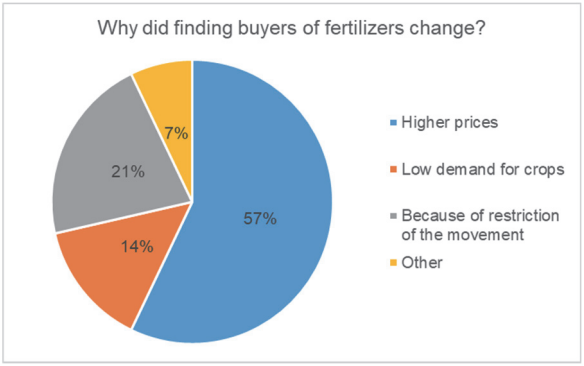
In terms of input sales, fertilizer sales were the most heavily affected. Over 80% of the respondents were affected and the extent of the impact was much greater than that of seeds and pesticides. Factors contributing to the impact included movement restrictions, lower demand, and import and export restrictions. Farmers have also been affected by the higher prices of fertilizers and pesticides, which they have refrained from buying and reduced their use.





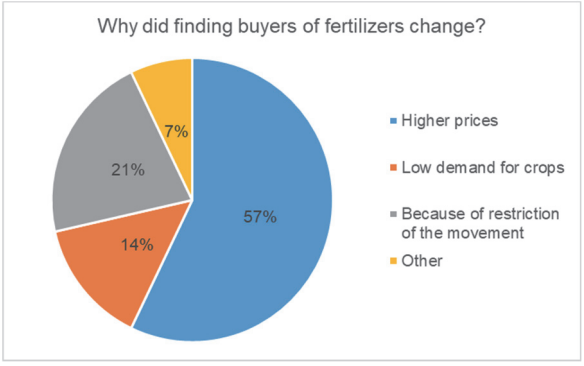






Change of selling price before/after COVID-19

	Before Tsh	After Tsh	Unit	%Change
Urea	50,000	100,000	50kg	100%
	800	2,000	kg	150%
NPK	65,000	90,000	50kg	38%
	1,200	2,000	kg	67%
	1,300	2,500	kg	92%
DAP	70,000	120,000	50kg	71%
	65,000	115,000	50kg	77%
	57,000	110,000	50kg	93%
	65,000	115,000	50kg	77%
	1,200	2,500	kg	108%
	1,200	2,000	kg	67%



Change in sales volume of fertilizer per month

Before Covid-19	After COVID-19	Unit	%Change
200,000	10,000	kg	-95%
100	150	kg	50%
300	100	kg	-67%
500	200	kg	-60%
18,140	4,535	kg	-75%
1,800	500	kg	-72%
500	200	kg	-60%
4,500	1,500	kg	-67%
3,600	1,200	kg	-67%

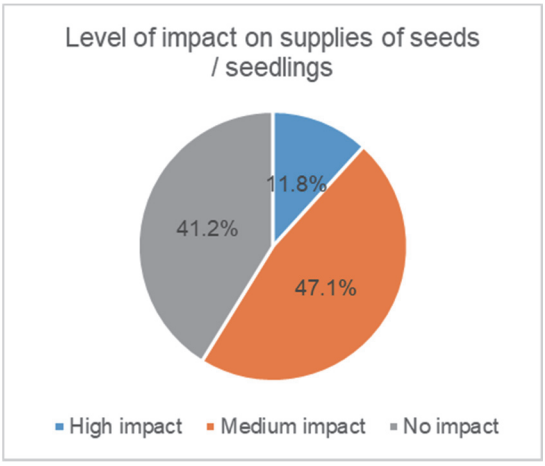
Source: VC survey results

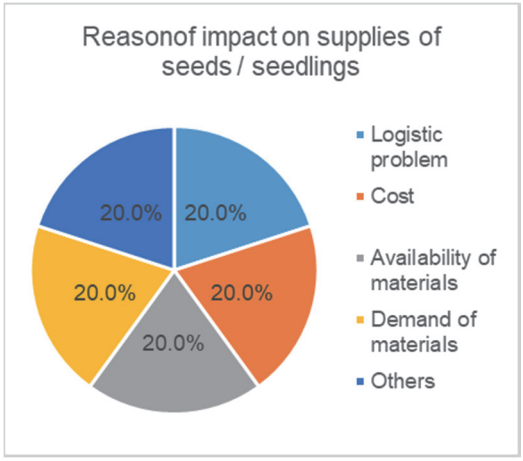
3) Change of procurement

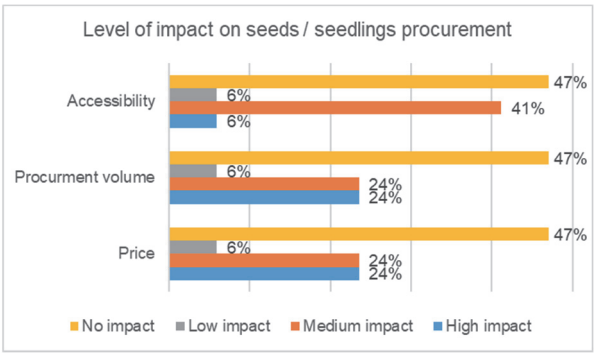
[Seeds/Seedlings]

58.8% of the respondents were affected in seed procurement. More than 50% of the respondents were affected in terms of procurement quantity, procurement price and access to suppliers respectively. Factors contributing to this negative impact included distribution problem, higher procurement prices, and changes in crop demand.

The period most affected was from April to June 2020, followed by October to December 2020. There was no change in the sources of procurement, but 78% of the suppliers had more difficulty finding suppliers than before COVID-19.





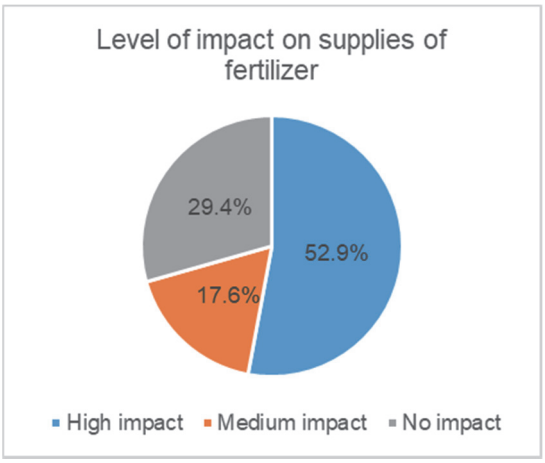


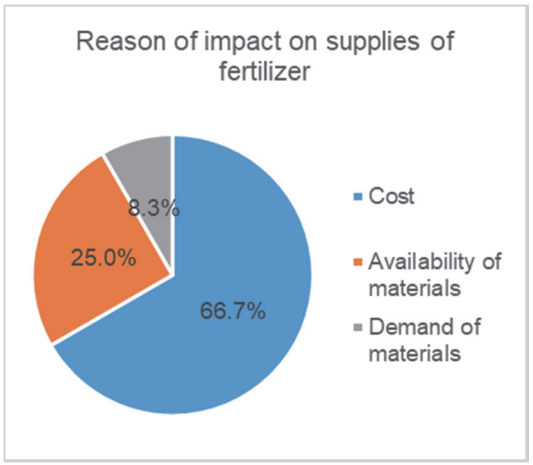
Source: VC survey results

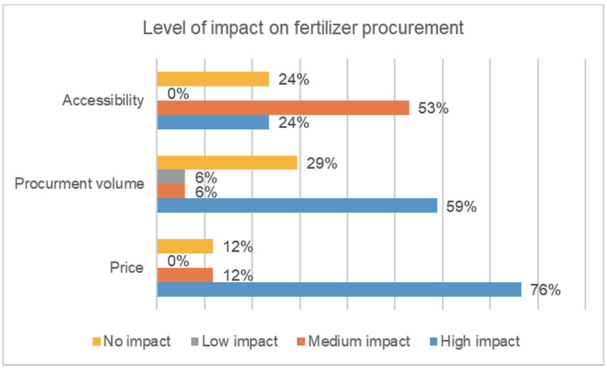
[Fertilizer]

70.6% of the respondents were affected in fertilizer procurement. More than 80% of the respondents were affected in terms of procurement price, and more than 70% were affected in terms of procurement quantity and access to suppliers. Factors contributing to this negative impact were high procurement prices and difficulty in obtaining raw materials.

The most affected period was April-June 2020, followed by October-December 2020. 85% of the respondents had more difficulty finding suppliers than before COVID-19.







Source: VC survey results

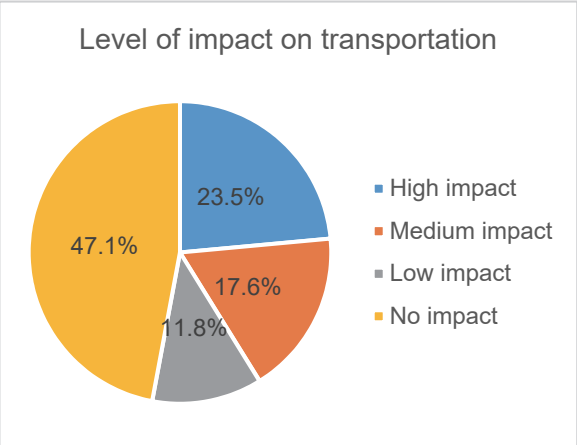
[Agrochemicals]

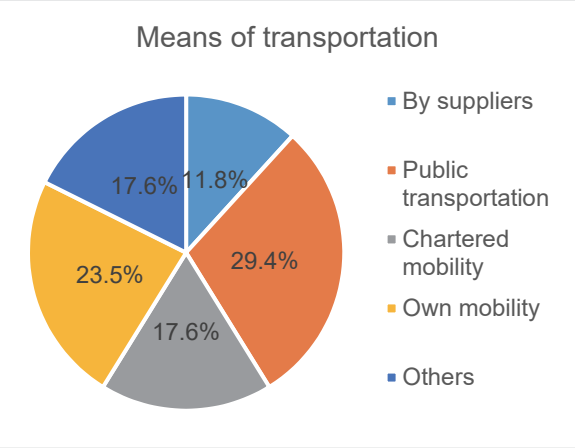
47.1% of the respondents were affected in their pesticide procurement. The most affected period was from April to June 2020, followed by January to March 2021. 23.5% of the respondents had more difficulty finding suppliers than before COVID-19.

4) Influence on distribution, labor and financing

[Distribution]

52.9% of the respondents were affected in distribution. The most common factor was an increase in distribution costs, with some companies being severely impacted by up to a 100-120% increase in costs, although the extent of the increase varied. The most affected period was from April to June 2020, followed by October to December 2020.



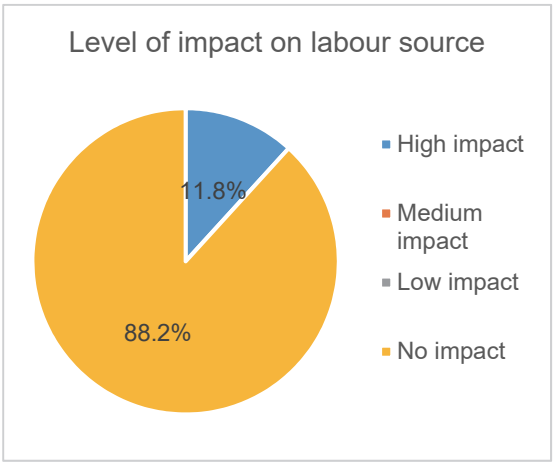


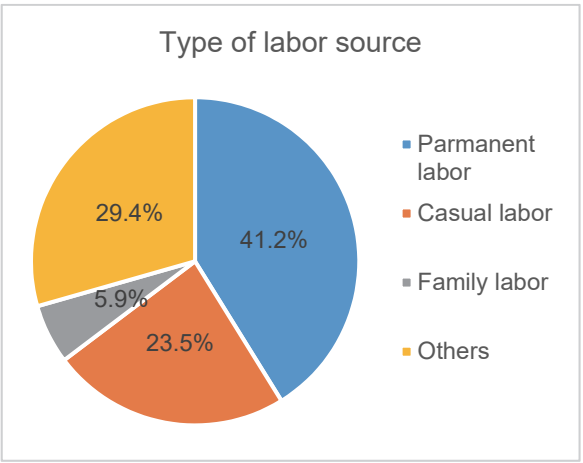
Accessibility of transportation				Transportation cost			
Impact		Reason		Impact		Change	
High impact	11.8%	Cost	85.7%	High impact	35.3%	100-120% up	22.2%
Medium impact	29.4%	Restiction of movement	14.3%	Medium impact	11.8%	50-99% up	22.2%
Low impact	0%			Low impact	11.8%	30-49% up	22.2%
No impact	58.8%			No impact	41.2%	10-29% up	11.1%
						decreased	22.2%

Source: VC survey results

[Labor]

Labor availability was largely unaffected by COVID-19. For those that responded, employment costs were 60% to 70% lower than before COVID-19.



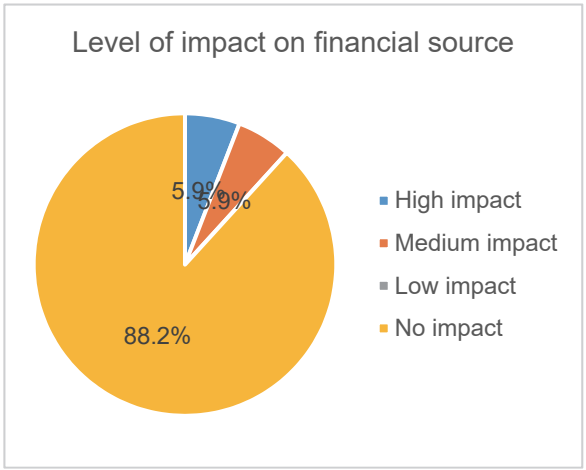


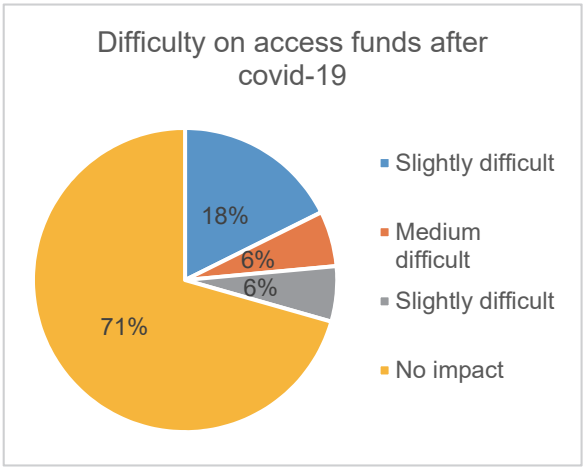
Source: VC survey results

[Financing]

Financial sources for operations were largely unaffected by COVID-19. Since more than 70% of the respondents operate with their own funds, only 30% of the respondents reported that it was more difficult to secure funds compared to before COVID-19. The factors were soaring costs, commercial instability, and distribution challenges.

In terms of payment mode at the time of procurement and at the time of sale, 60% were cash, which was hardly affected by COVID-19.



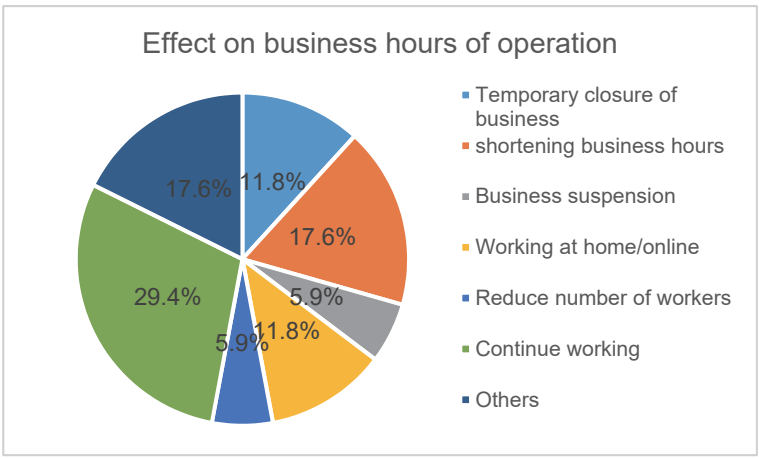


Type of financial source								
Government	Cooperatives	Commercial bank	Rural bank	Micro Finance	Traders	Relatives	Own	Others
0.0%	0.0%	17.6%	0.0%	0.0%	5.9%	0.0%	76.5%	5.9%

Source: VC survey results

5) Measures taken against COVID-19

About 50% of the respondents answered that they took preventive measures against COVID-19, including 11.8% closed shop, 17.6% shortened business hours, 5.9% laid off hired workers, and 11.8% worked at home. 30% of the respondents conducted normal business operations while taking a precaution on the situation.



Source: VC survey results

6) Change of business environment

The competitive environment of the input business has changed to strengthening by new entrants, strengthening by e-commerce, and easing by many companies withdrawing from the market. In particular, it was reported that e-commerce was used by a telephone company (Vodacom) when the store was closed and people who were afraid of spreading the infection.

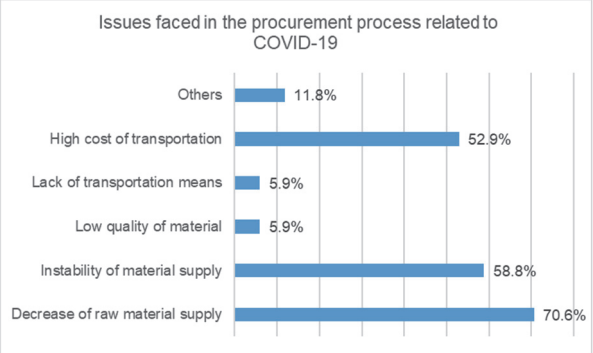
7) Support

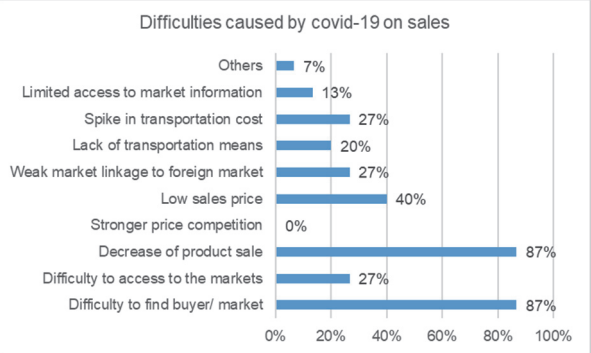
No public support from the Government was provided to VC stakeholders at the input stage.

8) Challenges, Needs and Perspective

In terms of challenges on procurement, 70% of respondents cited material supply sources, 59% cited unstable material supply, and 53% cited high transportation costs. In terms of sales, 87% of respondents cited difficulties in securing buyers and 87% cited declining sales.

Input suppliers pointed out that the Government should reduce import taxes to create a more beneficial environment for farmers. They also expressed concern about cash flow due to declining profits and delayed payments, and suggested a change in the way they dealt with customers, by exchanging goods for payment, rather than paying on credit.





(3) Impacts on Production Stage and Underlying Factors

1) Overview

Farmers purchased seeds, fertilizers and pesticides from local agro-dealers and the sources of purchase did not change compared before COVID-19. Prices of agricultural inputs increased and were most affected in the first and second seasons of 2020 and the third season of 2021.

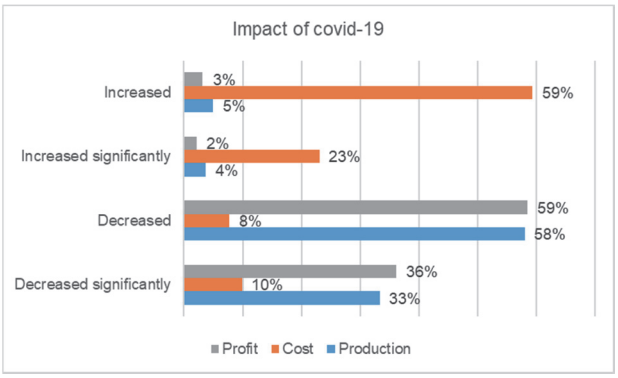
Production costs increased due to high prices and difficulty in obtaining agricultural inputs. In addition, the shrinking of markets and difficulties in accessing markets led to a decrease in production volume, changes in cropping patterns, and reduced income. In case of tomatoes, some farmers were stolen their produce before harvest, while others were unable to find buyers and let them rot in the field.

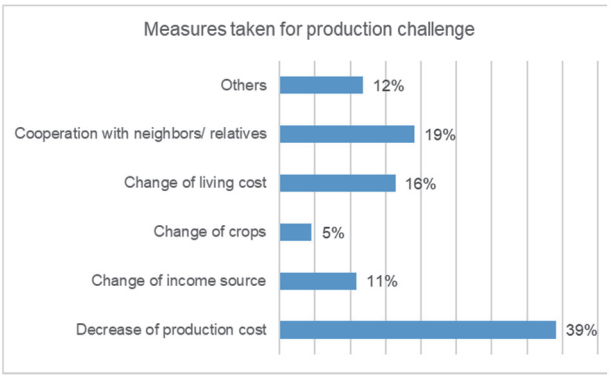
In terms of sales, it became difficult to secure buyers in the cropping season of 2020 due to movement restrictions and market closure. Most of the farmers obtained market information from buyers before COVID-19, but some farmers used smartphone applications after COVID-19. The reason for the difficulty in obtaining market information was that buyers avoid coming to farmgate due to movement restrictions. As for the method of communication with buyers, many farmers used face-to-face conversation before COVID-19, but the percentage of farmers using phone increased after COVID-19.

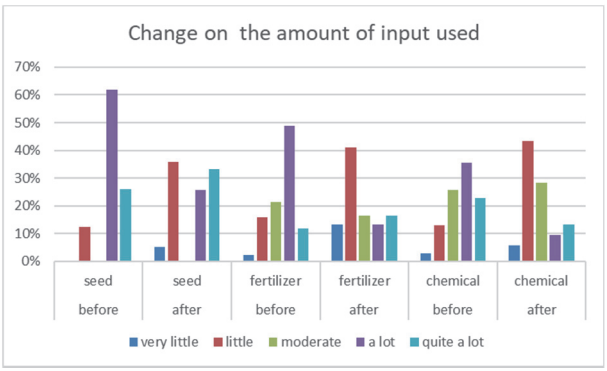
2) Change of Production

Around 80% of the respondents experienced a decrease in production, an increase in costs, and a corresponding decrease in profits. The most affected period was 1st cropping season (March to June) in 2020. To cope with this impact, measures were taken to reduce production costs and to cooperate with

neighboring farmers and relatives. 60% of the respondents reported using more fertilizers and pesticides before COVID-19, but 50% of them responded by using less after COVID-19 in order to reduce their production cost.







Source: VC survey results

3) Change of Sales

The percentage of sales to middleman decreased after COVID-19, and the percentage of sales directly to wholesalers and retailers increased. The reason for this was due to movement restrictions. In terms of transportation for sales, there was a decrease in buying by traders and use of trucks, and a slight increase in the use of bicycle and tricycle. As for the availability of market information, the percentage of market information obtained from buyers decreased after COVID-19, and the percentage obtained from extension agents increased.

The biggest impact on sales was the decline in farmgate prices, followed by movement restrictions. To deal with the sales issues, many respondents answered to cooperating with neighboring farmers but others said there was no choice to sell their products at lower price.

Source: VC survey results

4) Change of procurement

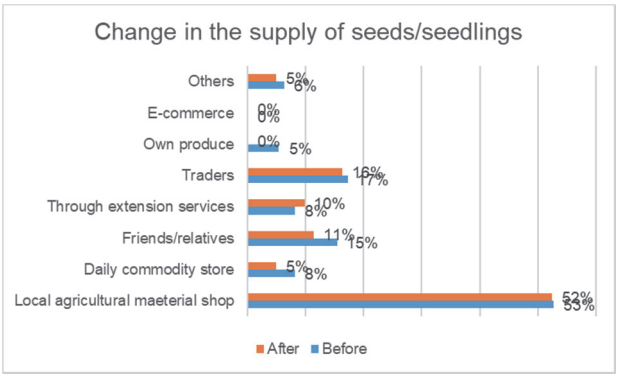
For procurement of seeds, fertilizers, and pesticides, most of the farmers used local agricultural material shops, and there was no significant change in their usage before and after COVID-19. Most of the respondents indicated that they directly visit to the shop to purchase the products. Major payment method was cash, and the use of mobile money was observed very few.

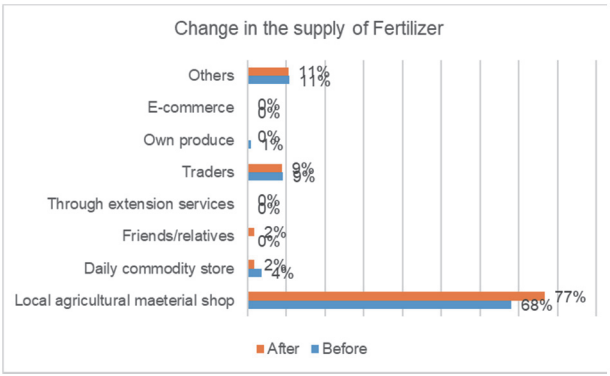
In terms of the degree of impact on inputs procurement, the most significant impact was observed on access to fertilizer. More than 90% of the respondents were affected, and the timing was April-June 2020.

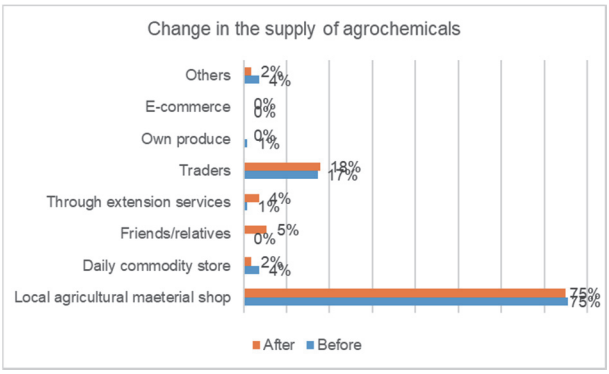
Labor availability was affected by the decline in the employment of seasonal casual workers and an increase in family labor after COVID-19. The reason for this was that fewer people could be hired due to movement restrictions and higher employment costs.

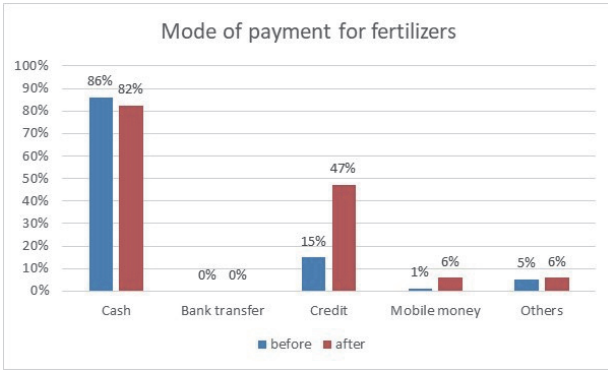
About half of the respondents reported that their access to agricultural financing had been affected. It became

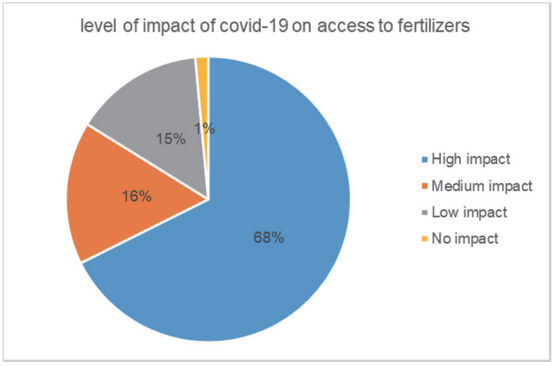
difficult for them to farm with their own funds, and they had to borrow more from relatives or from the cooperative. Sixty percent of the respondents responded to this challenge by reducing their use of agricultural inputs.

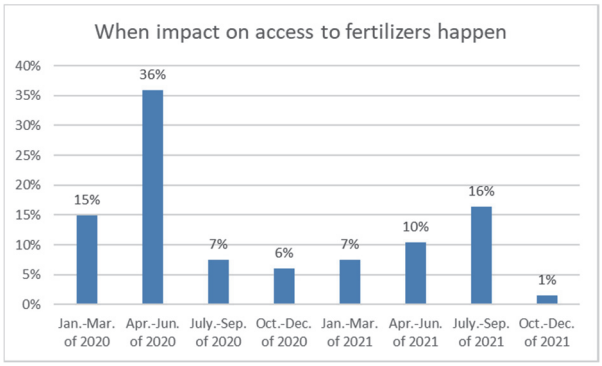


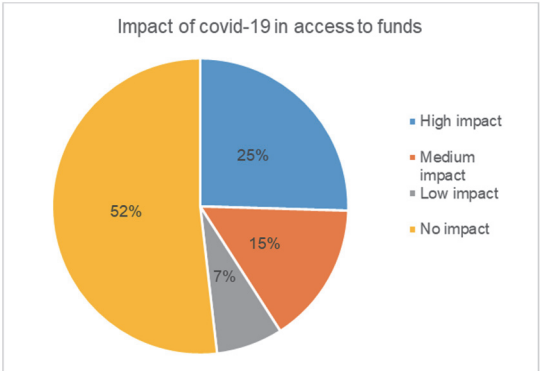


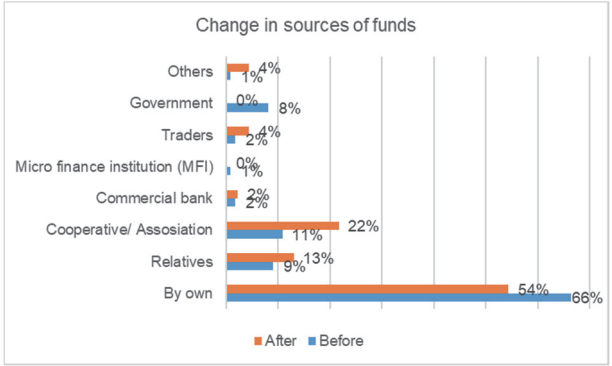


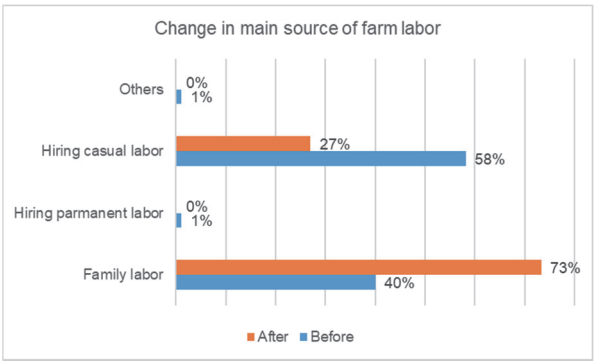


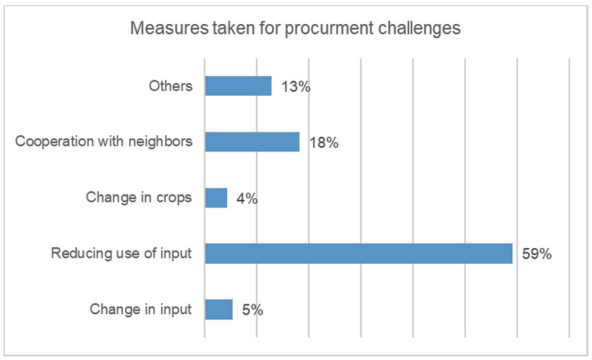








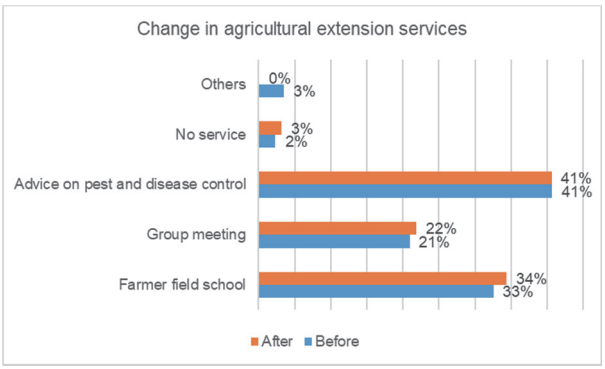


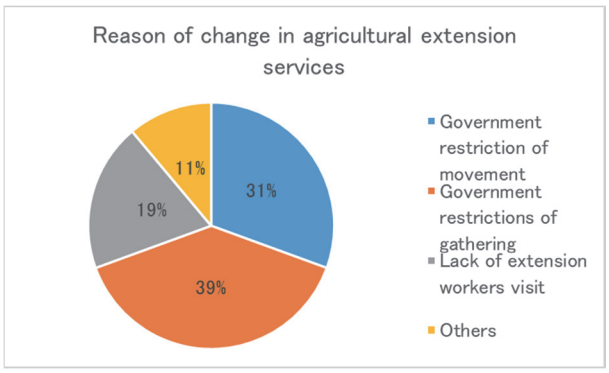


Source: VC survey results

5) Support

No public support against COVID-19 was reported, but a major fertilizer company provided agricultural materials to farmers in 2020. As for agricultural extension, farmers were provided with extension services such as advice on pest control and farmer field school, and there was no difference in the extension services provided before and after COVID-19.





Source: VC survey results

9) Challenges, Needs and Perspective

Major challenge in terms of procurement of inputs was the soaring prices of agricultural materials. It was suggested lowering prices, stabilizing prices, and resuming fertilizer subsidy policies.

Challenges on sales include falling selling prices, movement restrictions / border closures, reduced demand, confusion in local markets / wholesalers, and difficulty in securing buyers. Farmers cooperate with neighboring farmers to deal with these issues. Measures were taken such as changing the crops produced, changing buyers, reducing the cultivation area, and reducing the production volume.

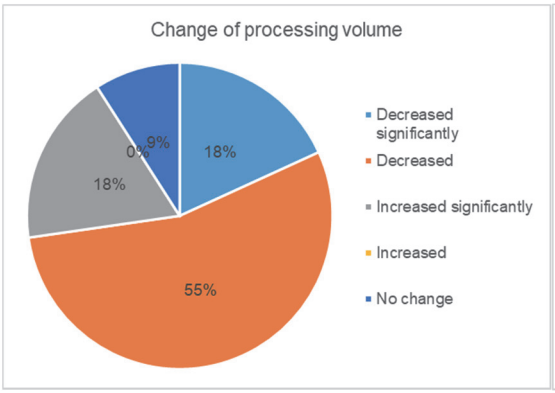
While 40% have a positive outlook in the long run, 30% are worried about the future perspectives. The reasons for this were that production costs remained high due to the lack of signs that agricultural material prices were going down, and that there were concerns about COVID-19 infection control measures.

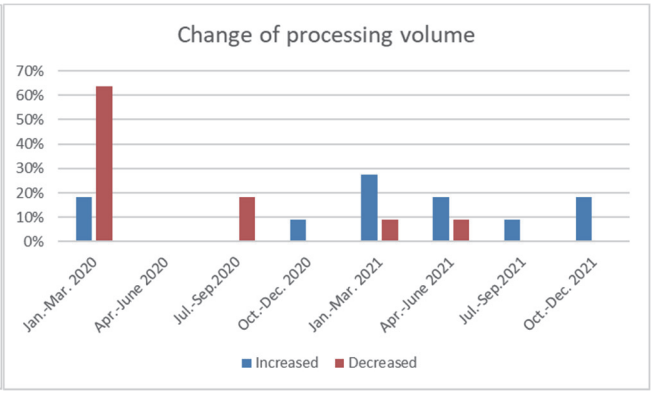
(4) Impacts on Processing Stage and Underlying Factors

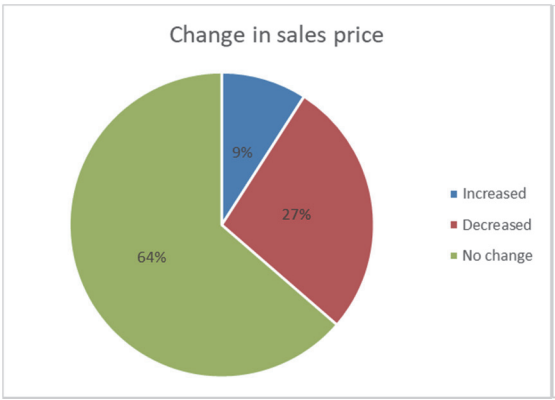
1) Change of sales

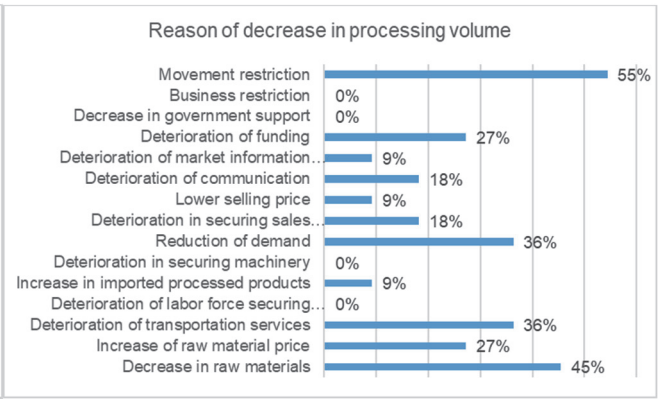
73% of the respondents reported a decrease in processing volume. The most common period affected

was January to March 2020. The reasons for this were restrictions on movement and a decrease in raw materials. As for selling prices, 64% of the respondents answered that there was no change, and 27% answered that the prices decreased.







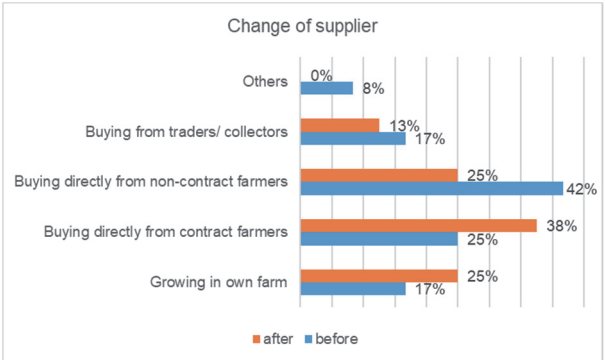


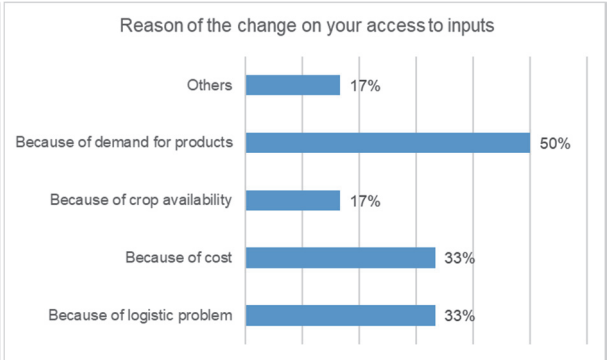
Source: VC survey results

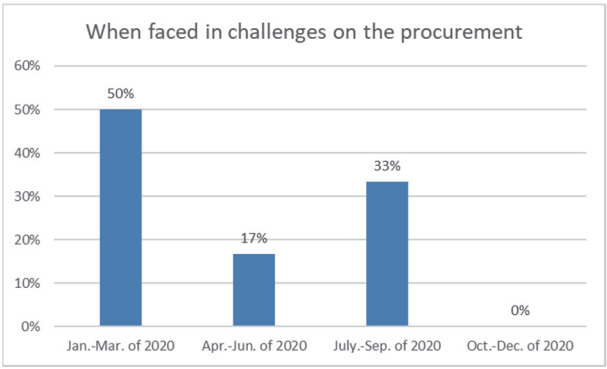
2) Change of procurement

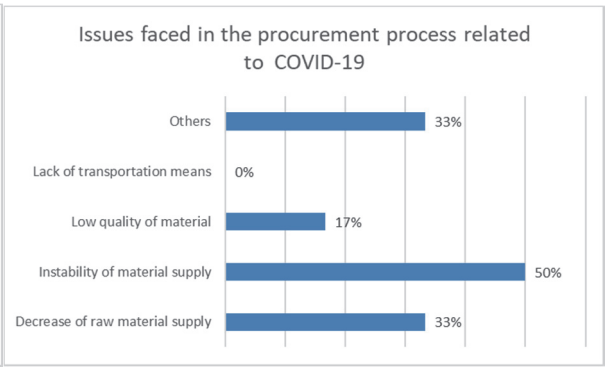
Suppliers of raw materials for processing increased their procurement from their own farm or from contract farmers and decreased their procurement from non-contract farmers compared to before COVID-19. The reasons for this were 50% change in demand and 33% logistical problems.

Procurement volume was affected by 50% of the respondents, all of whom saw a decrease in procurement volume. The most common reason for this was a change in product demand, followed by logistics and cost issues. The period affected was from January to September 2020.









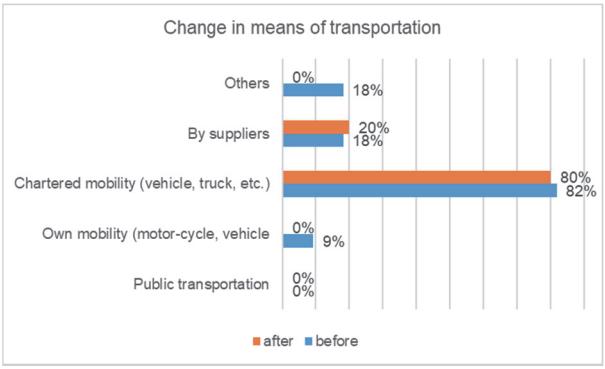
Source: VC survey results

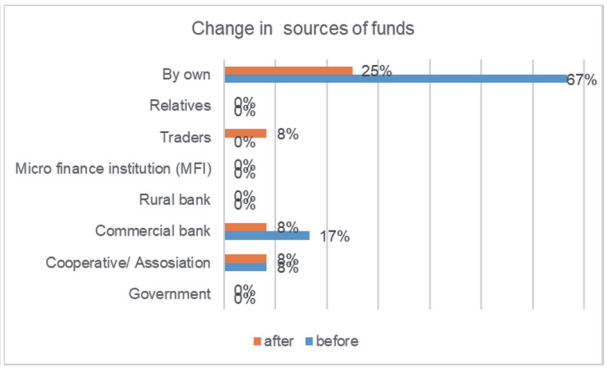
3) Influence on distribution, labor and financing

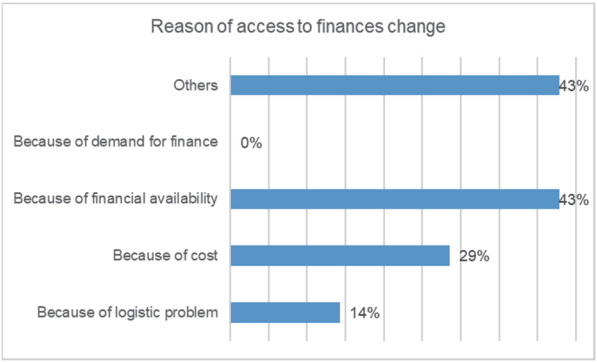
There was no significant change in the means of transportation used for processing stage between before and after COVID-19. 80% of the respondents used chartered mobility and 20% relied on transportation provided by suppliers.

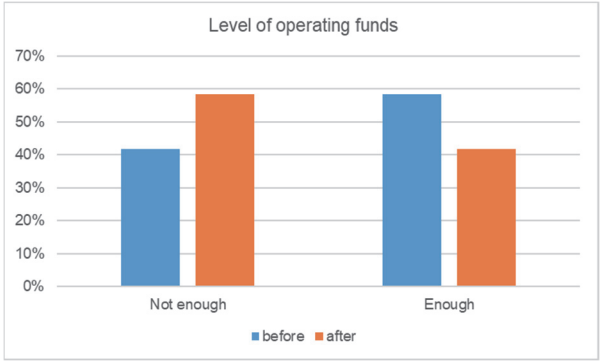
Most of the respondents did not change in the number of employees (full-time and part-time) even after COVID-19.

Less than 70% of respondents reported that the funding sources were self-financing before COVID-19, but the percentage dropped to 25% after COVID-19. Access to funds became more difficult, and the the respondents who lacked operational funds increased after COVID-19.







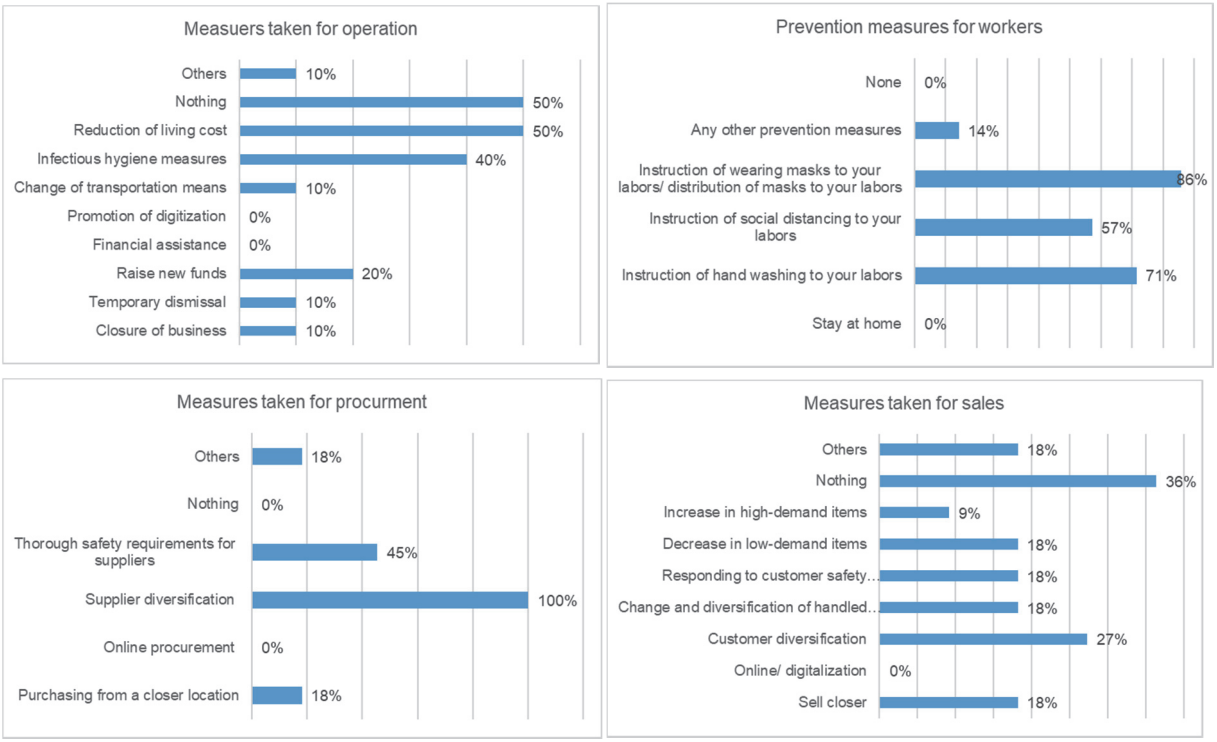


Source: VC survey results

5) Measures taken against COVID-19

In terms of operations, the COVID-19 response measures focused on reducing living costs and infection control. Employed workers were given nose masks and encouraged to wear masks and to wash their hands.

In response to COVID-19, measures were taken to diversify customers on the sales side, and measures were taken to increase the number of suppliers on the procurement side.



Source: VC survey results

6) Change of business environment

Temporary suspension of operations of 17%, reduction in business hours of 25%, givens a shift to employees17% and salary reduction of 8% were observed. 25% of the respondents answered that they continued to operate normally.

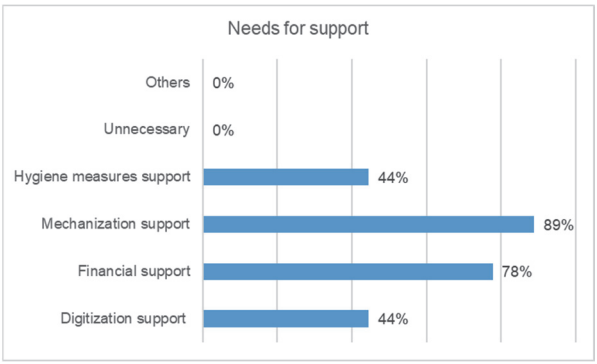
7) Support

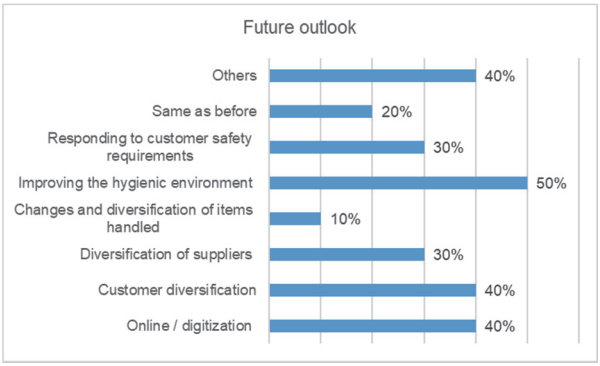
It is reported that no public support was provided to processors.

8) Challenges, Needs and Perspective

There were many requests for mechanization and financial support.

80% of the respondents had a positive outlook for the future, because the prevention measures against COVID-19 were lifted and customers started returning to market. In terms of future business outlook, there were high expectations for improving hygienic environment, diversification of customers, and digitalization.





Source: VC survey results

(5) Impacts on Distribution Stage and Underlying Factors

1) Overview

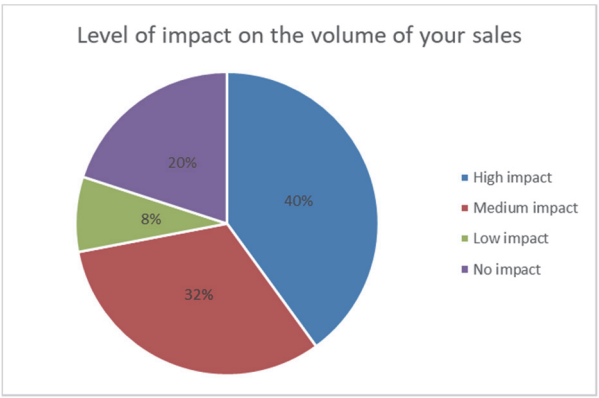
At the distribution stage, it was affected by market access and shrinking demand, difficulty in accessing destinations, falling wholesale prices, soaring transportation costs, unstable supply of agricultural products, and lack of transportation means. The impact was reported from January to September 2020 due to movement restrictions, market closures, and lack of market information.

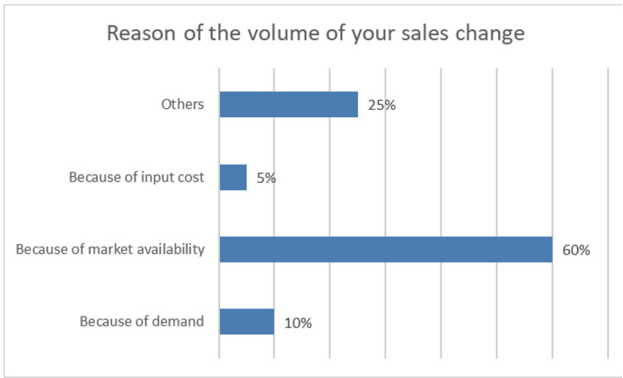
2) Change of sales

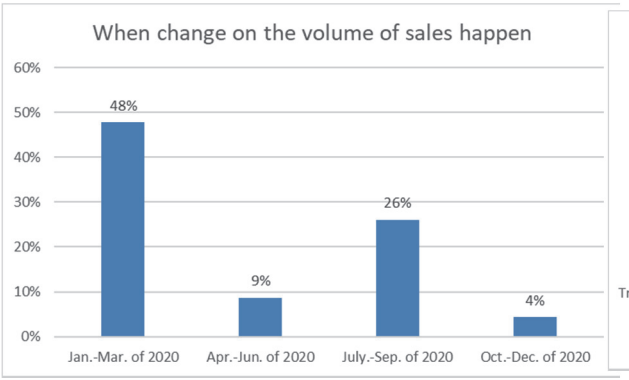
80% of the respondents experienced negative impact on their sales volume. The reasons were mostly market availability. The period mostly affected was from January to March 2020.

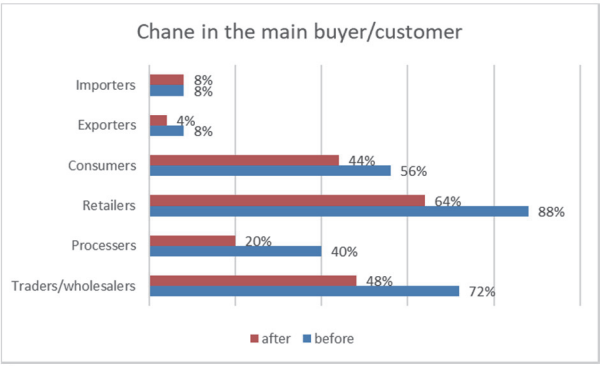
57% of the respondents increased their selling prices. The reason for the price increase was that it became harder to obtain in the market despite the demand. On the other hand, the reason for the price decrease was to sell out of inventory due to fewer customers.

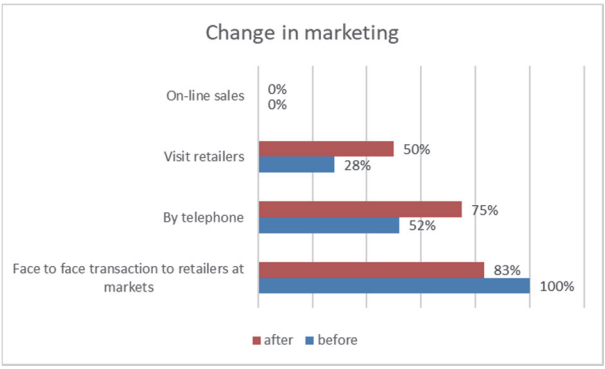
Retailers and wholesalers were the main customers, and there was no significant change in the composition before and after COVID-19. Before COVID-19, the main method of marketing was face-to-face information gathering, but after COVID-19, the percentage of communication by phone increased. The similar observed for the payment method, which was cash payment before COVID-19, but after COVID-19, there was a tendency to use mobile money to avoid face-to-face transactions. In addition, about 30% of the respondents received safety and quality control requests from their customers after COVID-19.

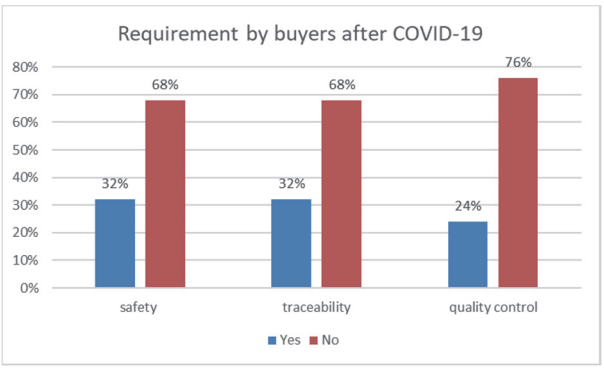










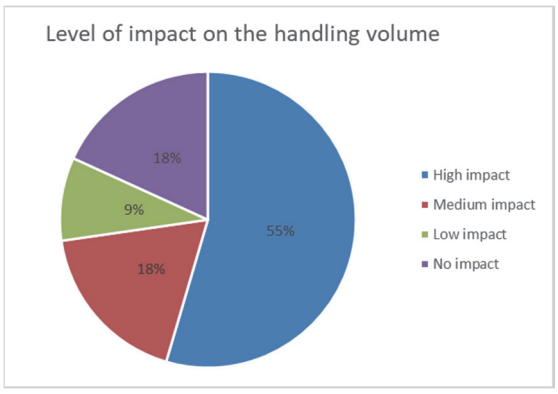


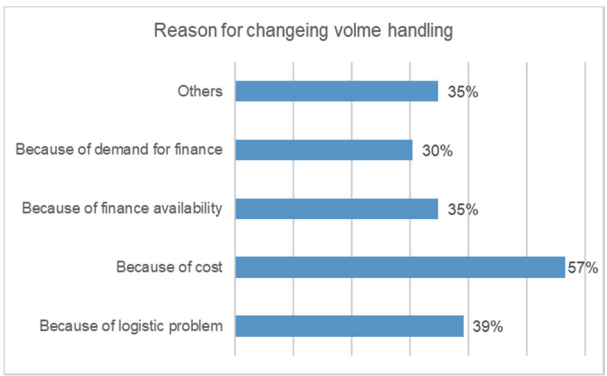
Source: VC survey results

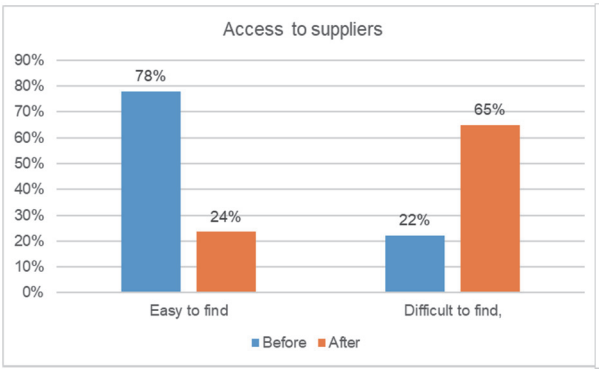
3) Change of procurement

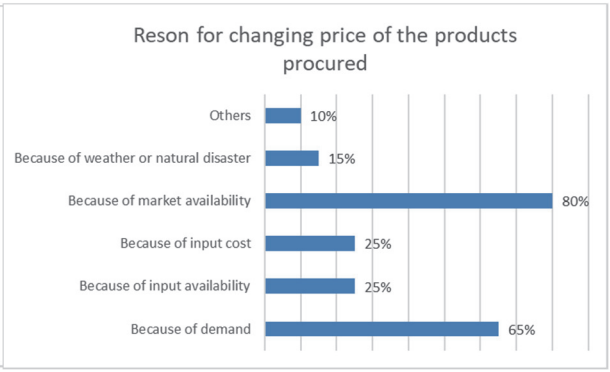
82% of the respondents experienced negative impact on their handling volume. For 80% of them, the volume of goods handled decreased. The reasons were mostly cost and logistics issues. The period affected was from January to September 2020.

More than 90% of the responding traders purchased from farmers; there was no change in the suppliers after COVID-19, but it was more difficult to find suppliers than before COVID-19. The impact on purchase prices was seen from January to September 2020. Price changes were caused by market restrictions and reduced demand.









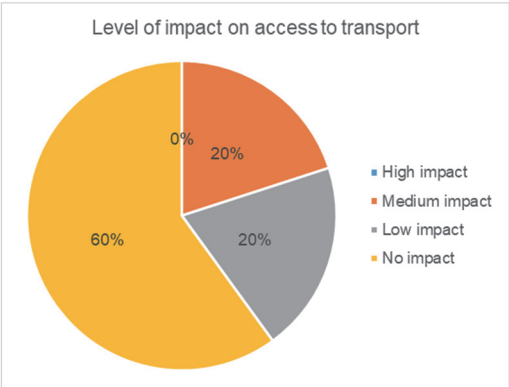
Source: VC survey results

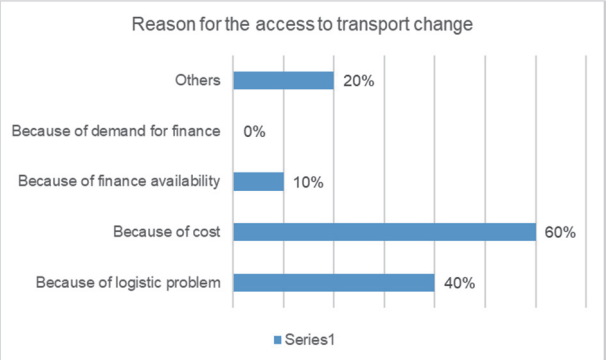
4) Influence on distribution, labor and financing

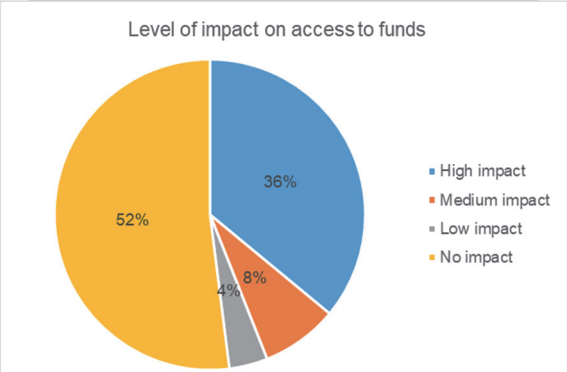
For logistics, 84% of the respondents used chartered trucks. 40% of the responding vendors were affected by access to the transportation due to the cost. The challenge on transportation accessibility was observed from January to September 2020.

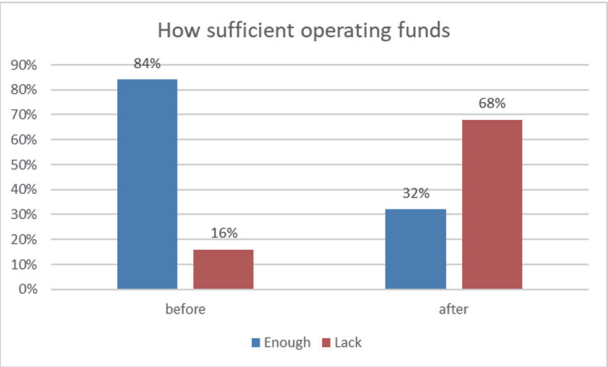
Before COVID-19, 84% of respondents were able to raise sufficient funds for their operations, but after COVID-19, it became difficult for them to raise funds. In terms of source of funds, self-financing accounted for half of the respondents before COVID-19, while borrowing from cooperatives and traders increased after COVID-19.

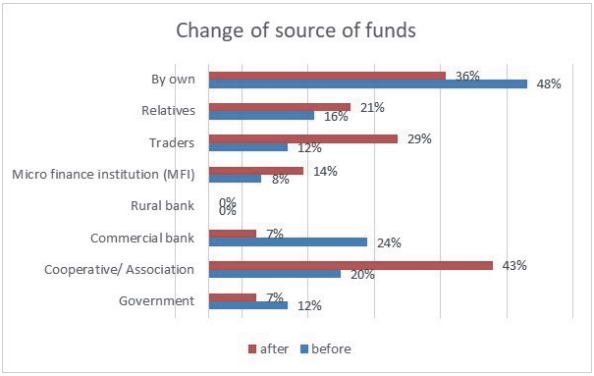
There were no major impacts on labor accessibility. It was reported that some respondents adopted rotation working due to the impact of movement restrictions and cost reduction.

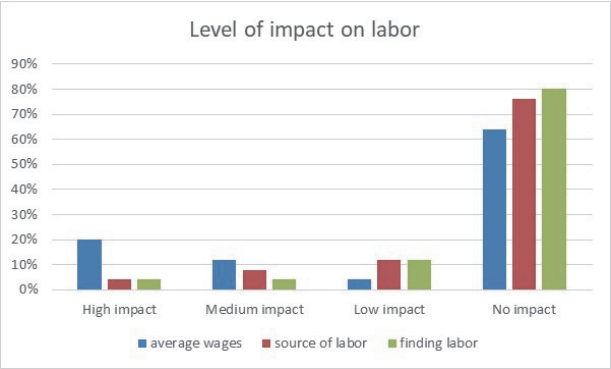












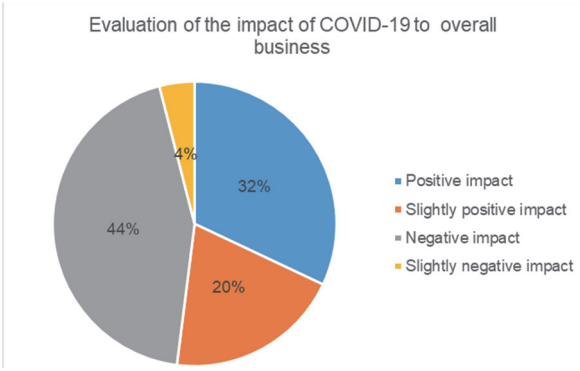
Source: VC survey results

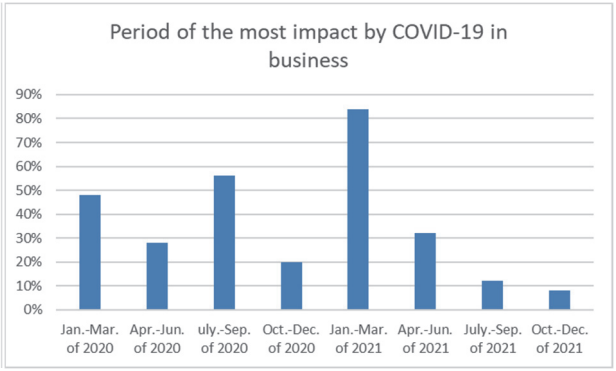
5) Measures taken against COVID-19

In Ilala market, Dar es Salaam, government-sponsored hand-washing tanks were installed and used to wash hands and disinfect hands for market stakeholders and consumers.

6) Change of business environment

90% of respondents answered that there was no change in the business environment under COVID-19 in terms of competitiveness. Two companies answered that they worked on strengthening new customers while one company reported strengthening with E-Commerce.





Source: VC survey results

7) Support

Most of the respondents did not receive government support. One company exempted a tax in June 2020.

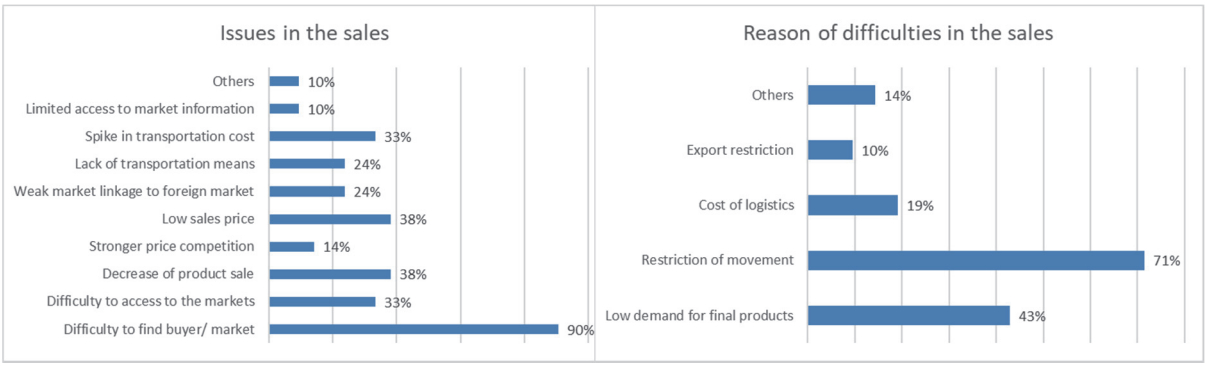
8) Challenges, Needs and Perspective

On the procurement side, the issues are soaring prices, decreasing demand for target agricultural products, and increasing costs for borrowed trucks. In terms of sales, securing markets and buyers is a major issue doe to movement restriction. Therefore, there was a request for the government to lift the restrictions, especially to reduce the restrictions that affect border transactions.

On the other hand, the demand for crops is increasing now, and it has the prospect of returning to normal.

Since the outbreak of COVID-19, buyers have been demanding the safety, traceability and quality control of

agricultural products.



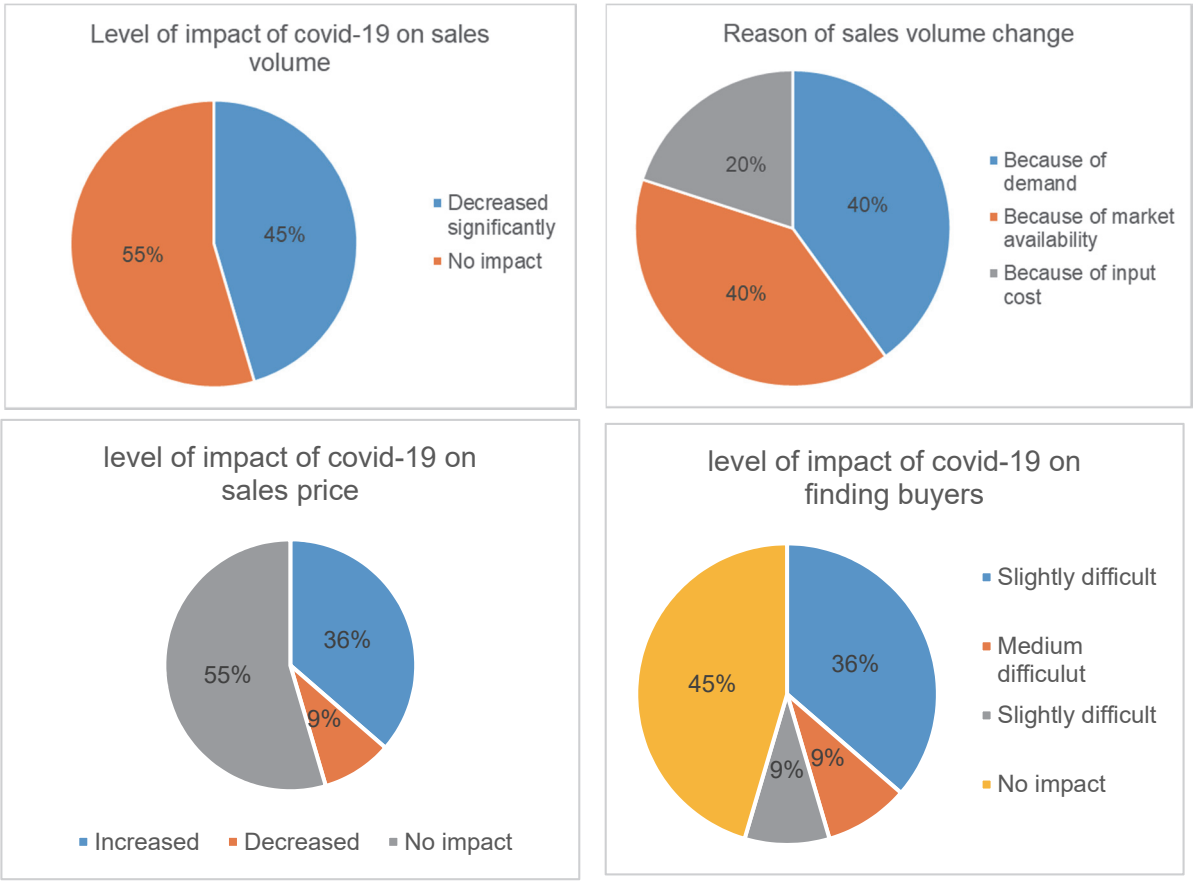
Source: VC survey results

(6) Impacts on Sales Stage and Underlying Factors

Retailer

1) Change of sales

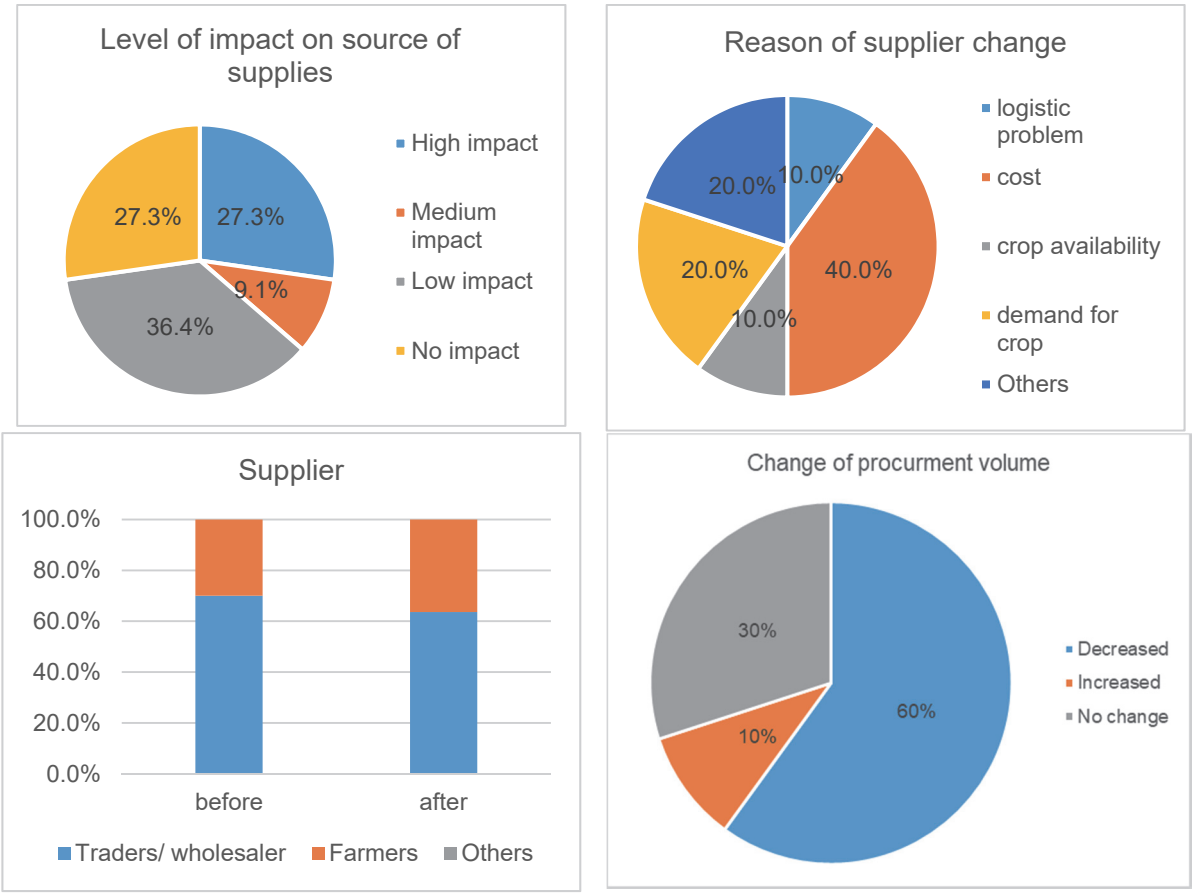
45% of the respondents reported that their sales volume had decreased significantly. Sales price increased in 36% of the cases. The range of increase varied from 15% to 67%. The affected period was from January to September 2020.



Source: VC survey results

2) Change of procurement

About 70% of the retailers interviewed indicated that their procurement was affected. The factors were cost 40%, crop demand 20%, distribution 20%, and raw material availability 10%. The main suppliers were wholesalers and farmers, with a slight increase in the percentage of respondents who said they procured directly from farmers to address distribution problems after COVID-19.



Source: VC survey results

3) Influence on distribution, labor and financing

[Logistics]: Forty-five percent of the responding retailers had their own means of transportation, and 27% used public transportation. After COVID-19, 20% were affected by access to transportation means.

[Labor force]: 70% of the respondents were family workers, 10% were employed throughout the year, and 10% were employed by seasonal workers to secure a labor force. Therefore, the securing of labor was not affected by COVID-19.

[Securing funds]: 90% of the responding retailers raised their own funds and 10% raised funds by borrowing from relatives. As for the funding source, 18% were affected by COVID-19 and changed to borrowing from the union. 27% said it was difficult to raise funds, the period was from January to June 2020, and the degree of funding shortage was 57%.

4) Measures taken against COVID-19

Infection control measures such as installing hand-washing equipment and hand-disinfecting sanitizers for customers and wearing masks for employees have been taken, but its cost is a burden.

5) Change of business environment

64% of respondents reported shortening business hours, 73% reported a reduction of number of customers; and 64% reported a decrease in expenditure by customers in 2020. The number of customers and expenditure by customers recovered in 2021.

Only for respondents, E-Commerce was not introduced.

6) Support

At the market in Dar es Salaam, water tanks have been installed so that you can wash your hands before entering the market. On the other hand, there was no public support for retailers.

7) Challenges, Needs and Perspective

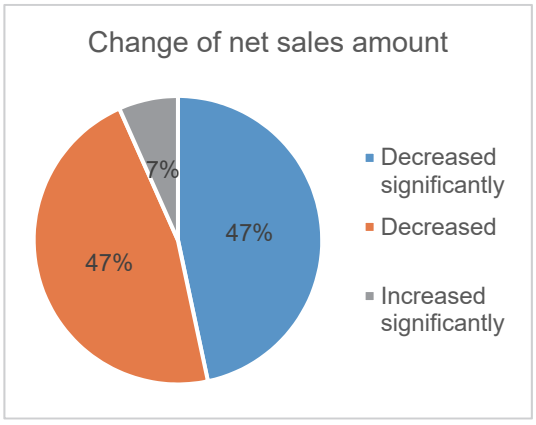
Issues that became apparent due to the impact of COVID-19 included high costs in procurement, soaring transportation costs, increased burden of infection control costs, decreased demand in sales, intensified competition, and decreased profits. Opinions were raised that expected price stabilization, securing sales channels, and provision of loans as countermeasures.

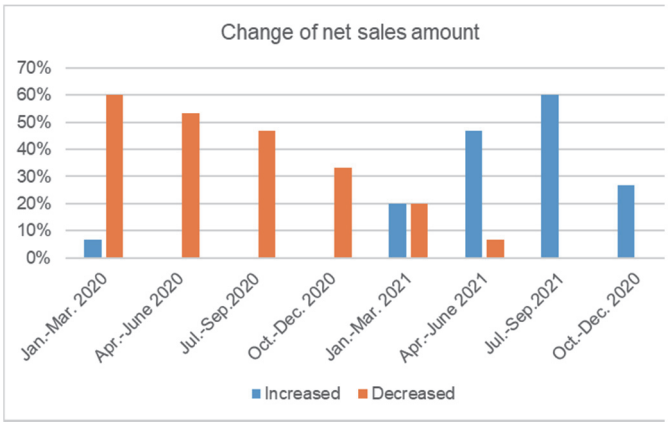
60% of the respondents were positive about the future outlook. The reason is that the government has begun to take measures against COVID-19 infection, infection control measures are becoming widespread among the citizens, and along with this, economic activities have resumed and the prices of goods have fallen.

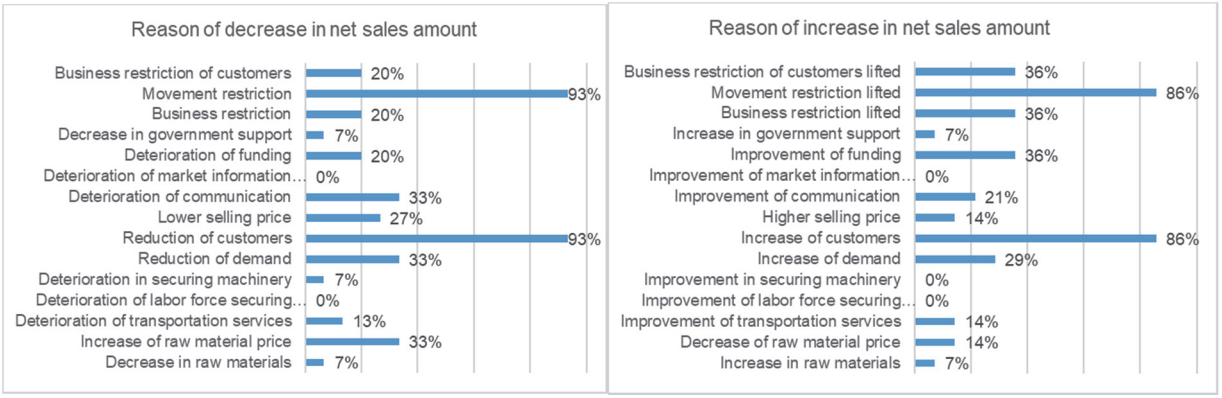
Restaurant

1) Change of sales

Over 90% of the respondents experienced a decrease in sales. The change in sales showed a declining trend throughout 2020, with the peak of the decline occurring between January and March 2020. The reason for the decrease in sales was the movement restrictions and the reduction of customers, while the reason for the recovery was the removal of movement restrictions and the increase in customers.



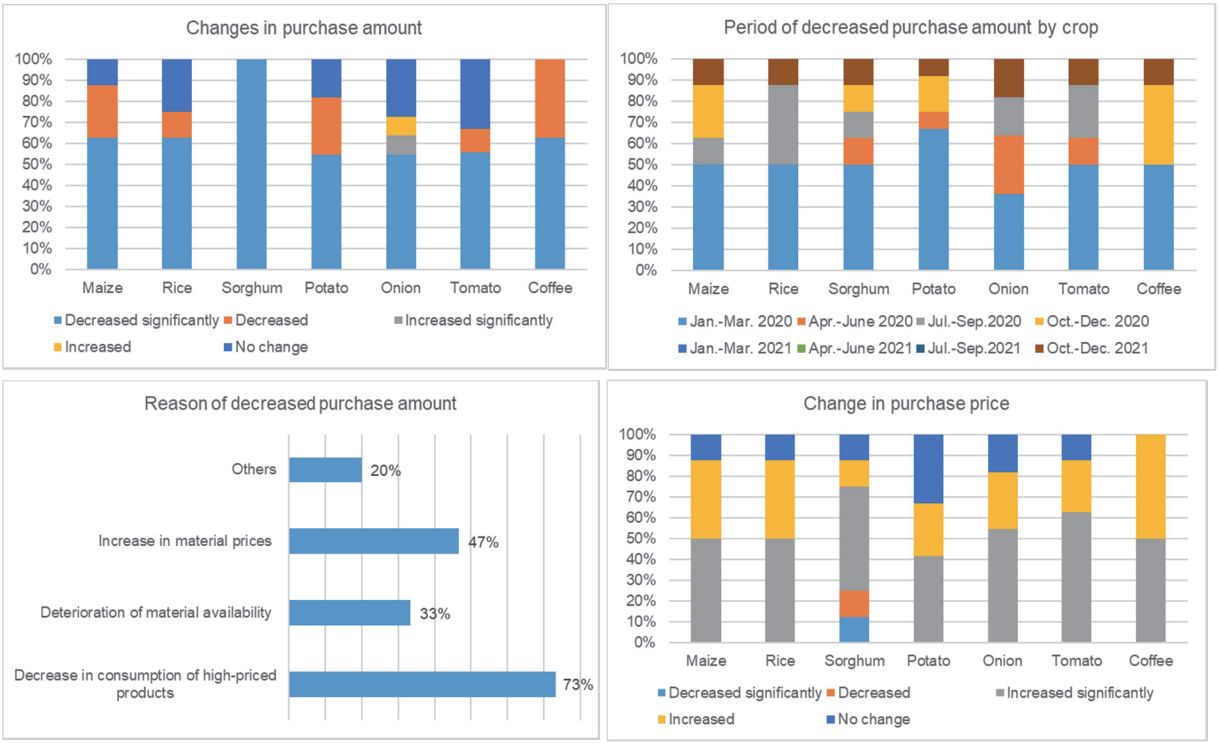




Source: VC survey results

2) Change of procurement

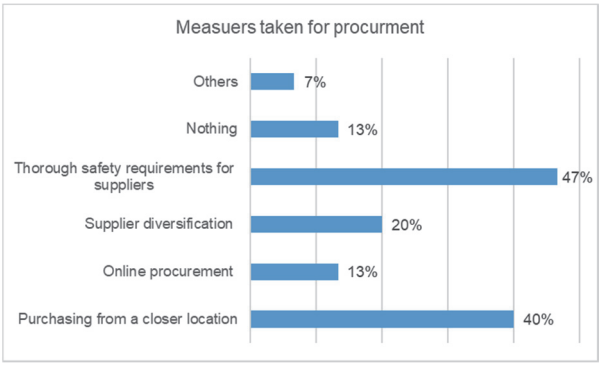
In all target crops, the quantity of purchase raw materials decreased and the purchase price increased compared to before COVID-19. The most affected period was from January to March 2020. Reasons for the decrease in purchasing volume included a decrease in consumption of high-priced products and an increase in the price of materials.



Source: VC survey results

3) Measures taken against COVID-19

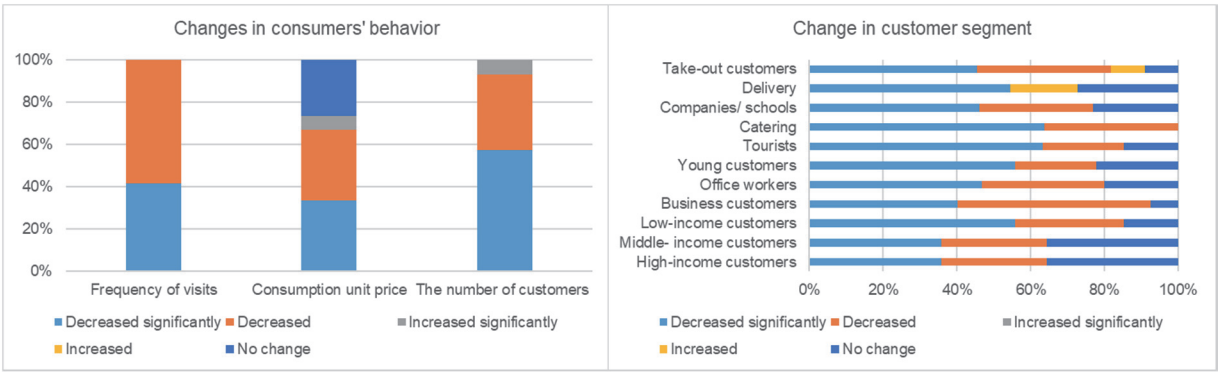
In the area of procurement, the measures taken in response to COVID-19 were to enforce safety requirements on suppliers and to procure from closer locations.



Source: VC survey results

4) Change of business environment

Compared to before COVID-19, there was a decrease in the frequency of visits, a decrease in unit consumption, and a decrease in the number of customers. The change in customer base was marked by a decrease in catering, business customers/office workers, and tourists. On the other hand, the number of delivery and takeout customers increased.



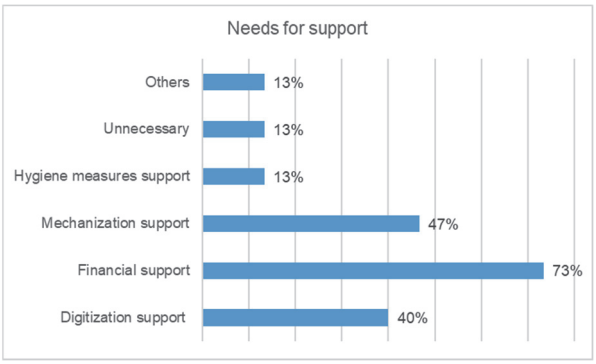
Source: VC survey results

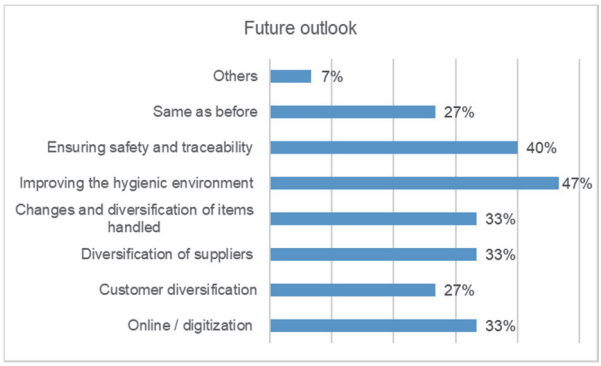
5) Support

No public support for the effects of COVID-19 was provided to restaurants.

7) Challenges, Needs and Perspective

As for future support, the most common opinion was for financial support. As for future business outlook, the most common responses were to improve the sanitation environment and to work on ensuring safety.



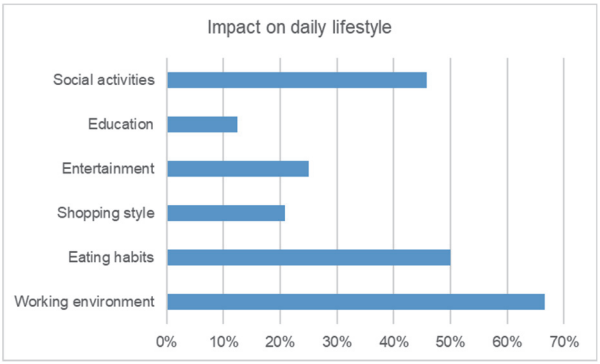


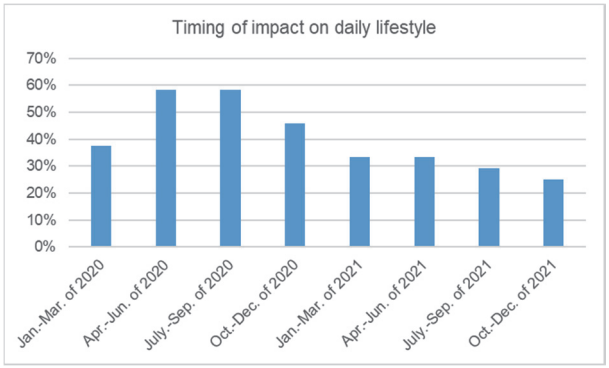
Source: VC survey results

(7) Impacts on Consumption Stage and Underlying Factors

1) Overview

The impact of COVID-19 on the consumption stage tended to peak from April to September 2020, and the degree of impact gradually decreased. In the aspect of daily lifestyle, the impact on the working environment, eating habits, and social activities was significant.



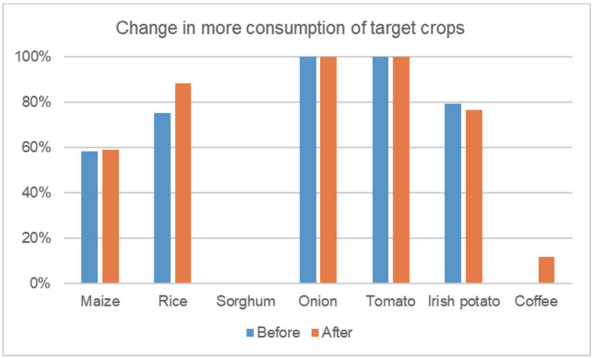


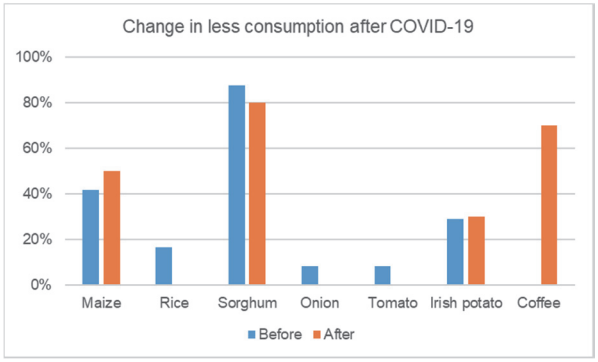
Source: VC survey results

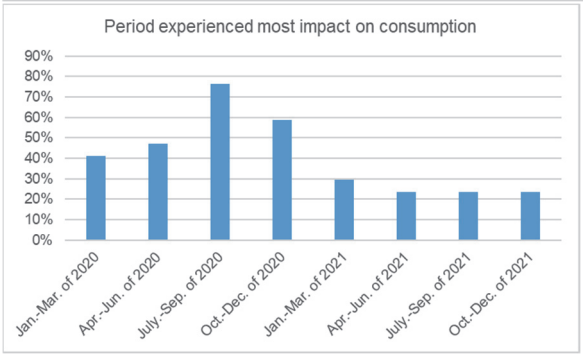
2) Change of Consumption of respective crops

Consumption in the seven target crops under this study was affected by a peak in July - September 2020 and eased in 2021.

Compared to before COVID-19, rice consumption increased, while onion and tomato consumption did not change significantly. Potato consumption decreased slightly. Coffee consumption was low in the country, and more respondents reported that they reduced their consumption after COVID-19.





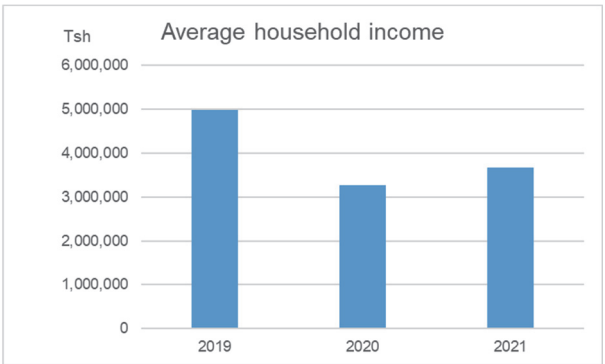


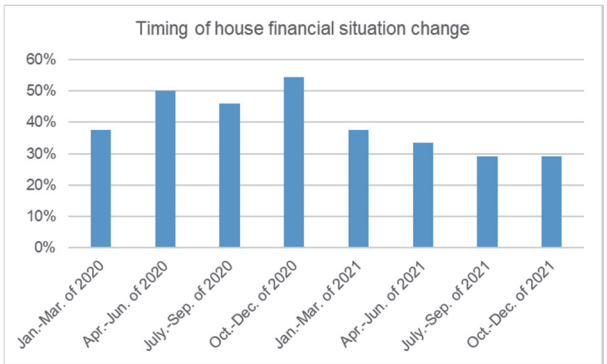
Source: VC survey results

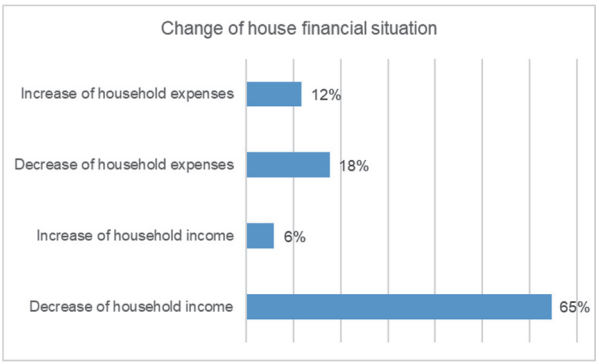
3) Change of household income

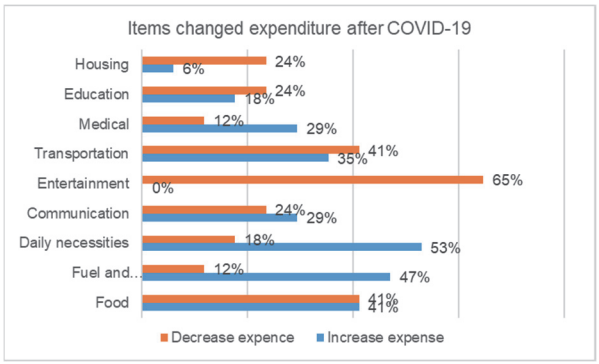
Household income decreased in 2020 compared to 2019, but showed a slight improvement in 2021; the degree of impact peaked toward the second half of 2020 and decreased in 2021.

65% of respondents reported a decrease in household income after COVID-19; the impact on spending after COVID-19 was a reduction in spending on entertainment and an increase in spending on daily necessities, fuel and utilities, and medicines.









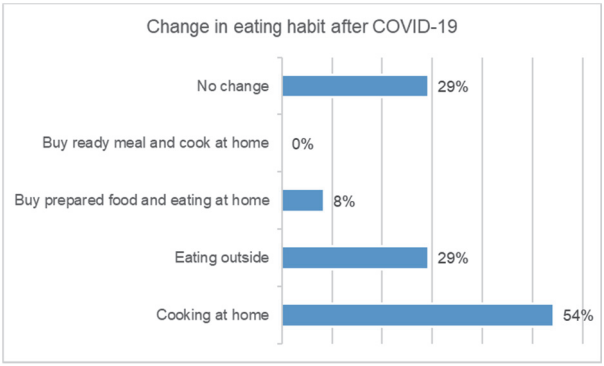
Source: VC survey results

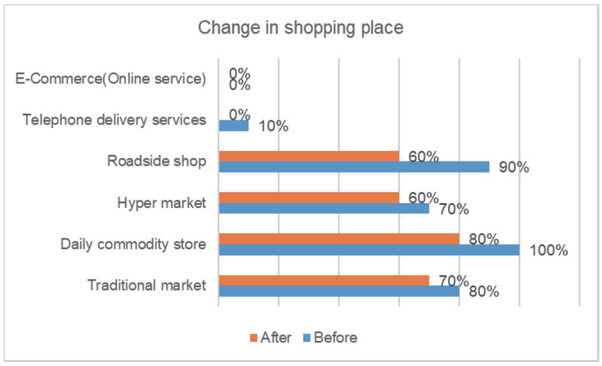
4) Measures taken against COVID-19

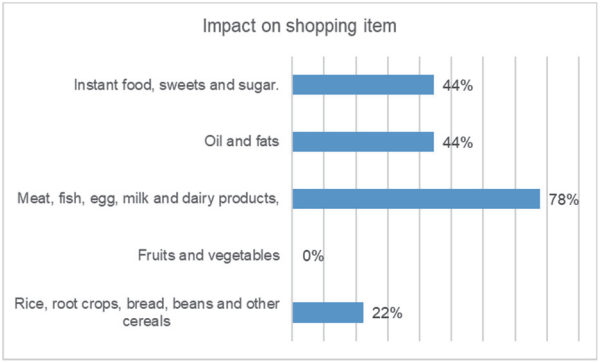
The COVID-19 responses taken in terms of consumption behavior included changes in shopping and eating habits.

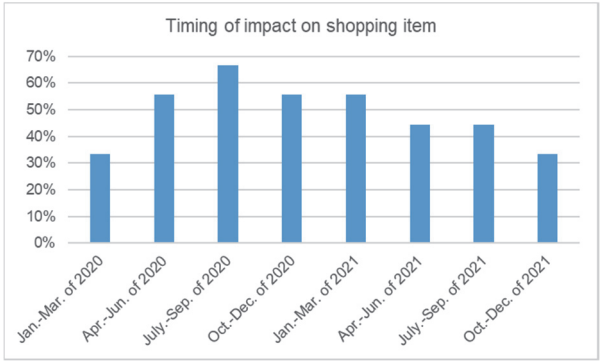
In the case of eating habits, the respondents changed their consumption style to a tendency to eat at home. Even those who responded that there was no change in their eating habits took measures to prevent infection, such as increasing frequency of hand washing before meals and keeping a social distance from others when eating out.

As for the items affected in shopping, meat, eggs, and dairy products were most affected, followed by fats and oils, and sugar. On the other hand, price, nutrition, and freshness were the most important factors when purchasing food, but there was no change before and after COVID-19.









Source: VC survey results

5) Support

As support for consumers, education on COVID-19 infection control was provided.

8) Challenges, Needs and Perspective

Issues raised include concerns about COVID-19 infection and food safety. In addition, consumers are greatly affected by the economic impact on their households, such as employment instability, unemployment, and income decline due to the effects of COVID-19.

On the other hand, in the future outlook, less than 60% of the respondents took a positive view. This is because the government has begun to take measures against COVID-19 infection and vaccination has started.

(8) Impacts on the relationship between VC Stages and Factors

Input - Production: High production costs and decreased profits due to shortage of input materials and soaring prices.

Production - Processing: Procurement prices soar as production volume decreases.

Production / Processing - Distribution: The distribution volume decreases due to the decrease in production volume and processing volume. Soaring selling prices.

Distribution - Sales: With the decrease in distribution volume, the purchase volume and sales volume decrease and the selling price soars.

3.5.5 Impacts on FVC in the Country

(1) Common and Differentiated Effects by Crops and Underlying Factors

The impact of 7 target crops in Tanzania at each VC stage are shown in Table below.

Table 3.5.23 Impact of target crops by crop type, distribution type and VC stage

	Crop						
	Distribution among corridor			Distribution within corridor			Outside regional distribution
	Maize	Rice	Sorghum	Potato	Onion	Tomao	Coffee
	Cereals/staple food	Cereals/staple food	Cereals/staple food	Horticultural crop	Horticultural crop	Horticultural crop	Export/ industrial crop
Input	Medium	Large	Small	Large	Large	Small	Medium
Production	Large	Medium	Small	Large	Large	Large	Medium
Processing	Medium	Medium	—	Medium	—	Medium	Medium
Distribution	Medium	Medium	Small	Large	Large	Large	
Sales	Small	Large	Small	Medium	Large	Medium	Medium
Consumption	Small	Small	Small	Medium	Small	Small	Medium

Source: VC survey results

Note: Large: Large negative impact, Medium: Negative impact, Small: No impact or minor impact, -: Not applicable. The extent of impact was rated based on the results of the key informant survey, the questionnaire survey, and the results of the field survey

1) Common Effects across Crops

The common effects of crops are the shortage of input materials and soaring prices, which in turn led to higher production costs. It is thought that the distribution volume of input materials that rely on imports

has decreased due to the impact of border blockades by neighboring countries. The most affected period was from January to June 2020, with intermittent but less severe impacts thereafter.

At production stage, the common impact was higher production costs due to higher input prices. The decline in producer prices was also a common impact for many crops. Horticultural crops, which is perishable, had to be sold at lower prices. In addition, higher costs and lower selling prices led to lower incomes for farmers. In order to reduce the impact of high costs, farmers responded by refraining from purchasing and using fertilizers and pesticides.

In addition, there was a common point that securing sales channels was difficult in the cropping year of 2020 because of a decrease in customers and demand at each VC stage as the impact of logistics disruptions and tightened quarantines in border trade. In 2021, respondents indicated that there would be signs of recovery in distribution.

At sales stage, it was also reported that the high cost of business due to COVID-19 infection control is putting pressure on the management of small-scale retailers.

2) Differentiate Effects across Crops

Maize: Higher prices of inputs resulted in higher production costs, but production volumes were not significantly affected. Producer prices dropped significantly and sales volume declined, affected by the reduction in distribution volume due to border closures and tighter quarantines at border transactions.

Rice: Productivity per unit decreased due to higher production costs resulting from higher prices of inputs and lower usage fees. The volume of processed (milled) rice decreased at processing stage due to the impact of reduced distribution, following border closures and tighter quarantines at border transactions. Rice prices fell and consumption increased.

Sorghum: Since sorghum is cultivated with low inputs, the high cost of inputs had no significant impact on production stage. There was no impact on production volume, but it was difficult to secure sales channels due to high distribution costs.

Onion: Production volume decreased due to high production costs caused by high prices of input materials. The volume of distribution decreased due to the border closure, which prevented traders from coming to buy onion from Kenya.

Tomato: Higher production costs due to higher prices of inputs resulted in lower producer prices. A decrease in distribution made it difficult to secure buyers, and more retailers bought directly from farmers. There was no change in consumption.

Potato: Higher production costs due to higher prices of inputs and lower production volume due to lower demand. Processing, sales, and consumption volumes declined as cheaper food products were substituted for consumption. The impact has been mitigated with the recovery of the food service industry.

Coffee: Farmers reduced their use of inputs due to higher production costs caused by higher prices of inputs. There was a temporary logistical disruption in the first half of 2020, but export destinations have secured.

(2) Trends and Underlying Factors in the Country

The table below shows the trend in target crops organized by crop and distribution types.

Table 3.5.24 Trends in impact by crop / distribution type

VC type	Cereals / staple crop	Horticultural crop	Export crop
Domestic distribution			
Regional distribution			
Neighboring countries			Coffee
Within corridor		Potato, Onion, Tomato	
Among corridor	Maize, Rice, Sorghum		
Outside region			Coffee

Green: small impact, Blue: middle impact, Gray: large impact
Source: VC survey

Distribution among corridor type: Maize, Rice, Sorghum

Grain maize and rice can be stored for a long time, but they were greatly affected by the blockade of borders by neighboring countries, and they were accumulated without selling even though the production was secured. Maize was also impacted by a significant drop in producer prices.

The impact of sorghum was small because the area of cultivation and consumption was limited.

Distribution within corridor type: Onion, Tomato, Potato

Since horticultural crops do not last long, they are affected by market needs and supply-demand balance at the time of harvest. Even if the price dropped significantly from the usual year due to the influence of COVID-19, the producers had to sell it, which was affected by the decrease in income.

Distribution outside region type: Coffee

The production volume of coffee has been increasing in recent years and the export sales channel is secured, so the impact is considered to be small.

(3) Underlying Factors of Vulnerability in FVC in the Country

[Input / Production stages]

Inputs are heavily dependent on imports, especially hybrid seeds, chemical fertilizers, and agrochemicals, which were greatly affected by the stagnation of distribution, as a result of lockdown and shrink economic activities in the exporting countries. In addition, the global rise in the price of chemical fertilizers had a significant impact on the procurement system. Fertilizer prices soared, putting pressure on farmers' production costs.

[Production / Distribution stages]

Most of small-scale farmers sell their produce to middleman / traders who come to buy them at farmgate.

In many cases, buyers come with transportation to bring the bought items to their destination market. Also buyers have a role of market information channel for farmers. In other words, under disrupted distribution caused by the impact of COVID-19, buyers were unable to come to buy at farmgate, making it difficult to secure sales channels, especially for fast-damaging horticultural crops that had to be sold at lower prices. Lack of market information on the producer side is vulnerable in food value chain.

[Distribution / Sales stages]

Face-to-face transactions and cash transactions are popular among value chain actors at each stage. Many small-scale farmers sell to buyers who come to buy at farmgate, and the movement restrictions have prevented them from securing sales outlets. Cash payment is still the main method of payment, and the use of bank transfers and mobile money is limited. Credit problems such as late payments from sellers have also become apparent.

One of the issues with Tanzania's distribution structure is the practice of packing in excess weight "*rumbesa*". In particular, horticultural crops have short shelf life, so if they are packed in excess weight and overloaded, the quality will deteriorate and a lot of loss will occur at the distribution stage.

(4) How Resilient FVC Should be in the Country

[Input / Production stages]

There is a need to move away from dependence on imported inputs in order to ensure stable distribution of inputs and supply of affordable inputs to farmers. In the short term, it can be suggested that farmers' access to agricultural inputs will be improved by reintroducing a subsidy system for input purchases. In the long term, it is recommended to invite investment for domestic production of inputs especially fertilizers.

Agricultural extension services were provided farmers with advice on pest and disease control and farmer field school even under the spread of COVID-19. In order to provide extension services more effectively, the introduction of IT-based agricultural extension and production technology guidance (e.g., use of M-Kilimo/E-Extension) is expected.

[Production / Distribution stages]

It is important to shift to market oriented production in order to fill the gap of farmers' lack of market information and to have options and diversification in sales channels in case of unforeseen circumstances. By collecting market information and practicing production planning with sales channels in mind, farmers will have the ability to sell their products in with/post COVID-19.

For grains, it is recommended that the enhancement of storage facilities and the use of the Warehouse Receipt System (WRS), and incorporate a system that can withstand the seasonality of price fluctuations and temporary price declines.

[Distribution / Sales stages]

In terms of distribution, it is proposed that packing in excess weight "*rumbesa*" be modified transparently through proper weighing and packaging to prevent losses due to quality deterioration.

Mobile Money, such as M-Pesa, is a widely used system for remittance and receipt of small amounts. Mobile Money, such as M-Pesa, is a popular system for small-scale remittances and receipts, and is expected to be linked with the M-Kilimo system promoted by the Ministry of Agriculture (e-contract and e-payment functions to be installed in the future).

Table 3.5.25 (Reference) Ongoing/completed projects/measures in Tanzania toward resilient FVC

Good Practice	Implementer (VC stage)	Content, background, and factors referred to as good practices
Relay driving to mitigate disruption of cross border distribution	Distributers, Traders (distribution)	In the early stages of the COVID-19 outbreak (first half of 2020), in order to alleviate logistical disruptions caused by strict measures that imposed movement restrictions on drivers even after quarantine at the border, efforts were made for truck drivers arriving at the border to entrust another driver on the other side of the border to relay the truck and transport it to its final destination.
M-Kilimo Matchmaking by ICT	Ministry of Agriculture (production, distribution, sales)	The Ministry of Agriculture is developing an online trading system: e-market. e-market focuses on matching and networking between buyers and farmers There are 3,046 buyers and 3,905 farmers were registered in e-market (as of September 2021). Farmers' information (crop name, price, trading location) is posted on the website, and buyers can click on the information they want to see to display their contact information and discuss business. A smartphone application will be developed in the future. Furthermore, e-agro inputs, e-mechanization, e-logistics, e-nutrition, e-contract, and e-payment functions are expected to be developed.
Public Private Partnership for VC development	Southern Agricultural Growth Corridor of Tanzania (SAGCOT) (input, production, distribution)	This initiative aims to increase agricultural productivity, improve food security, reduce poverty, and ensure environmental sustainability through the commercialization of smallholder agriculture in the agribusiness value chain along with Southern corridor of Tanzania. The implementation period is until 2030. The implementation period is 20 years, until 2030, with the goal of commercializing 350,000 hectares of farmland. It will work in four areas: public investment, investment in small and medium enterprises, large-scale commercial investment, and policy reform to increase investment in agribusiness, which will lead to higher incomes and job creation for smallholders.
Improvement of financial service and market access	Market Infrastructure Value Addition and Rural Finance (MIVARF)	The program will focus on strengthening marketing infrastructure and systems and the rural financial sector. In particular, it will aim to: (i) Increase access of poor rural people to a wide range of financial services for productivity-enhancing technologies, services and assets. (ii) To increase access to sustainable agricultural input and output markets and opportunities for rural enterprises.

(5) Adaptation and Counter Measures in the Country and Potential Cooperation

The table below summarizes the proposed adaptation/overcoming measures and support measures in Tanzania.

Table 3.5.26 Adaptation / Overcoming Measures and Support Measure

Affecting factors /VC vulnerabilities	Objectives	Period	Countermeasure	Necessary action	Target crop	Target VC
Soaring fertilizer prices and dependence on imported inputs	Stable supply of fertilizer	Short term	Fertilizer subsidies to farmers	Fertilizer subsidies to farmers	All crops	Production
	Enhance domestic production of	Medium term	Domestic production of chemical	Investment in domestic factories and		Input

	inputs		fertilizers, agricultural chemicals, seeds, etc.	attraction of foreign factories, Cooperation with Japanese companies		
Low producer price	Price improvement	Medium term	Dissemination of production based on market information	Applying the SHEP approach to non-horticultural crops	All crops	Production
Lack of market information, limited sales channels	Diversification of sales destinations	Medium term	Farming based on commercial distribution, Utilization of WRS	Provision of market information, Raising awareness among farmers	All crops	Production, Distribution, Sales
Face-to-face transactions and cash transactions	Promotion of electronic transactions	Medium term	Promotion of Mobile Kilimo, Facilitate e-commerce through M-Pesa etc.	Utilization of matching applications, etc. (production ⇔ sales) Promotion of electronic transactions through the use of cell phones	Grain/staple crops, horticultural crops	Input, Production, Distribution, Sales
Distribution loss due to overloading	Improvement of distribution loss	Medium term	Appropriate packing weight	Transparent price setting by weighing during production and sales transactions	Horticultural crops	Distribution
Difficulty in securing funds	Improvement in securing funds	Medium term	Easing of interest rates, easing of lending requirements	Cooperation with financial institutions	All crops	Input, Production, Processing, Distribution, Sales

Chapter 4 Analysis of Impacts on FVC

4.1 Trends and Underlying Factors of Impacts

(1) Trends of Impacts and Underlying Factors in the Countries

1) Ethiopia

The first process affected by COVID-19 was the upstream input process of FVCs due to the difficulty of access to agricultural materials such as pesticides, seeds, seedlings, fertilizers and chemicals due to import restrictions. Restriction on human movement also made it difficult for many farmers and consumers to work from April to September 2020, resulting in a decrease in household income for the entire year 2020. Consumption stage, downstream of FVC, is also affected.

This is most likely due to the shortage of agricultural materials and equipment in the input process, which is upstream of the FVCs, and a shift in purchasing behavior to grains (a change in consumption behavior to buy more nutritious food) due to a decrease in income of consumers, who are downstream of the FVCs.

By crops, grains/staple foods such as wheat, teff and rice, and horticultural crops such as onions and beans have been severely affected, while coffee and spices such as chili sauce, two of Ethiopia's major industrial crops, have seen a recovery in the flow of production, processing and distribution (exports) since restrictions on movement and imports/exports were lifted, leading to increased exports to consumers in overseas markets and sales to relatively wealthy domestic consumers.

Export crops such as coffee and spices are less affected because 1) although they are luxury items, they are consumed on a daily basis and have domestic demand as well as export demand, which mitigates the impact from the demand side even if the logistics leading to exports are disrupted, and 2) they are consumed on a daily basis and can be processed close to production areas without the need for large-scale facilities, making them less susceptible to movement restrictions.

In the area of grains and staple foods, the supply of teff, a staple food ingredient, cannot keep up with demand, so there is substituted by wheat and rice, but the impact on consumption, such as price hikes, is still significant. However, the impact on consumption, such as price hikes, is still significant. There are three main reasons for this: 1) insufficient production and supply due to poor weather conditions in addition to deteriorating access to inputs; 2) demand for grains and staple foods still exists even though consumption demand is shrinking, but imports cannot make up for the shortage (macroeconomic factors such as insufficient government foreign exchange reserves); and 3) inefficiency in the distribution stage (including speculative activities).

In addition, horticultural crops that are not staple foods are not necessities in terms of calorie intake, and their relatively high prices and limited access to export markets have directly affected the shrinking demand for consumption.

In response to this situation, it is essential to improve the efficiency of distribution of grains and staple foods from the perspective of national food security, which is to ensure the supply of food at stable prices. In the case of horticultural crops, it is necessary to improve the processing of fresh crops and the efficiency of distribution so that export markets can be targeted.

However, once the restrictions on movement and import/export of coffee and spices such as chili sauce were lifted, the flow of production, processing, and distribution (export) of Ethiopia's representative craft crops recovered, leading to increased exports to consumers in overseas markets and sales to relatively wealthy domestic consumers. Therefore, it is important not only to focus on the weakening of input and consumption processes, but also to focus on the sophistication and added value of wholesale and processing processes, following the example of successful cases of craft crops. It is inferred that it is important for them to focus on upgrading and adding value to the wholesale and processing processes, following the successful examples of craft crops.

Of course, domestic production of agricultural chemicals to increase production and productivity, and domestic production of seeds and seedlings to ensure the quality of agricultural products are also

important in the future, but in line with Ethiopia's agricultural and industrial policies, support for upgrading processing and distribution processes will play an important role in strengthening FVCs as a whole.

BOX: Summary of FVC Impacts: Ethiopia

In Chapter 3, the impact of each crop and VC process on FVCs was summarized by country and expressed in three levels: large (major impact), medium (moderate impact), and small (minor or no impact). The degree of impact was evaluated based on the results of the key informant survey and the questionnaire survey, taking into account the results of the field survey. The table below shows the results of this evaluation with the scores attached for convenience.

The results also show that in 2020, the input and distribution stages were significantly affected, with rice and wheat upstream of VC, and onion and other horticultural crops affected in all stages. The impact continues to be at the consumption stage in teff and broad beans.

Table 4.1 Impact on FVCs: Ethiopia (2020)

	Crop							
	Inter-corridor distribution	Domestic distribution		Intra-corridor distribution	Neighboring country distribution		Extra-region distribution	
VC Stage	Rice	Wheat	Teff	Onion	Broad bean	Chili sauce	Coffee	Average
Input	3.00	3.00	1.50	3.00	3.00	0.00	0.00	1.93
Production	1.50	3.00	0.00	3.00	1.50	0.00	0.00	1.29
Processing	3.00	3.00	1.50	-	1.50	1.50	0.00	1.75
Distribution	3.00	3.00	3.00	3.00	3.00	3.00	1.50	2.79
Sales	1.50	1.50	1.50	1.50	1.50	0.00	0.00	1.07
Consumption	1.50	1.50	3.00	3.00	3.00	0.00	0.00	1.71
Average	2.25	2.50	1.75	2.70	2.25	0.75	0.25	1.76

Impact on FVCs: Ethiopia (2021)

Input	3.00	3.00	1.50	1.50	1.50	0.00	0.00	1.50
Production	0.00	1.50	0.00	1.50	1.50	0.00	0.00	0.64
Processing	1.50	3.00	0.00	-	1.50	1.50	0.00	1.25
Distribution	3.00	3.00	3.00	3.00	3.00	1.50	1.50	2.57
Sales	0.00	0.00	1.50	1.50	1.50	0.00	0.00	0.64
Consumption	0.00	1.50	3.00	1.50	3.00	0.00	0.00	1.29
Average	1.25	2.00	1.50	1.80	2.00	0.50	0.25	1.32

Changing Impacts on FVCs: Ethiopia (2020-2021)

Input	0.00	0.00	0.00	1.50	1.50	0.00	0.00	0.43
Production	1.50	1.50	0.00	1.50	0.00	0.00	0.00	0.64
Processing	1.50	0.00	1.50	-	0.00	0.00	0.00	0.50
Distribution	0.00	0.00	0.00	0.00	0.00	1.50	0.00	0.21
Sales	1.50	1.50	0.00	0.00	0.00	0.00	0.00	0.43
Consumption	1.50	0.00	0.00	1.50	0.00	0.00	0.00	0.43
Average	1.00	0.50	0.25	0.90	0.25	0.25	0.00	0.44
Notes:	Large improvemen	Medium improvem	Small improvement or no change		(-) Worsening			

Note: The number represents the scale of the impact. The scores were set as small (0), medium (1.5), and large (3.0), with 0 to 1 being a small impact, 1 to 2 being a medium impact, and 2 to 3 being a large impact. These are ordinal scales and are not suitable for quadratic arithmetic, but averages are taken for convenience in order to understand the trend of impacts by crop or VC stage.

Source: JICA Study Team

2) Kenya

The impact of COVID-19 in Kenya had the limited impact on production in 2020. Due to rising fuel costs and changes in demand, farmers had decreased their income and lost motivation in production in 2021. Some farmers had reduced the cultivation areas such as maize, cooking banana and dried bean. On the other hand, rice production is shown the rise in production because of a certain demand. In 2020, the early stage of the COVID-19 pandemic, the Kenyan government ordered strict lockdowns, curfews,

restrictions on movement crossing counties, and border closures, which brought major impact on logistics and processing. In particular, the distribution of sugarcane and export horticultural crops was temporarily delayed. As for processed tea, 95% was directed to export, but in 2021 FOB prices fell down, which was affecting farmers' income.

The Kenyan government has set economic priority in the fifth wave of pandemic, which showed the largest number of newly infected patients started in December 2021, has not taken strict measures since October 2021, and has not imposed restrictions on distribution and retailing The changes over the last two years have been the decline in farmers' income due to the rise in farm inputs and services such as chemical fertilizers, fuel costs, and electricity costs. The rise in processing and distribution costs, while consumers are tending to refrain from buying, which makes FVC vulnerability. As a result, the food loss has occurred in some crops, and there is a need for promotion of processing in rural areas and financing for agricultural processing companies. On the production side, the agricultural mechanization bill has been put forward, and it is necessary to support mechanical service providers. In regional logistics in East Africa, facilitation of logistics in the northern corridor from Mombasa Port to the Uganda border has a great impact on the economies of the countries in the region, so further improvement is needed.

BOX: Summary of FVC Impacts: Kenya

The table below shows the scores based on the results of the impact on FVCs for each crop and VC process. These results show the magnitude of the impact on sugarcane and the continuing impact on the distribution stage.

Table 4.2 Impacts on FVCs: Kenya (2020)

	Crop							
	Inter-corridor distribution			Intra-corridor distribution	Domestic distribution		Extra-region distribution	
VC Stage	Maize	Rice	Dried beans	Potatoes	Plantain	Sugarcane	Tea	Average
Input	3.00	3.00	0.00	3.00	1.50	3.00	3.00	2.36
Production	0.00	0.00	1.50	0.00	1.50	3.00	1.50	1.07
Processing	1.50	3.00	0.00	3.00	-	3.00	3.00	2.25
Distribution	3.00	3.00	3.00	3.00	1.50	3.00	3.00	2.79
Sales	1.50	3.00	1.50	1.50	1.50	0.00	1.50	1.50
Consumption	0.00	1.50	0.00	1.50	1.50	0.00	0.00	0.64
Average	1.50	2.25	1.00	2.00	1.50	2.00	2.00	1.76

Impacts on FVCs: Kenya (2021)

Input	3.00	3.00	0.00	3.00	1.50	3.00	3.00	2.36
Production	0.00	0.00	1.50	0.00	1.50	3.00	3.00	1.29
Processing	0.00	3.00	0.00	1.50	-	3.00	1.50	1.50
Distribution	1.50	3.00	3.00	3.00	1.50	3.00	1.50	2.36
Sales	0.00	1.50	1.50	1.50	1.50	0.00	1.50	1.07
Consumption	0.00	1.50	0.00	1.50	0.00	0.00	0.00	0.43
Average	1.50	2.25	1.00	2.00	1.50	2.00	2.00	1.76
Notes:	Large impact	Medium impact	Small impact					

Change in Impact on FVCs (2020-2021)

Input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Production	0.00	0.00	0.00	0.00	0.00	0.00	-1.50	-0.21
Processing	1.50	0.00	0.00	1.50	-	0.00	1.50	0.75
Distribution	1.50	0.00	0.00	0.00	0.00	0.00	1.50	0.43
Sales	1.50	1.50	0.00	0.00	0.00	0.00	0.00	0.43
Consumption	0.00	0.00	0.00	0.00	1.50	0.00	0.00	0.21
Average	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Notes:	Large improvemen	Medium improvem	Small improvement or no change		(-) Worsening			

Source: JICA Study Team

3) Uganda

The impact of COVID-19 in Uganda can be summarized as a decline in the income of general consumers in cities and towns, a decline in the population due to the return to villages, and a decline in the consumption of large consumers such as schools and hotels. These factors led to a decline in the producer prices of vulnerable plantains and horticultural crops, and a decline in the sales volume. There are concerns about the impact of lower producer prices on future farming and the impact on vulnerable smallholders. Since there was little impact on the production side in rural areas, where about 80% of Ugandan lives, the overall impact can be judged not to be significant.

If we focus, however, on the urban areas, the impact of COVID-19 has directly hit dwellers lose their jobs or have their salaries drastically reduced due to the lockdown. Since many of them do not have stable jobs and their savings are assumed to be limited.

As regard to consumer prices, cereals did not decline much because they are difficult to convert to other crops and can be stored for a relatively long-life product, while plantain and horticultural crops, which are easily damaged, experienced large price declines, even if only temporary.

Another issue common to all VC players is that they are small-scale businesses and therefore vulnerable. Thus, this is an issue that needs to be addressed when considering future support measures.

BOX: Summary of Impacts on FVC: Uganda

Based on the results of the impact on FVC by crop and VC process, the scores are shown in the table below. These results show that the impact of the input stage will continue into 2021.

Table 4.3 Impacts on FVCs: Uganda (2020)

	Crop							
	Inter-corridor distribution		Intra-corridor distribution			Domestic distribution	Extra-region distribution	
VC Stage	Maize	Rice	Potatoes	Onion	Tomato	Plantain	Coffee	Average
Input	0.00	0.00	0.00	0.00	0.00	0.00	3.00	0.43
Production	0.00	0.00	0.00	0.00	0.00	0.00	1.50	0.21
Processing	1.50	1.50	-	-	-	-	1.50	1.50
Distribution	1.50	1.50	1.50	1.50	1.50	3.00	1.50	1.71
Sales	1.50	1.50	3.00	1.50	3.00	3.00	0.00	1.93
Consumption	0.00	1.50	3.00	1.50	1.50	1.50	0.00	1.29
Average	0.75	1.00	1.50	0.90	1.20	1.50	1.25	1.14

Impacts on FVCs: Uganda (2021)

Input	1.50	1.50	1.50	1.50	1.50	0.00	1.50	1.29
Production	0.00	0.00	0.00	0.00	0.00	0.00	1.50	0.21
Processing	1.50	1.50	-	-	-	-	1.50	1.50
Distribution	1.50	1.50	1.50	1.50	1.50	3.00	1.50	1.71
Sales	1.50	1.50	3.00	1.50	1.50	3.00	0.00	1.71
Consumption	0.00	1.50	3.00	1.50	1.50	1.50	0.00	1.29
Average	1.00	1.25	1.80	1.20	1.20	1.50	1.00	1.26
Notes:	Large Impact	Medium Impact	Small Impact					

Change in Impact on FVCs: Uganda (2020-2021)

Input	-1.50	-1.50	-1.50	-1.50	-1.50	0.00	1.50	-0.86
Production	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Processing	0.00	0.00	-	-	-	-	0.00	0.00
Distribution	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sales	0.00	0.00	0.00	0.00	1.50	0.00	0.00	0.21
Consumption	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average	-0.25	-0.25	-0.30	-0.30	0.00	0.00	0.25	-0.12
Notes:	Large improvemen	Medium improvem	Smallさい改善	変化なし	(-) Worsening			

Source: JICA Study Team

4) Rwanda

The largest impact of COVID-19 in Rwanda was the decrease in the distribution of input materials and agricultural products, which was due to the obstruction of distribution because of movement restrictions, border closures and export restrictions. Although the restrictions on legal traders were lifted relatively early due to infection control measures, the distribution system has not been restored to normal even as of December 2021. In addition, as of December 2021, illegal trade in agricultural products, which is said to account for 40% of Rwanda, has shrunk significantly. In all crops, the price of input materials increased, the production cost of farmers increased, the distribution cost increased, and the sales price to consumers increased due to the confusion in distribution. However, the producer price of agricultural products did not rise so much, and it seems that the prices of agricultural products were suppressed by the pressure from distributors and intermediaries. Although it had the greatest impact in April to June 2020 and is gradually settling down, final consumer price has not returned, and the long-term impact continues.

However, the level of impact varies depending on the crop. Plantain, which is a perennial crop and domestically distributed, had little impact because they did not require an initial investment each year and had few border transactions. In addition, coffee, which is also a perennial crop and distributed outside the region, had little impact because it does not require an initial investment every year and its supply chain is established compared to other crops. Maize and rice, which is annual crop and distributed among corridors was affected to some extent. It requires initial investment every year, and had illegal trade, which affected distribution and sales. The distribution channel of rice has changed, and the demand for maize has changed due to the increase in demand. Horticultural crop, which is distributed within corridor also requires initial investment every year and had an impact on illegal trade. Horticultural crops are poorly preserved, thereby losses occurred due to disposal by farmers and distributors, demand for horticultural crops has decreased, consumption has decreased, and conversion to other crops has been observed. In addition to that, it is thought that the problem of the value chain became prominent due to the occurrence of COVID-19, which was originally a vulnerable business that found a buyer after production.

BOX: Summary of FVC Impacts: Rwanda

The table below shows the scores based on the impact of each crop and VC process on FVC. These results show that the impact in 2020 was large, and although many processes improved in 2021, the impact in the rice and consumption stages continued.

Table 4.4 Impacts on FVCs: Rwanda (2020)

	Crop							
	Inter-corridor distribution		Intra-corridor distribution			Domestic distribution	Extra-region distribution	
VC Stage	Maize	Rice	Potatoes	Onion	Tomato	Plantain	Coffee	Average
Input	0.00	3.00	3.00	3.00	3.00	0.00	3.00	2.14
Production	0.00	1.50	0.00	3.00	3.00	0.00	0.00	1.07
Processing	0.00	3.00	3.00	-	3.00	-	0.00	1.80
Distribution	3.00	3.00	3.00	3.00	3.00	1.50	0.00	2.36
Sales	3.00	3.00	3.00	3.00	3.00	1.50	1.50	2.57
Consumption	3.00	3.00	3.00	3.00	3.00	1.50	0.00	2.36
Average	1.50	2.75	2.50	3.00	3.00	0.90	0.75	2.06

Impact on FVCs: Rwanda (2021)

Input	0.00	1.50	1.50	1.50	1.50	0.00	0.00	0.86
Production	0.00	1.50	0.00	0.00	1.50	0.00	0.00	0.43
Processing	0.00	3.00	1.50	-	0.00	-	0.00	0.90
Distribution	1.50	3.00	1.50	1.50	1.50	1.50	0.00	1.50
Sales	1.50	1.50	1.50	1.50	1.50	1.50	0.00	1.29
Consumption	1.50	3.00	3.00	3.00	3.00	0.00	0.00	1.93
Average	0.75	2.25	1.50	1.50	1.50	0.60	0.00	1.16
Notes:	Large Impact	Medium Impact	Small Impact					

Change in Impact on FVCs: Rwanda (2020-2021)

Input	0.00	1.50	1.50	1.50	1.50	0.00	3.00	1.29
Production	0.00	0.00	0.00	3.00	1.50	0.00	0.00	0.64
Processing	0.00	0.00	1.50	-	3.00	-	0.00	0.90
Distribution	1.50	0.00	1.50	1.50	1.50	0.00	0.00	0.86
Sales	1.50	1.50	1.50	1.50	1.50	0.00	1.50	1.29
Consumption	1.50	0.00	0.00	0.00	0.00	1.50	0.00	0.43
Average	0.75	0.50	1.00	1.50	1.50	0.30	0.75	0.90
Notes:	Large improvemen	Medium improvem	Small improvement or no change		(-) Worsening			

Source: JICA Study Team

5) Tanzania

COVID-19 prevention measures such as movement restrictions and business restrictions were not implemented in Tanzania, but from January to June 2020, when COVID-19 infection spread worldwide, the borders of neighboring countries were blocked. Due to the impact of the stagnation of logistics, it became difficult to obtain inputs, especially fertilizer, which affected the input process and production process in VC. Farmers who have squeezed production costs and lost income may fall into a negative chain where it becomes difficult to secure production funds for the following season.

In addition, in the processing process and sales process, there were some companies that took temporary closures and shortened business hours due to fear of infection, but they are returning to normal business in 2021.

BOX: Summary of Impacts on FVC: Tanzania

Based on the results of the impact on FVC for each crop and VC process, a score is given in the table below. These results show the magnitude of the impact in 2020, and that although many processes improved in 2021, the distribution of potatoes and onions and the marketing of rice continued to be affected.

Table 4.5 Impacts on FVCs: Tanzania (2020)

	Crop							
	Inter-corridor distribution			Intra-corridor distribution			Extra-region distribution	
VC Stage	Maize	Rice	Sorghum	Potatoes	Onion	Tomato	Coffee	Average
Input	1.50	3.00	0.00	3.00	1.50	3.00	1.50	1.93
Production	3.00	1.50	0.00	3.00	3.00	3.00	1.50	2.14
Processing	1.50	1.50	-	1.50	-	1.50	1.50	1.50
Distribution	1.50	1.50	0.00	3.00	3.00	3.00	0.00	1.71
Sales	0.00	3.00	0.00	1.50	3.00	1.50	1.50	1.50
Consumption	0.00	0.00	0.00	0.00	0.00	0.00	1.50	0.21
Average	1.25	1.75	0.00	2.00	2.10	2.00	1.25	1.50

Impacts on FVCs: Tanzania (2021)

Input	1.50	3.00	0.00	1.50	1.50	1.50	0.00	1.29
Production	3.00	1.50	0.00	3.00	3.00	1.50	1.50	1.93
Processing	1.50	1.50	-	0.00	-	0.00	0.00	0.60
Distribution	0.00	1.50	0.00	0.00	3.00	0.00	0.00	0.64
Sales	0.00	3.00	0.00	1.50	0.00	0.00	0.00	0.64
Consumption	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average	1.00	1.75	0.00	1.00	1.50	0.50	0.25	0.86
Notes:	Large Impact	Medium Impact	Small Impact					

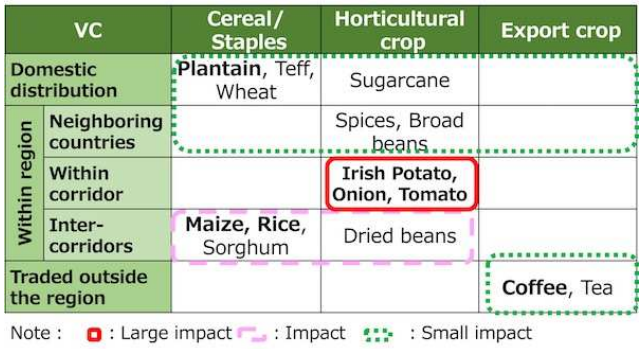
Change in Impact on VC: Tanzania (2020-2021)

Input	0.00	0.00	0.00	1.50	0.00	1.50	1.50	0.64
Production	0.00	0.00	0.00	0.00	0.00	1.50	0.00	0.21
Processing	0.00	0.00	-	1.50	-	1.50	1.50	0.90
Distribution	1.50	0.00	0.00	3.00	0.00	3.00	0.00	1.07
Sales	0.00	0.00	0.00	0.00	3.00	1.50	1.50	0.86
Consumption	0.00	0.00	0.00	0.00	0.00	0.00	1.50	0.21
Average	0.25	0.00	0.00	1.00	0.60	1.50	1.00	0.64
Notes:	Large improvemen	Medium improvem	Small improvement or no change		(-) Worsening			

Source: JICA Study Team

(2) Trends of Impacts by Crop

In addition to classifying the target crops as cereals/staple foods, horticultural crops, and export crops, the study also classified them into the following types based on the distribution area: domestic distribution type, neighboring country distribution type, intra-corridor distribution type, inter-corridor distribution type, and extra-region distribution type. The major trend in the magnitude of the impact by type is that the intra-corridor distribution type has a large impact, the inter-corridor distribution type has some impact, and the other types have a small impact.



Source: JICA Study Team

Figure 4.1 Impact by Crop Types

Table 4.6 Impact by Crop Types (2)

(2020)

	Cereals/staple	Horticulture crops	Export crop	Ave
domestic distribution	1.41	2.00	-	1.50
neighboring country distribution	-	2.25	0.75	1.50
intra-corridor distribution	-	2.10	-	2.10
inter-corridor distribution	1.67	1.00	-	1.60
extra-region distribution type	-	-	1.10	1.10
Ave.	1.57	2.02	1.04	1.65

(2021)

	Cereals/staple	Horticulture crops	Export crop	Ave
domestic distribution	1.33	1.00	-	1.30
neighboring country distribution	-	1.38	-	1.38
intra-corridor distribution	-	2.00	0.50	1.25
inter-corridor distribution	1.17	2.00	-	1.30
inter-extra-region distribution type	-	-	0.65	0.65
Ave.	1.27	1.44	0.63	1.22

(Change)

	Cereals/staple	Horticulture crops	Export crop	Ave
domestic distribution	0.07	1.00	-	0.20
neighboring country distribution	-	0.88	-	0.13
intra-corridor distribution	-	0.10	-	0.85
inter-corridor distribution	0.49	-1.00	-	0.30
inter-extra-region distribution type	-	-	0.45	0.45
Ave.	0.30	0.58	0.42	0.43

Source: JICA Study Team

Based on the survey results, in order to analyze the above country-specific impacts in detail, the team first re-organize the uses of the target crops in the diets of each country, and then examine the crop classification framework.

The target crops were classified by crop type (grain/staple food, horticultural crops, and export crops) and distribution type (domestic, neighboring country, intra-corridor, inter-corridor, and extra-region). In addition to this, they were classified according to the following perspectives (see table below)

- Classification as crops: cereals, horticultural crops, and industrial craft crops (See Chapter 3)
- Dietary use: staple food, side dishes, seasonings, and luxury items
- Classification as goods: necessities, others
- Main markets: domestic, domestic/international, international

- Main nutrients: carbohydrates, proteins, vitamins, minerals, others

Table 4.7 Classification of target crops

	Crop	Crop type	Distribution type	Crop classification	Goods	Usage	Market	Export/Production Ratio (weight)	Nutrition
Ethiopia	Teff	Cereals/ staple foods	Domestic distribution	Cereals	Necessities	Staple food	Domestic		Carbohydrates
	Wheat	Cereals/ staple foods	Domestic distribution	Cereals	Necessities	Staple food	Domestic		Carbohydrates
	Rice	Cereals/ staple foods	Inter-corridor distribution	Cereals	Necessities	Staple food	Domestic/ International		Carbohydrates
	Broad bean	Horticultural Crops	Neighboring country distribution	Horticultural Crops	Others	Side dish	Domestic/ International		Protein
	Onion	Horticultural Crops	Intra-corridor distribution	Horticultural Crops	Others	Side dish	Domestic/ International		Others
	Chili sauce	Export Crops	Neighboring country distribution	Industrial Crops	Necessities	Seasonings	Domestic/ International		Vitamins, etc.
	Coffee	Export Crops	Extra-region distribution	Industrial Crops	Others	Beverage	Domestic/ International	38%	Minerals, etc.
Kenya	Maize	Cereals/ staple foods	Inter-corridor distribution	Cereals	Necessities	Staple food	Domestic/ International		Carbohydrates
	Rice	Cereals/ staple foods	Inter-corridor distribution	Cereals	Necessities	Staple food	Domestic/ International		Carbohydrates
	Plantain	Cereals/ staple foods	Domestic distribution	Cereals	Necessities	Staple food	Domestic		Carbohydrates
	Potatoes	Horticultural Crops	Intra-corridor distribution	Horticultural Crops	Others	Side dish	Domestic/ International		Carbohydrates
	Dried beans	Horticultural Crops	Inter-corridor distribution	Horticultural Crops	Others	Side dish	Domestic/ International		Protein
	Sugarcane	Horticultural Crops	Domestic distribution	Industrial Crops	Necessities	Seasonings	Domestic		Carbohydrates
	Tea	Export Crops	Extra-region distribution	Industrial Crops	Others	Beverage	International	107%	Vitamins, etc.
Uganda	Maize	Cereals/ staple foods	Inter-corridor distribution	Cereals	Necessities	Staple food	Domestic/ International		Carbohydrates
	Rice	Cereals/ staple foods	Inter-corridor distribution	Cereals	Necessities	Staple food	Domestic/ International		Carbohydrates
	Plantain	Cereals/ staple foods	Domestic distribution	Cereals	Necessities	Staple food	Domestic		Carbohydrates
	Potatoes	Horticultural Crops	Intra-corridor distribution	Horticultural Crops	Others	Side dish	Domestic/ International		Carbohydrates
	Onion	Horticultural Crops	Intra-corridor distribution	Horticultural Crops	Others	Side dish	Domestic/ International		Others
	Tomato	Horticultural Crops	Intra-corridor distribution	Horticultural Crops	Others	Side dish	Domestic/ International		Vitamins
	Coffee	Export Crops	Extra-region distribution	Industrial Crops	Others	Beverage	International	89%	Minerals, etc.
Rwanda	Maize	Cereals/ staple foods	Inter-corridor distribution	Cereals	Necessities	Staple food	Domestic/ International		Carbohydrates
	Rice	Cereals/ staple foods	Inter-corridor distribution	Cereals	Necessities	Staple food	Domestic/ International		Carbohydrates
	Plantain	Cereals/ staple foods	Domestic distribution	Horticultural Crops	Necessities	Staple food	Domestic		Carbohydrates
	Potatoes	Horticultural Crops	Intra-corridor distribution	Horticultural Crops	Others	Side dish	Domestic/ International		Carbohydrates
	Onion	Horticultural Crops	Intra-corridor distribution	Horticultural Crops	Others	Side dish	Domestic/ International		Others
	Tomato	Horticultural Crops	Intra-corridor distribution	Horticultural Crops	Others	Side dish	Domestic/ International		Vitamins
	Coffee	Export Crops	Extra-region distribution	Industrial Crops	Others	Beverage	International	65%	Minerals, etc.
Tanzania	Maize	Cereals/ staple foods	Inter-corridor distribution	Cereals	Necessities	Staple food	Domestic/ International		Carbohydrates
	Rice	Cereals/ staple foods	Inter-corridor distribution	Cereals	Necessities	Staple food	Domestic/ International		Carbohydrates
	Sorghum	Cereals/ staple foods	Inter-corridor distribution	Cereals	Necessities	Staple food	Domestic/ International		Carbohydrates
	Potatoes	Horticultural Crops	Intra-corridor distribution	Horticultural Crops	Others	Side dish	Domestic/ International		Carbohydrates
	Onion	Horticultural Crops	Intra-corridor distribution	Horticultural Crops	Others	Side dish	Domestic/ International		Others
	Tomato	Horticultural Crops	Intra-corridor distribution	Horticultural Crops	Others	Side dish	Domestic/ International		Vitamins
	Coffee	Export Crops	Extra-region distribution	Industrial Crops	Others	Beverage	International	114%	Minerals, etc.

Source: JICA Study Team

Necessary goods[1] are the most important, including staples for dietary use, sugarcane for seasoning,

[1] In economic terms, necessary goods are those for which the income elasticity of demand (the ratio of the change in demand

and spices (chili sauce) as an essential Ethiopian seasoning.

Staple foods vary from country to country. In Ethiopia, the staples are teff, wheat and, to a lesser extent, rice, and if teff is not available, wheat is used as a substitute because teff cannot be imported. In Kenya, Uganda, Rwanda and Tanzania, the staple foods are maize, plantain, cassava, rice, sorghum, etc. If maize is not available, other crops are substituted or imported from countries around the Northern Corridor.

Other than necessities, there are side dishes and luxury items. It is also important to consider whether the products are intended for the domestic market or not. Furthermore, Ethiopia and the countries surrounding the Northern Corridor have different economic zones, and taking these conditions into account, the countries are divided into six groups as shown in the table below (see table below).

Table 4.8 Classification of target crops

Goods	Usage	Market	Distribution	Group	Crop	Ethiopia	Kenya	Uganda	Rwanda	Tanzania
Necessities	Staple	Domestic	Domestic	1	Teff	X				
					Wheat	X				
					Plantain		X	X	X	
		Domestic/ International	Inter-corridor	2	Maize		X	X	X	X
					Rice	X	X	X	X	X
					Sorghum					X
	Seasoning	Domestic	Domestic	3	Sugarcane		X			
			Domestic	4	Chili sauce	X				
Others	Side dish	Domestic International	Intra-corridor	5	Potatoes		X	X	X	X
					Onion	X	X	X	X	X
					Tomato		X	X	X	X
					Dried beans		X			
			Neighboring country		Broad bean	X				
	Beverage	Domestic/ International	Extra-region	6	Coffee	X		X	X	X
		International			Tea		X			

Source: JICA Study Team

The impacts of each of these groups are compared and summarized in the table below.

Table 4.9 Impacts by crop group (2020)

	Group1		Group2	Group1	Group2				Group3	Group4	Group5		Group6		
Goods	Necessities										Others				
Crop	Staple food								Seasonings		Side dish		Beverage		
Country/ Corridor	Ethiopia			Northern Corridor			Tanzania	Northern Corridor	Kenya	Ethiopia	Ethiopia	Northern Corridor	Ethiopia	Northern Corridor	Kenya
	Teff	Wheat	Rice	Plantain	Rice	Maize	Sorghum	Maize、Rice、Sorghum	Sugarcane	Chili sauce	Onion、Broad bean	Potatoes、Onion、Tomato、Dried beans	Coffee	Coffee	Tea
Input	1.50	3.00	3.00	0.50	2.25	1.13	0.00	1.50	3.00	0.00	3.00	1.77	0.00	2.50	3.00
Production	0.00	3.00	1.50	0.50	0.75	0.75	0.00	0.67	3.00	0.00	2.25	1.50	0.00	1.00	1.50
Processing	1.50	3.00	3.00	-	2.25	1.13	-	1.69	3.00	1.50	1.50	2.00	0.00	1.00	3.00
Distribution	3.00	3.00	3.00	2.00	2.25	2.25	0.00	2.00	3.00	3.00	3.00	2.59	1.50	0.50	3.00
Sales	1.50	1.50	1.50	2.00	2.63	1.50	0.00	1.83	0.00	0.00	1.50	2.32	0.00	1.00	1.50
Consumption	3.00	1.50	1.50	1.50	1.50	0.75	0.00	1.00	0.00	0.00	3.00	1.50	0.00	0.50	0.00
Average	1.75	2.50	2.25	1.30	1.94	1.25	0.00	1.44	2.00	0.75	2.45	1.94	0.25	1.08	2.00
Market	Domestic		Domestic/ International	Domestic	Domestic/ International				Domestic	Domestic/ International				International	
Distribution	Domestic		Inter-corridor	Domestic	Inter-corridor				Domestic	Neighboring country	Intra-corridor	Intra-/ Inter-corridor	Extra-region		

Source: JICA Study Team

Furthermore, the magnitude of impact for each individual crop and VC process, by group, is shown in the table below.

to the change in income) is between zero and one, and luxury goods are those for which the income elasticity is one or more. Luxury goods are those with an elasticity of less than zero, and inferior good are those for which demand decreases as income increases. Strictly speaking, all conditions other than income growth need to be held constant, which is not easy to measure when all goods are affected, as in COVID-19.

Table 4.10 List of impacts on crops and VC stages (2020)

Group	Group1			Group2			Group3	Group4	Group5					Group6		
Goods	Necessities								Others							
Crop Type	Cereals/staple foods						Horticulttural Crop							Export Crop		
Usage	Staple food						Seasonings		Side dish					Beverage		
Market	Domestic			Domestic/ International			Domestic	Domestic/ International	Domestic/ International					Domestic/ International	International	
Distribution type	Domestic distribution			Inter-corridor distribution			Domestic distribution	Neighboring country distribution	Neighboring country distribution	Intra-corridor distribution			Inter-corridor distribution	Extra-region distribution		Average
Crop	Teff	Wheat	Plantain	Maize	Rice	Sorghum	Sugarcane	Chili sauce	Broad bean	Potatoes	Onion	Tomato	Dried beans	Coffee	Tea	
Average																
Input	1.50	3.00	0.50	1.13	2.40	0.00	3.00	0.00	3.00	2.25	1.88	2.00	0.00	1.88	3.00	1.76
Production	0.00	3.00	0.50	0.75	0.90	0.00	3.00	0.00	1.50	0.75	2.25	2.00	1.50	0.75	1.50	1.16
Processing	1.50	3.00	-	1.13	2.40	-	3.00	1.50	1.50	2.50	-	2.25	0.00	0.75	3.00	1.80
Distribution	3.00	3.00	2.00	2.25	2.40	0.00	3.00	3.00	3.00	2.63	2.63	2.50	3.00	0.75	3.00	2.27
Sales	1.50	1.50	2.00	1.50	2.40	0.00	0.00	0.00	1.50	2.25	2.25	2.50	1.50	0.75	1.50	1.71
Consumption	3.00	1.50	1.50	0.75	1.50	0.00	0.00	0.00	3.00	1.88	1.88	1.50	0.00	0.38	0.00	1.24
Average	1.75	2.50	1.30	1.25	2.00	0.00	2.00	0.75	2.25	2.02	2.18	2.12	1.00	0.88	2.00	1.65
Northern Corridor (Kenya、Uganda、Rwanda、Tanzania)																
Input	-	-	0.50	1.13	2.25	0.00	3.00	-	-	2.25	1.50	2.00	0.00	2.50	3.00	1.71
Production	-	-	0.50	0.75	0.75	0.00	3.00	-	-	0.75	2.00	2.00	1.50	1.00	1.50	1.13
Processing	-	-	-	1.13	2.25	-	3.00	-	-	2.50	-	2.25	0.00	1.00	3.00	1.82
Distribution	-	-	2.00	2.25	2.25	0.00	3.00	-	-	2.63	2.50	2.50	3.00	0.50	3.00	2.14
Sales	-	-	2.00	1.50	2.63	0.00	0.00	-	-	2.25	2.50	2.50	1.50	1.00	1.50	1.88
Consumption	-	-	1.50	0.75	1.50	0.00	0.00	-	-	1.88	1.50	1.50	0.00	0.50	0.00	1.13
Average	-	-	1.30	1.25	1.94	0.00	2.00	-	-	2.02	2.00	2.12	1.00	1.08	2.00	1.62
Ethiopia																
Input	1.50	3.00	-	-	3.00	-	-	0.00	3.00	-	3.00	-	-	0.00	-	1.93
Production	0.00	3.00	-	-	1.50	-	-	0.00	1.50	-	3.00	-	-	0.00	-	1.29
Processing	1.50	3.00	-	-	3.00	-	-	1.50	1.50	-	-	-	-	0.00	-	1.75
Distribution	3.00	3.00	-	-	3.00	-	-	3.00	3.00	-	3.00	-	-	1.50	-	2.79
Sales	1.50	1.50	-	-	1.50	-	-	0.00	1.50	-	1.50	-	-	0.00	-	1.07
Consumption	3.00	1.50	-	-	1.50	-	-	0.00	3.00	-	3.00	-	-	0.00	-	1.71
Average	1.75	2.50	-	-	2.25	-	-	0.75	2.25	-	2.70	-	-	0.25	-	1.76
Kenya																
Input	-	-	1.50	3.00	3.00	-	3.00	-	-	3.00	-	-	0.00	-	3.00	2.36
Production	-	-	1.50	0.00	0.00	-	3.00	-	-	0.00	-	-	1.50	-	1.50	1.07
Processing	-	-	-	1.50	3.00	-	3.00	-	-	3.00	-	-	0.00	-	3.00	2.25
Distribution	-	-	1.50	3.00	3.00	-	3.00	-	-	3.00	-	-	3.00	-	3.00	2.79
Sales	-	-	1.50	1.50	3.00	-	0.00	-	-	1.50	-	-	1.50	-	1.50	1.50
Consumption	-	-	1.50	0.00	1.50	-	0.00	-	-	1.50	-	-	0.00	-	0.00	0.64
Average	-	-	1.50	1.50	2.25	-	2.00	-	-	2.00	-	-	1.00	-	2.00	1.76
Uganda																
Input	-	-	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	-	3.00	-	0.43
Production	-	-	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	-	1.50	-	0.21
Processing	-	-	-	1.50	1.50	-	-	-	-	-	-	-	-	1.50	-	1.50
Distribution	-	-	3.00	1.50	1.50	-	-	-	-	1.50	1.50	1.50	-	1.50	-	1.71
Sales	-	-	3.00	1.50	1.50	-	-	-	-	3.00	1.50	3.00	-	0.00	-	1.93
Consumption	-	-	1.50	0.00	1.50	-	-	-	-	3.00	1.50	1.50	-	0.00	-	1.29
Average	-	-	1.50	0.75	1.00	-	-	-	-	1.50	0.90	1.20	-	1.25	-	1.14
Rwanda																
Input	-	-	0.00	0.00	3.00	-	-	-	-	3.00	3.00	3.00	-	3.00	-	2.14
Production	-	-	0.00	0.00	1.50	-	-	-	-	0.00	3.00	3.00	-	0.00	-	1.07
Processing	-	-	-	0.00	3.00	-	-	-	-	3.00	-	3.00	-	0.00	-	1.80
Distribution	-	-	1.50	3.00	3.00	-	-	-	-	3.00	3.00	3.00	-	0.00	-	2.36
Sales	-	-	1.50	3.00	3.00	-	-	-	-	3.00	3.00	3.00	-	1.50	-	2.57
Consumption	-	-	1.50	3.00	3.00	-	-	-	-	3.00	3.00	3.00	-	0.00	-	2.36
Average	-	-	0.90	1.50	2.75	-	-	-	-	2.50	3.00	3.00	-	0.75	-	2.06
Tanzania																
Input	-	-	-	1.50	3.00	0.00	-	-	-	3.00	1.50	3.00	-	1.50	-	1.93
Production	-	-	-	3.00	1.50	0.00	-	-	-	3.00	3.00	3.00	-	1.50	-	2.14
Processing	-	-	-	1.50	1.50	-	-	-	-	1.50	-	1.50	-	1.50	-	1.50
Distribution	-	-	-	1.50	1.50	0.00	-	-	-	3.00	3.00	3.00	-	0.00	-	1.71
Sales	-	-	-	0.00	3.00	0.00	-	-	-	1.50	3.00	1.50	-	1.50	-	1.50
Consumption	-	-	-	0.00	0.00	0.00	-	-	-	0.00	0.00	0.00	-	1.50	-	0.21
Average	-	-	-	1.25	1.75	0.00	-	-	-	2.00	2.10	2.00	-	1.25	-	1.50

Source: JICA Study Team

Comparing these groups within the framework of staple foods, seasonings, side dishes, and luxury items the following can be said.

1) Staple foods (Group 1, 2)

Staple foods are necessities, and if certain crops are difficult to obtain or relatively expensive, they will be imported or substituted with cheaper alternatives.

a. Ethiopian staple foods: teff and wheat

Teff is a staple food in Ethiopia, mixed with "injera", and is produced and consumed only in Ethiopia. There have been access problems on the input stage, but little impact on the production stage. However, due to impediments at the distribution stage, it can only be sold in markets within the narrow areras, which has affected sales and consumption.

Teff is grown almost exclusively in Ethiopia, and even if VC disruptions occur, it cannot be imported. The soaring market price of teff has led to substitution with wheat, rice and maize.

However, wheat as a substitute crop has also been affected negatively in the production and distribution stages. In 2021, the price of wheat will rise due to demand for teff substitution. Prices soared and consumption was moderately affected. Rice production is about 160,000 tons, compared to about 5 million tons of teff and wheat production, which is insufficient to replace teff and wheat due to its low quantity and high price.

Table 4.11 Impacts on VC by crop: teff and wheat (2020)

	Teff (Ethiopia)	Wheat (Ethiopia)
Input	Medium	Large
Production	Small	Large
Processing	Medium	Large
Distribution	Large	Large
Sales	Medium	Medium
Consumption	Large	Medium

Source: JICA Study Team

As a result, it has become a major challenge for the staple VCs to be impeded. This can be attributed to (i) the vastness of the country, which makes it prone to long VC constraints, (ii) the lack of well-developed linkages with neighboring countries, such as in the Northern Corridor, which also constrains importing from neighboring countries, and (iii) Ethiopia's relatively tightly controlled COVID-19 policy, which has isolated the country and regions of the country.

b. Maize: Countries around the Northern Corridor

On the other hand, in the target countries around the Northern Corridor, the impact of Maize was significant at the distribution and marketing stage, but it can be said that the impact was mitigated at the consumption stage due to inter-corridor distribution and crop substitution among staple foods. Maize has been more heavily impacted on the distribution side. In Kenya, the impact on the input side was significant: imports of chemical fertilizers were delayed, leading to shortages in stores and higher prices. On the production side, all countries are doing well and the impact is small. In Rwanda, exports to the Democratic Republic of Congo (DRC) were delayed, and distribution and sales were severely impacted.

Table 4.12 Impacts on VC by crop: Maize, Countries compared (2020)

	Kenya	Uganda	Rwanda	Tanzania
Input	Large	Small	Small	Medium
Production	Small	Small	Small	Large
Processing	Medium	Medium	Small	Medium
Distribution	Large	Medium	Large	Medium
Sales	Medium	Medium	Large	Small
Consumption	Small	Small	Large	Small

Source: JICA Study Team

c. Rice

In the case of rice, the impact has been significant outside of the production stage. By country, except for Rwanda, the impact at the sales and consumption stage was small, and was mitigated by distribution within the Northern Corridor. All countries except Uganda have been significantly affected. Imports from Asia have stagnated, and imports from Tanzania, where production has been strong, have flowed into Kenya, Uganda and Rwanda and have had a significant impact.

Table 4.13 Impacts on VC by Crop: Rice, Country compared (2020)

	Ethiopia	Kenya	Uganda	Rwanda	Tanzania
Input	Large	Large	Small	Large	Large
Production	Medium	Small	Small	Medium	Medium
Processing	Large	Large	Medium	Large	Medium
Distribution	Large	Large	Medium	Large	Medium
Sales	Medium	Large	Medium	Large	Large
Consumption	Medium	Medium	Medium	Large	Small

Source: JICA Study Team

d. Plantain: target countries around the Northern Corridor

In the target countries around the Northern Corridor, domestically distributed plantains were affected at the distribution and sales stage, but the impact at the consumption stage was mitigated due to the short value chain. It has been significantly affected by distribution and sales in Uganda, but not so much in general.

Table 4.14 Impacts on VC by crop: Plantain, Country compared (2020)

	Kenya	Uganda	Rwanda
Input	Medium	Small	Small
Production	Medium	Small	Small
Processing	-	-	-
Distribution	Medium	Large	Medium
Sales	Medium	Large	Medium
Consumption	Medium	Medium	Medium

Source: JICA Study Team

2) Seasonings (Groups 3 and 4)

a. Chili Sauce

In the case of Ethiopian chili sauce (spice), although there was an impact in processing and in terms of distribution, the impact in the downstream, such as in the sales and consumption process, was small. This may be due to the fact that it is used in daily diets, the processing process takes place close to the production area, the VC to consumption is not long, and that the markets are domestic as well as international.

b. Sugarcane

On the other hand, sugarcane in Kenya is highly affected in the upstream of the VC from production to processing due to deteriorating input access. On the production side, the weather has been favorable, but in addition to the increased production costs that have affected the profitability of producers, the processing side has been severely impacted by the continued shutdown of operations due to COVID-19 infection among workers. In particular, the processing side, including the shutdown of large-scale processing plants, became a bottleneck for the entire VC. On the distribution side, the distribution of domestic sugarcane decreased, but the impact on sales and consumption was small because of the imports.

One of the factors behind this was the flexible import policy in response to the stagnation of sugar processing, which had been domestically produced, and this was presumably one of the reasons for the small downstream impact of VC.

Table 4.15 Impacts on VC by crop: Chili sauce and sugarcane (2020)

	Chili sauce (Ethiopia)	Sugarcane (Kenya)
Input	Small	Large
Production	Small	Medium
Processing	Medium	Large
Distribution	Large	Large
Sales	Small	Medium
Consumption	Small	Small

Source: JICA Study Team

3) Side dishes (Group 5)

All of the side dishes, horticultural crops, had a large impact across the VCs. The impact was greater upstream, such as at the production stage, in Ethiopia and Rwanda, while in the other countries the impact was greater midstream to downstream.

What Ethiopia and Rwanda have in common is that (i) they have adopted more controlling policies in response to COVID-19, and (ii) they may be more constrained in terms of VC access than other countries. Ethiopia is a large country with long VC and located within less developed corridors than the Northern Corridor. Rwanda is landlocked and has a mountainous terrain, which is also constraints of domestic

VC.

a. Potatoes

Potatoes were surveyed in four countries and can be said to have been significantly affected (see table below). In all of them, there were medium to large impacts except the production stage. In Kenya, on the processing side, demand for French fries has decreased due to the closure of processing plants and the refraining of fast food restaurants from operating. On the consumption side, the consumption of potatoes as a source of carbohydrates increased due to reduced or lost income opportunities.

Table 4.16 Impacts on VC by crop: Potatoes, Country compared (2020)

	Kenya	Uganda	Rwanda	Tanzania
Input	Large	Small	Large	Large
Production	Small	Small	Small	Large
Processing	Large	-	Large	Medium
Distribution	Large	Medium	Large	Large
Sales	Medium	Large	Large	Medium
Consumption	Medium	Large	Large	Small

Source: JICA Study Team

b. Onions

Onions were studied in four countries (see table below). There was a significant impact in all countries except Uganda. In terms of production, there was a negative impact on the livelihoods of many small-scale farmers (Rwanda) who shifted production to other vegetables and fruits (Ethiopia).

Table 4.17 Impacts on VC by crop: Onion (2020)

	Ethiopia	Uganda	Rwanda	Tanzania
Input	Large	Small	Large	Medium
Production	Large	Small	Large	Large
Processing	-	-	-	-
Distribution	Large	Medium	Large	Large
Sales	Medium	Medium	Large	Large
Consumption	Large	Medium	Large	Small

Source: JICA Study Team

C. Tomatoes

Tomatoes are studied in three countries (see table below). It is a representative of perishable crops and has been greatly affected at the distribution stage. In Uganda, it has been affected by the stagnation of exports to South Sudan. In Rwanda, the entire process has been severely affected, and there has been an increase in waste (harvest loss).

Table 4.18 Impacts on VC by crop: Tomato, Country compared (2020)

	Uganda	Rwanda	Tanzania
Input	Small	Large	Large
Production	Small	Large	Large
Processing	-	Large	Medium
Distribution	Medium	Large	Large
Sales	Large	Large	Medium
Consumption	Medium	Large	Small

Source: JICA Study Team

d. Dried beans

Only Kenya was surveyed for dry beans. It has been affected at the distribution stage, but in general the impact has been moderate. Import of cheaper dried beans from Ethiopia and Uganda increased and had a significant impact on distribution stage for whom handles domestically produced dried beans.

e. Broad beans

Broad bean has been negatively affected by VC in general. It has been significantly impacted due to deteriorating input access and has also been affected on the production stage due to unfavorable weather conditions. Processing, distribution, and marketing are also affected, and there is a significant impact on

consumption, with reduced demand.

Table 4.19 Impacts on VC by crop: Dried beans and Broad beans (2020)

	Dried beans (Kenya)	Broad bean (Ethiopia)
Input	Small	Large
Production	Medium	Medium
Processing	Small	Medium
Distribution	Large	Large
Sales	Medium	Medium
Consumption	Small	Large

Source: JICA Study Team

4) Beverage materials (Group 6)

a. Coffee

Coffee has a well-established supply chain as a traditional export crop, so the impact is minimal. When comparing Ethiopia to countries around the Northern Corridor, only Ethiopia also has a large domestic market (38% in terms of export volume/production volume ratio), which may be a factor in the small impact of the downstream VC processes of sales and consumption.

In addition, coffee processing is a relatively small-scale process, such as washing station, that can be done in the vicinity of the production area, and processing is unlikely to be a major constraint as in the case of Cha, which is discussed below.

b. Tea

Tea (Kenya) was greatly affected by the input, processing and distribution stages. In particular, the impact of movement and operation restrictions in processing which requires relatively large scale facilities in addition to upstream processes such as production, is significant and has become one of the bottlenecks.

Table 4.20 Impacts on VC by Crop: Extraterritorial Distribution Type: Coffee and Tea (2020)

	Ethiopia	Uganda	Rwanda	Tanzania	Tea (Kenya)
Input	Small	Large	Large	Medium	Large
Production	Small	Medium	Small	Medium	Medium
Processing	Small	Medium	Small	Medium	Large
Distribution	Medium	Medium	Small	Small	Large
Sales	Small	Small	Medium	Medium	Medium
Consumption	Small	Small	Small	Medium	Small

Source: JICA Study Team

(3) Trends and background of impacts in each process and among processes

The table below shows the number of crops with the largest impact at the VC stage, organized by VC stage and country: distribution (21 crops), input (18 crops), marketing (11 crops), production (10 crops), processing (9 crops), and consumption (9 crops). The magnitude of the impact at the distribution and input stages can be seen.

Table 4.21 High impacted crops: VC stage, country

	Ethiopia	Kenya	Uganda	Rwanda	Tanzania	Total
Input	4	5	1	5	3	18
	Wheat Rice Onion Broad bean	Maize Rice Potatoes Sugarcane Tea	Coffee	Rice Potatoes Onion Tomato Coffee	Rice Potatoes Tomato	
Production	2	1	1	2	4	10
	Wheat Onion	Sugarcane	Coffee	Onion Tomato	Maize Potatoes Onion Tomato	
Processing	2	4	0	3	0	9
	Wheat Rice	Rice Potatoes Sugarcane Tea		Rice Potatoes Tomato		
Distribution	6	6	1	5	3	21
	Teff Wheat Rice Onion Broad bean Chili sauce	Maize Rice Potatoes Dried beans Sugarcane Tea	Plantain	Maize Rice Potatoes Onion Tomato	 Potatoes Onion Tomato	
Sales	0	1	3	5	2	11
		Rice	Plantain Potatoes Tomato	Maize Rice Potatoes Onion Tomato	Rice Onion	
Consumption	3	0	1	5	0	9
	Teff Onion Broad bean		Potatoes	Maize Rice Potatoes Onion Tomato		
	17	17	7	25	12	78

Source: JICA Study Team

1) Inputs

At the input stage, distribution disruption, movement restrictions, and high prices of input materials caused impacts such as reduced supply, delays, and access difficulties. This impact was mainly in the first half of 2020 and has started to recover (Rwanda). In addition, negative impacts on procurement of agricultural machinery continued until October 2021 (Kenya). Difficulty of access to imported inputs were the most prevalent factor.

2) Production

Production itself is more affected by weather than by COVID-19 (all countries covered). At the production stage, high input prices have increased production costs, but shrinking demand has resulted in smaller margins and continued wrinkles for producers (Rwanda). in the second half of 2020, the impact of COVID-19 was prolonged, and annual crops such as mung bean, rice, plantain, and potatoes saw their area under cultivation decrease due to increased production costs (Kenya).

3) Processing

In the processing stage, the processing volume decreased due to business restrictions, logistics restrictions, and shrinking demand. The main impact of this was in the first half of 2020. Challenges included poor raw material quality and low availability of raw materials, and the establishment of storage facilities to compensate for this (Rwanda). In Kenya, the most significant impact and bottleneck was the suspension or restriction of operations, especially at large processing plants for tea, sugar and flour milling.

4) Distribution

In the distribution process, the government's restrictions on movement and import/export from April to September 2020 became a major bottleneck, which affected the distribution and sales area of agricultural and food products, which were limited to the regional and township levels. Even after that, although not due to the impact of COVID-19, since most of the businesses are traditional small-scale wholesalers, the distribution area could not be expanded, and instead, distribution costs have soared.

Regarding the import side of trade, as mentioned in the input process, imports of agricultural materials have been stagnant, and although things have calmed down in 2021 compared to mid-2020, it was confirmed that this will continue to be a problem until September 2021, including lead time delays.

Distribution channels via market facilities and processing plants were significantly affected (Kenya). In the first half of 2020, business restrictions and market closures affected purchasing and sales, resulting in reduced income. Procurement are returning to normal, but sales continue to be affected (Rwanda).

5) Sales

Retail businesses were forced to close temporarily (April-September 2020) due to movement restrictions and lockdowns caused by COVID-19. In addition, due to the fact that people are still encouraged to stay at home to prevent the spread of the disease, the average number of visitors per day has been decreasing, and retail businesses have been affected (Ethiopia). In urban areas, the volume of food sales decreased due to the negative impact on household income (Kenya).

In the first half of 2020, purchasing and sales were affected due to business restrictions and market closures. Procurement is returning to normal, but sales continue to be affected. As for food service, vaccination is progressing and there is a positive outlook (Rwanda).

6) Consumption

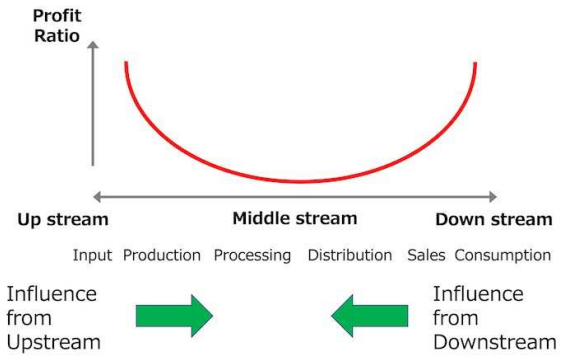
The rising prices of agricultural materials and increased transportation costs associated with COVID-19 have accelerated the increase in retail prices and caused a change in the product mix of crop consumption. Although the amount of consumption is decreasing compared to the previous years, the overall amount of consumption expenditure is also increasing due to the rising prices of crops. On the other hand, household income is on the decline due to temporary business closures associated with behavioral restrictions, so the direct purchase from local markets, extensive search for inexpensive produce and food sales, and finding good retail outlets also stood out as behavioral changes among consumers (Ethiopia).

Consumption of rice, fruits, and luxury goods has been stagnant (Kenya). The decline in income of many consumers during April-June 2020 has led to a change in lifestyle and increased food expenditures. This can be attributed to higher food prices (Rwanda).

7) Trends between and through VC processes

a. Impacts from the upstream of the value chain and downstream, with particularly large impacts in the midstream

Restrictions on import/export and movement in the upstream input stage processes led to reduced supply of agricultural products and lower operation rate in the processing process. In addition, restrictions on movement and income reduction in consumption stage led to a decrease in sales volume as a result of reflecting consumer needs in the sales stage. This in turn affected the distribution and processing stages. These shortages in the supply of inputs in the upstream and the contraction of demand due to lower incomes in the downstream have directly affected the production and sale stages, and further suppress the profit in the midstream such as processing and distribution stages. This has resulted in the so-called "smile curve" (low profit margins in the midstream compared to the upstream and downstream).



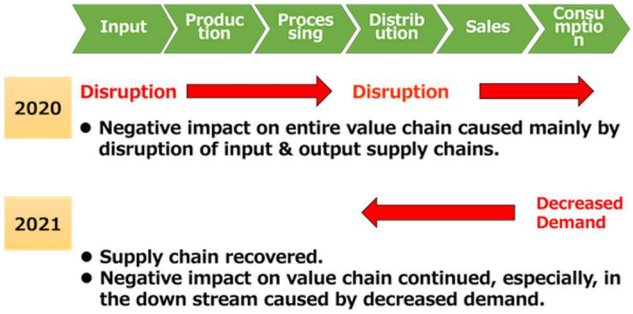
Source: JICA Study Team

Figure 4.2 Impacts from both up- and down stream

b. Down-stream impacts continued:

The impact on input - production - processing was largely due to movement restrictions in the first half to second half of 2020, and there were negative impacts such as a decrease in supply, production, and processing. After the removal of the restriction, no large disruption was observed (Rwanda).

On the other hand, in the distribution – sales - consumption stages, the impact has been prolonged. Major factor behind it, is the shrink of the demand for crops caused by the decrease in consumer income (Rwanda). This was seen not only in Rwanda, but also in other countries.



Source: JICA Study Team

Figure 4.3 VC Stage and Impact

c. Processing as bottleneck

Some crops require relatively large-scale facilities for processing before they can be distributed. Staple foods such as wheat require flour milling, sugar cane requires sugar refining, and tea requires tea refining, all of which are concentrated in relatively large-scale facilities. Large-scale processing plants for sugar, flour, and tea production in these areas had to suspend or restrict their operations, and employees were restricted from coming to work due to movement restrictions, which limited their operations and affected the entire VC. However, the results were different in Ethiopia, where the impact on the sales and consumption side continued, and in Kenya, where the impact was mitigated, and there were differences between countries. This can be attributed to Ethiopia's (i) counry size, which makes it prone to long VC and VC constraints; (ii) lack of well-developed linkages with neighboring countries, such as the Northern Corridor, which also limits trades; and (iii) relatively tightly controlled COVID-19 policies, which isolated the country and the region within the country.

4.2 Vulnerability in FVC in the Eastern Region of Africa

(1) Impact on FVCs and its background

FVCs in eastern Africa are vulnerable. The spread of COVID-19 and its preventive measures have made them more vulnerable. The manifested impacts were described in the previous section.

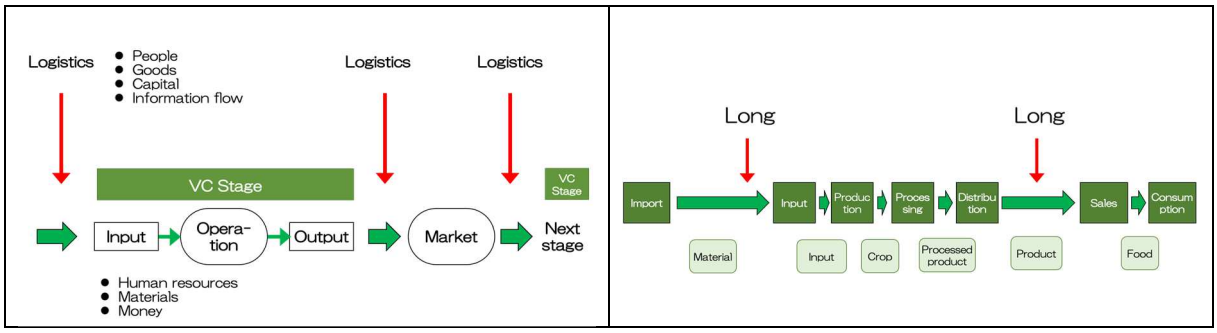
Based on those, this section analyzes with the theoretical framework in terms of 1) VC flows, 2) forms of crop distribution, 3) nature of the crop as a consumer commodity, and 4) characteristics of the country, and then summarizes the background and factors behind the impact and where the vulnerability lies.

1) Impact in the VC flow

The first preventive measures taken by all countries against COVID-19 are i) restriction of human movement. This was followed by ii) impeding the flow of goods and the various effects derived from it.

The results of the study also showed that the input and distribution stages of VC were highly affected.

To organize the theoretical framework, we first organize the processes within each VC process in the figure below. At the inflow and outflow of each stage, the logistics of transporting goods plays an important role, and its disruption is a major factor. Among the supply chains connecting each process, the longest ones are the input stage that handles imported raw materials and the distribution stage that transports products from the production area to the consumption aera, and the impact of these processes is the large. Therefore, the VC stage with long distribution distances are greatly affected.



Source: JICA Study Team

Figure 4.4 Processes within each VC process (left) and the length of logistics connecting the processes (right)

Following the input and distribution stages impacts, the downstream stages including consumption are affected. These include the stagnation of operations, sluggish sales, suppressed profits, and stagnation of money circulation, which result in lower income and shrinking demand. Once the demand shrinks, it suppresses profits in midstream stages such as processing and distribution, which is the so-called "smile curve.

All crops were affected, but from the perspective of the impacts on VC flow, the following can be said: i) Upstream impacts: access to inputs, especially imported inputs, deteriorated and production declined due to lack of timely inputs, especially for annual crops need annual inputs, crops with long VC, crop with non-preservable nature. ii) Distribution processes were also hampered by long VC. iii) Downstream impacts: shrinking demand shifted to low-cost staple foods, affecting upstream and midstream stages. iv) These upstream together with downstream impacts resulted in a suppression of profits for actors in the midstream processing and distribution stages of VC.

Currently, most of the transactions can be done by face to face, which is disrupted. Then, not only flow of products but also business and information flow are also disrupted. In addition, improving the efficiency and sanitary environment at critical points of distribution, such as wholesale markets and transshipment points, will enable safe and efficient distribution.

2) Form of crop distribution

As mentioned above, it was found that the impact of the long- distance distribution stage is significant. Next, the differences in the form of crop distribution also affects the impacts on VC.

Table 4.22 Forms of crop distribution

	Fresh	Simply processed	Processed in large scale plant
Distributed form	Potato, Onion, Tomato, Broad beans	Teff, Rice, Dried bean, Chili sauce, Coffee	Wheat, Sugarcane, Tea
Distributed in diversified form	Maize, Plantain, Sorghum	Maize, Plantain, Sorghum	Maize

Source: JICA Study Team

First, wheat, sugarcane, and tea are among the crops that are processed in relatively large-scale factories before being distributed. These crops are greatly affected from production to processing, with plant shutdowns during the processing stage being a limiting factor.

Secondly, horticultural crops such as potatoes, onions, tomatoes, and beans, which are distributed as perishable crops, are greatly affected by the distribution stage, as their quality cannot be maintained in a distribution system that does not have a cold chain and the quality of distribution is poor and freshness cannot be maintained.

3) Properties of crops as consumer goods and uses in the diet

In the previous section, the crops were classified into six groups based on their properties as consumer goods (necessities and others), their uses in the diet (staple food, seasonings, side dishes, and beverage materials), and their major markets.

Table 4.23 Categorization and impact of crops by their nature and use

Group	Crop	Good	Usage	Market	Distribution	VC Stage						Degree of Impact	Impact	Factor
						Input	Production	Processing	Distribution	Sale	Consumption			
1	Teff	Necessary goods	Staple foods	Domestic	Domestic				●		●	M	Impact on VC of teff due to inability to substitution or import. Wheat is also affected by the processing process.	Not substituted/ imported
1	Wheat					●	●	●	●			L		
1	Plantain								●	●		M	No significant impact.	
2	Maize			Domestic/ International	Intra-Corridor				●	●		M	No significant impact by crop substitution and trade within corridor.	
2	Rice					●		●	●	●	●	L	Stagnation of imports from Asia has changed the flow of VC. Pressure on profits of domestic rice stakeholders	Gap in VC base
2	Sorghum											S	No significant impact.	
3	Sugarcane		Seasoning	Domestic	Domestic	●	●	●	●			L	Problems in the upstream of VC due to shutdown of a large sugar factory. No impact on consumption by import.	Operation stop at large processing plant
4	Chili sauce			Domestic/ International	Neighboring countries				●			S	Affected at the distribution stage, but no problem.	Processing is dispersed. Domestic and overseas markets exist.
5	Broad beans	Others	Side dish	Domestic/ International	Neighboring countries	●			●		●	L	Significant impact across VC.	Substituted for low-priced alternative.
5	Potato				Intra-Corridor	●		●	●	●		L		
5	Onion					●	●		●		●	L		
5	Tomato					●	●	●	●	●		L		
5	Dry beans				Inter-Corridor				●			M		
6	Coffee		Beverage material	Domestic/ International	Extra-Region							S	No problem in spite of difficut access to input.	VC established.
6	Tea			International		●		●	●			L	Problems in the upstream of VC due to deteriorating access to inputs and shutdown of large factories.	Constrained in the input and processing.

Note:● : Large impact
Source: JICA Study Team

First, in groups 1 and 2, which are necessities and grains/staple foods; those demands are mutually substituted. When incomes fall or prices rise, they are substituted for other staple foods, or imported.

Maize, sorghum, and plantain were less affected. This was due to a shift in demand to those staple foods and its preservability.

Within this group, the major impact was seen in Ethiopian teff and wheat, which have not been substituted or imported. In Ethiopia, staple food VC has been affected, and this can be seen as a food security issue.

On the other hand, for rice, imports from Asia have stopped and rice from Tanzania has flowed into neighboring countries and has had a considerable impact on rice producer and processor in the region.

VC flow of rice has changed dramatically and has had a major impact on those involved in the production and processing of domestic rice. The background is partly due to the existence of disparities in rice VC base among the neighboring countries.

Second, in groups 3 and 4, which are seasonings, they are necessities, but substitution is unlikely to occur, and if a problem occurs, it will be covered by imports. Sugarcane had a large impact from production to processing, especially in the processing stage, but the impact in the sales and consumption process was mitigated by importing sugar. As for spices (chili sauce), there was an impact at the distribution stage, but the impact was small due to the proximity of the production and consumption areas and the existence of both overseas and domestic markets.

Third, horticultural crops in Group 5 are consumed as side dish, which have high price elasticity of demand[2], and when prices become high, they are substituted by staple foods with lower relative prices. Therefore, the demand itself shrinks. These crops fall in the category of intra-corridor distributed crop, and have a large impact downstream of the VC of sales (see table below).

Table 4.24 Affected crop types and processes

2020

	Inter-corridor distribution	Intra-corridor distribution	Neighboring country distribution	Domestic distribution	Extra-region distribution	Average
Input	1.65	2.05	1.50	1.29	2.10	1.76
Production	0.90	1.64	0.75	1.07	0.90	1.16
Processing	1.65	2.40	1.50	2.50	1.20	1.80
Distribution	2.40	2.59	3.00	2.14	1.20	2.27
Sales	1.95	2.32	0.75	1.29	0.90	1.71
Consumption	1.05	1.77	1.50	1.29	0.30	1.24
Average	1.60	2.10	1.50	1.50	1.10	1.65
Notes:	Large Impact	Medium Impact	Small Impact			

2021

	Inter-corridor distribution	Intra-corridor distribution	Neighboring country distribution	Domestic distribution	Extra-region distribution	Average
Input	1.80	1.64	0.75	1.29	0.90	1.46
Production	0.75	0.95	0.75	0.86	1.20	0.90
Processing	1.35	0.60	1.50	2.00	0.60	1.14
Distribution	1.95	1.64	2.25	2.14	0.90	1.76
Sales	1.20	1.36	0.75	1.07	0.30	1.07
Consumption	0.75	1.64	1.50	0.86	0.00	0.99
Average	1.30	1.38	1.25	1.30	0.65	1.22
Notes:	Large Impact	Medium Impact	Small Impact			

Source: JICA Study Team

In the background, as mentioned above, there are perishable products, which do not keep well, do not last long, are poorly processed, and have poor distribution quality, making them susceptible to situations such as COVID-19. The impact is still significant at the distribution and consumption stages in 2021.

In addition, the horticultural crops used as side dishes are rich in vitamins and other nutrients, as shown in Table 4.7, and their substitution for staple foods can be nutrition issues.

Fourth, Group 6 are crops used for beverage materials as well as traditional export crop. VC has already been established. In contrast to coffee, which was only affected at the input stage, Tea had a larger impact from input to processing.

4) Country characteristics

The following comparisons are made according to country characteristics.

Table 4.25 Characteristics of each country

	Ethiopia	Kenya	Uganda	Rwanda	Tanzania
Corridor	Kampala-Addis Ababa – Djibouti	Along the Northern Corridor	Along the Northern Corridor	Along the Northern Corridor	Near the Northern Corridor
Policy	More strict			ore strict	
Constraint to VC	Landlocked & vast		Landlocked	Landlocked & mountainous	

Source: JICA Study Team

The degree of impact on the process in each country is shown in the table below. In Ethiopia and Rwanda, where national policies are more stringent, the impact is greater. In Ethiopia and Rwanda, where national policies are more stringent, the impact is greater at the distribution stage, which will continue into 2021,

[2] Price elasticity of demand: The ratio of the change in demand to the change in price. Price elasticity of demand: The ratio of the change in demand to the change in price; an absolute value of one or more indicates elasticity and the likelihood of substitution by other goods.

and in Rwanda, the downstream impact is greater.

Table 4.26 Degree of impact by process in each country (2020)

	Ethiopia	Kenya	Uganda	Rwanda	Tanzania	Average
Input	1.93	2.36	0.43	2.14	1.93	1.76
Production	1.29	1.07	0.21	1.07	2.14	1.16
Processing	1.75	2.25	1.50	1.80	1.50	1.80
Distribution	2.79	2.79	1.71	2.36	1.71	2.27
Sales	1.07	1.50	1.93	2.57	1.50	1.71
Consumption	1.71	0.64	1.29	2.36	0.21	1.24
Average	1.76	1.76	1.14	2.06	1.50	1.65
	Notes:	Large Impact	Medium Impact	Small Impact		

Source: JICA Study Team

The table below shows a cross-country comparison of the most important staple foods for the population.

Table 4.27 Comparison of Affected Crops and Countries (2020)

Staple foods

Country	Ethiopia	Kenya	Uganda	Rwanda	Tanzania
Input	2.50	2.50	0.00	1.00	1.50
Production	1.50	0.50	0.00	0.50	1.50
Processing	2.50	2.25	1.50	1.50	1.50
Distribution	3.00	2.50	2.00	2.50	1.00
Sales	1.50	2.00	2.00	2.50	1.00
Consumption	2.00	1.00	1.00	2.50	0.00
Average	2.17	1.76	1.06	1.76	1.06

Domestic distribution

Country	Ethiopia	Kenya
Crop	Teff、Wheat	Sugarcane
Input	2.25	3.00
Production	1.50	3.00
Processing	2.25	3.00
Distribution	3.00	3.00
Sales	1.50	0.00
Consumption	2.25	0.00
Average	2.13	2.00

Source: JICA Study Team

For staple foods, the impact on downstream consumption is important, and it can be seen that the impact is large in Ethiopia and Rwanda. This may reflect the high level of country-specific VC constraints and the characteristics of more controlling governments.

In addition, in the countries along the Northern Corridor, except for Rwanda, the impact at the consumption stage is small, and it can be said that an impact on the VC in consumption stage is mitigated by distribution within the corridor.

In the case of domestic distributed crops, the impact on Kenyan sugarcane is mitigated downstream when comparing Ethiopian teff and wheat and Kenyan sugarcane. One of the reasons for this is that the downstream impact of VC is smaller than the downstream impact of VC due to a flexible import policy in response to the stagnation of sugar processing, which had been domestically produced. Comparing Ethiopia and Kenya, it can be argued that Kenya's flexible policy had a smaller impact on consumers than Ethiopia's controlled policy.

(2) Impact and Underlying Factors

The impacts on FVC and underly factors by COVID-19 are summarized as follow.

1. Major impacts on FVC stages.

- Changes of volumes and price range produced/consumed in each stage of FVC.

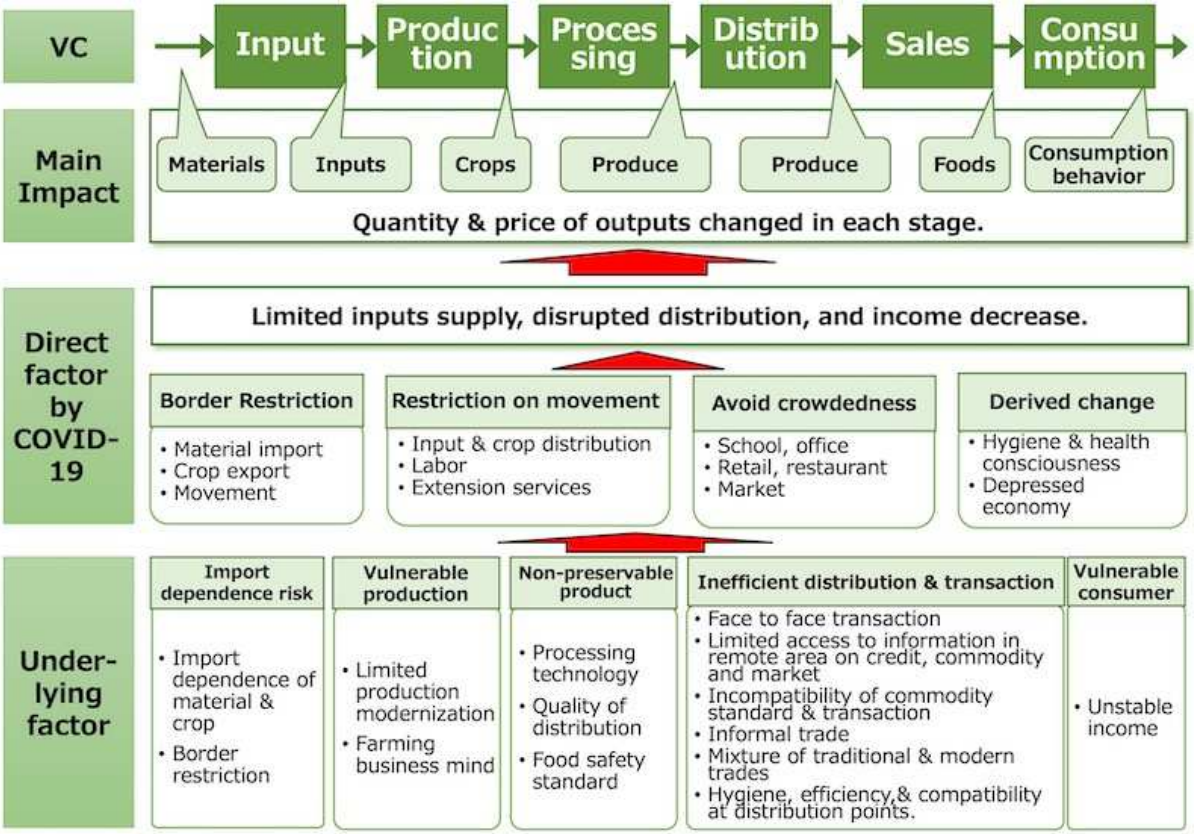
2. Direct factors caused by COVID-19 and preventive measures.

- Direct factor: input shortage, disruption of distribution and sales, changes of income
- Trigger to the change: restrictions on borders and movement, avoiding congestion, and change of people mind

3. Underlying factors

- Import dependence, vulnerability of production, preservability of products, efficiency of distribution, and vulnerability of consumer.

Those impacts, factors, and underlying factors are summarized in the figure below.



Source: JICA Study Team

Figure 4.5 Impacts of COVID-19, Factors and Underlying Factors

Chapter 5 Proposing FVC With/Post COVID-19

5.1 How Resilient FVC should be

FVC in Africa East Region is vulnerable, which was revealed by the outbreak of COVID-19. Followings are the strategy toward resilient FVC.

For the staple foods such as grains, it is necessary to promote domestic stockpiling and distribution in preparation for external shocks, as well as intra-regional stockpiling and distribution, and intra-regional coordination, in order to ensure food security. For Ethiopia, to avoid the threats to food security, it is desirable to strengthen the corridor and connectivity with the northern corridor for smooth distribution of food crops.

For the intra-corridor distributed crops like horticultural crops, it had the most significant impact on these crops. However, it has large potential for further development. To capitalize the wider marketing opportunities with corridor development, it is desirable to improve processing and distribution system. These includes strengthening processing capacities for value addition and preservability, more efficient distribution, soother business flow, and compatibility of standards among neighboring countries. Especially, for strengthening FVCs in landlocked countries, it is necessary to develop mechanism to facilitate the trade within the Northern Corridor.

For potential export crops, further value addition is necessary.

5.2 Measures for Developing Resilient FVC

Factors of vulnerability and measurers toward resilient FVC is summarized in the table below.

Table 5.1 Toward Resilient FVC

VC	Underlying Factors of Vulnerability	Toward Resilient FVC
Entire	● Financial shortage ● Face to face transaction	● Developing financial support system in preparation for external shock. ● On-line transaction
Input	● Import dependent, Face to face transaction, Remote distribution	● Domestic production/ stockpiling of inputs, regional distribution of inputs, E-commerce.
Production	● Vulnerable producer ● Under-developed farming	● Modernizing farming and processing ● Farming as business ● Organic production
Processing	● Low level of processing ● Food safety management ● Shortage of raw material, packing material	● Enhance processing & packaging level: preservability, value addition. ● Compatibility of food safety standards ● Domestic production of raw material, processing plants and materials.
Distribution	● Poor quality of logistics: efficiency and compatibility of products, information and commercial flow: ✓ Exchange of product and supply/ demand information through face to face transactions leading further human contact. ✓ Traditional distribution, undeveloped collecting, stocking and shipping system to larger market. ✓ Informal transaction ✓ Challenges in crop perishability ● Compatibility, inefficiency and hygiene of critical distribution point ✓ Storage and distribution facilities. ✓ Disruption at the border ✓ Impact in landlocked countries	● Smooth information and transaction flow: ✓ Compatibility of commodity standards, ✓ EC platforming of market information ✓ Modernizing and organizing distribution structure of crops and foods. ✓ Fair and registered transaction. ● Improvement of distribution point ✓ Improving compatibility of standards & system, efficiency and hygiene. ✓ Improving hygiene environment ✓ Improving storage and distribution facilities and system such as Warehouse Receipt System. ● Improving quality of distribution: ✓ Storage facility and technology, cold chain establishment etc. ✓ Regional coordination for smooth distribution

	● Lack of a well-developed corridor including Ethiopia: prevents the smooth distribution of food and the substitution and importation of food.	✓ Strengthening VC in landlocked countries ● Strengthening the corridor including Ethiopia: Strengthening linkages with the Northern corridor
Sales	● Limited procurement and sales channels	● Streaming sales channel. Access to remote area.
Consu-mption	● Low income, vulnerable people, loss of job.	● Supporting the poor and vulnerable people ● Awareness building for horticulture crop consumption.

Source: JICA Study Team

(1) Short-term measures

Short-term measures are as follows.

1) Ensuring smooth movement

The restriction of the movement triggered the impacts of COVID-19 on FVC. Governments have issued travel pass to the large-scale distributors and wholesalers. It is necessary to issue those passes to certified small-scale operators.

2) Strengthening utilization of ICT

It is necessary to strengthen the development and utilization of ICT such as sales by E-commerce, application development of smart phone, etc, to prevent unnecessary human movement and physical contact.

3) Strengthening financing in emergencies

a. Facilitating government support

Despite several government support available such as subsidy, seed provision to farmers, food provision to consumers, and income compensation, not many respondents received those support. One of the bottlenecks is complicated procedures for people. It is desirable to develop simplified procedures like one-stop service in those emergencies.

b. Underpinning support processing and distribution

Support to seriously affected middle stream processing and wholesalers are considerable by providing loan or subsidy. Those mid-stream actors are

c. Underpinning consumer demand

Underpinning consumer demand can be considerable to prevent rapid decrease of the consumption demand, which can also support upstream sectors like sales, distribution and processing.

4) Strengthening hygiene measures

Strengthening hygiene measures at the critical distribution points such as market, distributors, and transshipment points.

(2) Measures toward resilient FVC

Mid- to long term measures to overcome the vulnerability of FVC are as follows.

1) E-commerce, Platforming

Promotion of ICT: The e-commerce platform introduces a system that allows farmers to interact directly with buyers, consumers and exporters without relying on intermediaries. By shortening the value chain, it becomes possible to improve distribution efficiency and increase resilience. Strengthening of IT infrastructure can be considered such as increasing availability smartphones to farmers, introducing shared smartphones and tablet terminals to farmers, cultivation apps and online training to farmers (Rwanda).

2) Strengthening access to agricultural inputs

In mid to long term, it is necessary to develop domestic accessible system of agricultural inputs like seeds, chemical and fertilizer in emergencies, which includes domestic production, stockpiling and

regional accommodation.

3) Modernization of production and farming

Modernization of production and processing: MoALFC in Kenya seeks to modernize agriculture through agricultural mechanization hubs and agricultural technology development centers nationwide. In general, the services of private companies are superior, but it is also important to provide opportunities for modernization led by the county government and provinces in some regions (Kenya).

Farming as business: Farmers are engaged in farming 'grow and sell'. Due to the influence of COVID-19, they could not secure sales destinations more than usual, and surplus products were generated. It is desirable to farming to shift from 'grow and sell' to 'grow to sell'. e (Rwanda).

4) Supporting the development of processing and distribution and improving the compatibility of food hygiene standards

a. Improvement of crop preservation and value addition by upgrading processing and distribution

According to the "smile curve" theory, when the sales and profits of the processing and distribution companies are tight, the entire FVC becomes distorted and the priority is given to the input companies and consumers. Therefore, without proper profit sharing, the development of the whole food industry, including farmers, will not be possible. Therefore, COVID-19 should support the value addition of processing businesses and their development as "service providers" that can play many of the roles of distribution (wholesale) businesses (Ethiopia).

These measures will enable domestic production of processing machinery, equipment and materials, mitigate the impact of shocks, and improve the preservation and value addition of agricultural products.

b. Improving food standards and its compatibility within region

Improving processing level of agricultural products upgrades preservability, which makes it possible to expand distribution area and trade with neighboring countries. It is desirable to establish food hygiene standards to ensure compatibility with neighboring countries in order to ensure food safety and security in preparation for the expansion traded area of agricultural products.

5) Improving the quality of logistics and promoting efficient and smooth distribution

a. Improving logistics quality

Due to the influence of COVID-19, many crops and foods were lost in the distribution process. Although the processing level is low, the quality deteriorates and the quantity decreases in the process of packaging, transportation, storage, cargo handling of physical distribution, which causes a lot of foos loss.

In particular, horticultural crops are poorly preserved are often packed overloaded, which is a factor in quality deterioration and causes a lot of loss at the distribution stage. Proper weighing and packaging will attract fair transactions, correct overloading of transportation, and prevent loss due to quality deterioration (Ethiopia).

Warehouse Receipt System will be used to enhance storage and distribution facilities and systems (Tanzania).

Moreover, the most affected horticultural crops are perishable. In most countries, cold chain logistics are not well developed, and post-harvest loss, in which agricultural products and processed foods are spoiled in the process of storage and distribution, has become a major issue. In the future, it is desirable to develop cold chains to improve the regional distribution of perishable horticultural crops in particular (Rwanda).

b. Efficiency of distribution

The restrictions on movement within the COVID-19 disaster revealed the fact that when distribution is restricted at the provincial and county levels, the transportation system from the solid collection of crops to the secondary cities is weak, and furthermore, the system for inventory management and shipment to

metropolitan areas from the secondary cities is also inadequate. Therefore, the construction of an organized distribution network is fundamental.

Specifically, the organization of distribution, including the physical infrastructure of roads, storage warehouses, etc., and the introduction of modern distribution know-how, including systematic collection, inventory management, and shipment to major cities, will facilitate the distribution of many crops, which will not only reduce distribution costs, but will also benefit many consumers (including those overseas) (Ethiopia).

c. Fair and smooth distribution through smart logistics

Informal transactions, which account for 40% of Rwanda's agricultural trade, decreased by 72.5% in 2020 (IGC, 2021). Improving informal transaction of inputs and crops for smooth distribution (Rwanda).

d. Promoting smooth logistics at logistics critical points

There are issues with compatibility, efficiency, and hygienic environment at logistics critical points. Logistics points include borders, wholesale markets, transshipment points, logistics personnel, and so on.

At such distribution points, compatible product standards and transaction system, and smart distribution make it possible to know the product information in advance. It enables to shorten the transaction and inspection period at transshipment points to avoid contact between people and promote smooth logistics.

At the markets, by guiding efficient flow of people and products and improving the hygienic environment, infection can be avoided and smooth transactions can be achieved.

e. Improvement and coordination of distribution within the region

A temporary border closure due to the credibility of the Protocol with other countries in border measures has become a bottleneck in the distribution of agricultural products (Tanzania and Kenya). It is necessary to make regional coordination to improve distribution in neighboring countries and regions so as not to cause such distribution obstruction.

In addition, rice imports from Asia stagnated, and low-price rice from Tanzania flowed into Kenya, Uganda, and Rwanda, which had a major impact on rice production, processing, and distributors on the inflowing countries. From the viewpoint of food security, it is necessary to consider distribution adjustment and stockpiling of grains such as rice in the region.

f. Facilitating corridors, leveraging opportunities, and strengthening linkages

In Ethiopia, negative impacts on the distribution process of teff, a staple food, have had negative impacts on the VC. Crop substitution and importation have not progressed, and there have been negative impacts on the food crop consumption stage which could be also a food security issue. It is desirable to strengthen the corridor that includes Ethiopia and to strengthen the connectivity with the Northern Corridor so that food can be traded within the region.

In addition, landlocked countries such as Rwanda were greatly affected on the VC. In order to strengthen VC in landlocked countries, a mechanism to facilitate smooth trade within the Northern Corridor should be considered. For example, it is desirable to set up a warehouse as a buffer at the border with Uganda, referring to the warehouse receipt system in Tanzania, and to develop information and financial functions to enable perishable logistics.

6) Expansion of consumer demand and sales

Due to the impact of COVID-19, the impact of the drop in consumer demand from the downstream is large, and the impact is still prolonged.

Consumers are affected by rising prices for horticultural coming from foreign input. Rising prices of agricultural products and foods directly affected consumers, especially the livelihoods of vulnerable people, so a stable supply system is desired.

For this purpose, it may be necessary to raise awareness about promoting the consumption of domestic crops for important crops such as grains and staple foods. In addition, it will be necessary to raise awareness of the importance of nutritional intake of horticultural crops in order to improve nutrition.

In addition, the promotion of e-commerce and platforms mentioned above will increase the sales volume of retailers and restaurants, it is necessary to have a mechanism to support sales.