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Pivoting in response to Covid-19 disruptions in the midstream of potato and fish value chains in Kenya

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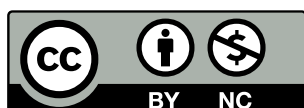
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1. Executive summary

Potato and fish value chains in Kenya have been severely affected by COVID-19 pandemic and the measures put in place by the government to contain it. In Kenya, as in many other countries, lockdowns, curfews, travel restrictions and other restrictive measures were introduced in March 2020, soon after the outbreak of the pandemic. Over time many of these restrictions have been removed, relaxed, reintroduced or strengthened in an attempt to achieve a balance between public health and economic priorities under changing circumstances. Small and medium enterprises (SMEs) in Kenya have been reported among the ones which have been most severely impacted by these restrictions worldwide. This study aimed to assess the impact of the pandemic and investigate the short- and longer-term responses and pivoting strategies deployed by actors in the midstream of the fish and potato value chains in face of COVID-19 restrictions, with a focus on traders and processors.

This study utilized longitudinal data collected from traders and processors located in counties which were purposively selected to represent key production and consumption areas in the two value chains. Data were collected from 518 and 419 actors in the potato and fish chain, respectively, resulting in a total sample size of 937 respondents.

The main results can be summarized as follow:

- Most businesses survived the disruptions brought by the COVID-19 pandemic and the restrictions imposed by the government of Kenya to limit its spread: at least 15% of businesses in the potato value chain stopped operations during July 2020, with wholesalers most heavily affected, but almost all businesses were operational again in 2021. In the fish value chain, there was no significant change in the number of operating businesses over the observed period.
- In 2020, both the number of days per week in which the businesses operate and the average volume handled on a single day showed a dramatic decline in both value chains. The resulting average drop in volumes handled per week was about 70% compared to 2019 levels for actors in the potato value chain, and about 40% for the ones in the fish value chain. For potato actors, a partial recovery was observed in 2021, with weekly volumes rising to about half of the 2019 level. For fish actors, weekly volume declined further in 2021.
- Change in prices followed very different trajectories in the two value chains. Potato purchasing prices fell sharply in 2020 relative to 2019, with small traders and wholesalers experiencing the largest drop (33%), suggesting that lower prices at source were not passed on entirely to buyers, perhaps as a result of elevated costs of doing business, particularly related to transport. Prices recovered somewhat in 2021 relative to 2020 but were still well below 2019 rates. Unlike potato, purchasing prices for fish increased sharply in 2020 relative to 2019, with wholesalers experiencing the largest increase (27%), and were even higher in 2021. Fish producers appear not to have benefited that much from higher prices received by midstream actors, possibly due to higher costs of doing business, including higher transport costs. These results suggest that producers

were more affected by declining prices (of potatoes), or benefitted less from increasing prices (of fish) than actors further down the chain. The divergent pattern in prices for the two sets of commodities may be explained by differences in seasonality, and by differences in COVID-19 containment measures affecting their respective value chains. The sharp drop in potato prices is likely linked to the coincidence of a seasonal peak in supply that occurs around July, coupled with a combination of more limited market access due to transport and mobility restrictions, and lower consumer demand linked to these restrictions and their income effects. In contrast, in the case of fish, the disruption of both fishing activities and imports of fish from China and Uganda likely contributed to constrained supply, even relative to lower demand, pushing up average fish prices.

- In both value chains, despite some variation across value chain nodes and by year, a general trend toward greater concentration was observed in the wake of COVID-19, as compared to the period prior to the pandemic. This might be explained by larger actors possessing advantages (e.g., higher working capital, more diverse supply networks, greater access to transport and digital platforms), which could take on increased significance under a shock like COVID-19, affording businesses in possession of them greater resilience and allowing them to capture a larger market share, even if the total volume of sales made by each business declined. The highest increase in market concentration was observed among potato processors and small fish traders.
- In both value chains, there was a tendency for the small traders and wholesalers based in production areas to sell a larger proportion of their products locally (i.e., within the same county) in 2020, as compared to 2019, with the share of product sold locally rising approximately 15% to 30%, suggesting that transport restrictions impacted the ability to access more distant markets.
- Actors in all nodes of both value chains consistently reported that accessing transport became more difficult and more expensive in 2020 compared to 2019. The situation improved in 2021 but transport remained less accessible and affordable than prior to the pandemic. This also resulted in a tendency towards using smaller vehicles, consistent with the lower volumes of goods traded, more localized sales, and perhaps more limited access to larger trucks.
- Since the emergence of COVID-19, many value chain actors in both chains have pivoted towards an increased use of informal agreements and formal contracts for their business transactions. Their use remains more widespread in the fish than the potato value chain. Short- and medium-term storage has also shown a sharp increase following the onset of the pandemic.
- Over the last two years, as response to the pandemic, there was also a significant increase in the use of ICT tools and social media platforms for searching and engaging with business partners, and for processing payments. While this was observed in both chains, their use is still much more frequent in the fish value chain.
- With the exception of increased storage, which was primarily a short-term strategy in face of the difficulty to access the market, the vast majority of

businesses which have started or increased the adoption of these practices in response to COVID-19 restrictions, indicate that they will continue using them once the pandemic ends. This will likely contribute to enhanced resilience to future supply/demand shocks in both value chains.

- In both potato and fish value chains, over 90% of respondents changed their business working hours and almost 40% transported their products over a different or longer route to avoid curfew or travel restrictions. About 70% reduced the number of permanent or seasonal employees in the fish chain, and almost 40% in the potato one. A similar pattern was found with regard to reduction of their salary (60% and 30%, respectively). These results suggest the need to reduce workforce costs in face of smaller business turnover, but also likely challenges in accessing labor.
- Mobilization of own savings and assets, and increased use of credit, including value chain financing, for maintaining business operations were far more common in the fish than the potato value chain. We speculate that the higher predisposition to offer and receive cash credit or value chain financing can be explained by underlying long-term relationships and trust within fish value chains, which trade year-round, as compared to the highly seasonal spot market that dominates potato purchases. Another explanation might relate to the characteristics of the primary production, where fishing activities require continual outlay on daily operating costs (e.g., fuel, labor), as compared to farming where costs tend to be lower and concentrated particularly around planting and harvesting time.

2. Introduction

Potato and fish value chains in Kenya have been severely affected by COVID-19 pandemic and the measures put in place by the government to contain it. In Kenya, as in many other countries, lockdowns, curfews, travel restrictions and other restrictive measures were introduced in March 2020, soon after the outbreak of the pandemic. Over time many of these restrictions have been removed, relaxed, reintroduced or strengthened in an attempt to achieve a balance between public health and economic priorities under changing circumstances. Small and medium enterprises (SMEs) in Kenya have been reported among the ones which have been most severely impacted by these restrictions worldwide (Nordhagen et al, 2021). Béné et al. (2016) have shown that the impact of a shock depends on both the actor's resilience capacity and the responses they put in place. This study was conducted to assess the impact of the pandemic and investigate the responses deployed by actors in the midstream of the fish and potato value chains, with a focus on traders and processors.

Capacities for pivoting in response to shocks are highly heterogeneous. Furthermore, Reardon et al. (2021) found that actors seldom act alone in their pivoting strategies but do so in complementary ways with other segment actors (co-pivoting). However, there is a paucity of empirical evidence in literature on how SMEs in Africa have pivoted and co-pivoted in response to the COVID-19 shock. Drawing on recently published theoretical work (Reardon et al, 2021) we address this gap in literature by looking for evidence of 'pivoting' and 'co-pivoting' behavior among potato and fish value chain actors during the COVID-19 pandemic. We seek to understand differences and commonalities in pivoting strategies deployed by firms across the target value chains, and among different types of business (larger- and smaller-scale SMEs) within each chain.

Potato is the second most important food crop in Kenya after maize. It is grown largely for commercial purposes and most production is traded domestically over long distances through brokers and traders. There are over 200 companies that process potatoes, ranging from large-scale processors to cottage industries. However, due to the rapid emergence of modern outlets, import of processed products is on the rise. It is projected that 14% of the demand for crisps and 27% of ready-cut frozen chips will be met through imports by 2024 (Andayi, 2020). Nairobi alone has more than 800 restaurants selling chips.

In Kenya, the fishery sector provides nutrient-rich food, jobs and income to a large population. Over 80% of supply comes from capture fisheries in Lake Victoria and is traded over long distances. In the lake, intensive fish culture using high-density polyethylene (HDPE) cages is growing rapidly. About a quarter of fish consumed in the country is imported and about 10% of the fish produced locally is exported (primarily as processed frozen fillets). Therefore, processing, logistics and cold storage SMEs play a critical role in the supply chain.

Potatoes and fish are perishable commodities characterized by a mix of product forms (fresh, processed, frozen); large volumes of production for domestic markets, plus some imports and exports; bimodal distribution of firms (lots of small-scale producers and SMEs in production, processing and trade, as well as a few larger-

scale businesses). This provides an ideal ground for investigating and comparing the diversity of pivoting and co-pivoting strategies (e.g., changes in procurement areas, type of suppliers or use of ICT tools) deployed by the actors to cope with (short-term) and adapt to (long-term/forward-looking) the changing circumstances brought by the pandemic; and how the characteristics of the actor and value chain might have facilitated or hindered the deployment of these strategies (e.g., size of operations, investment capacity, access to credit, portfolio diversity, etc.).

Unpacking private sector responses contributes to filling important gaps in literature, which so far has mostly focused on the impact of the pandemic on the production (farm level) and consumption ends of the value chain.

3. Materials and methods

This study utilized longitudinal data collected from actors in the potato and fish value chains located in selected counties of Kenya. The survey was conducted in August-September 2021 and focused on the trading and processing nodes of the value chain. Respondents were divided into 4 categories: (1) small traders (mostly itinerant traders and brokers who operate primarily in rural areas and procure directly from farmers and fisherfolk); (2) wholesalers (typically larger traders who are mainly located in urban settings, procure from other traders and sell across counties); (3) small processors; (4) medium/large processors. In the potato value chain, small processors were defined as having less than one ton of daily processing capacity. In the case of fish, small processors and medium/large processors were aggregated as only one medium-large processor was identified in the sample.

The counties were purposively selected to represent three key production areas and two main consumption areas in the two value chains. For the potato value chain, the targeted production counties were Nakuru (2nd largest potato producing county in Kenya), Meru (because of the presence of some small-scale irrigation - and, hence, off-season production - some large-scale potato farming and a few on-farm storage facilities) and Bomet (because uniquely characterized by widespread contract farming with large processors of potato crisps) (Figure 1). Additional details about these counties can be found in Annex A.

For the fish value chain, the targeted production counties were Nakuru (the location of Lake Naivasha, an important capture fishery), Meru (an area with rapidly growing small-scale pond-based aquaculture) and Kisumu (a major hub for fish production and trade, as it borders Lake Victoria). For both potato and fish value chains, Nairobi and Mombasa were chosen, being the two largest cities and consumption centers (Figure 1). In the case of fish, Mombasa doubles as a major production county for marine fish species, and a gateway for imported frozen fish, mostly tilapia from China, while Kisumu is also an important consumption zone in addition to being a site of production.

Survey respondents in these counties were identified and randomly selected from several lists. For potato actors, the lists included: list of officially registered wholesalers at county level, list of registered processors from the Kenya Bureau of Standards (KEBS), list of small traders and informal processors from existing lists available with the National Potato Council of Kenya (NPCK). Actors in the fish value chain were located through lists available with the Kenya Marine and Fisheries Research Institute (KMFRI) and Maseno University (MU). During the interviews, respondents were given the opportunity to confirm or change the category to which they had been originally assigned. Data were collected from 518 and 419 actors in the potato and fish value chain, respectively, resulting in a total sample size of 937 respondents.

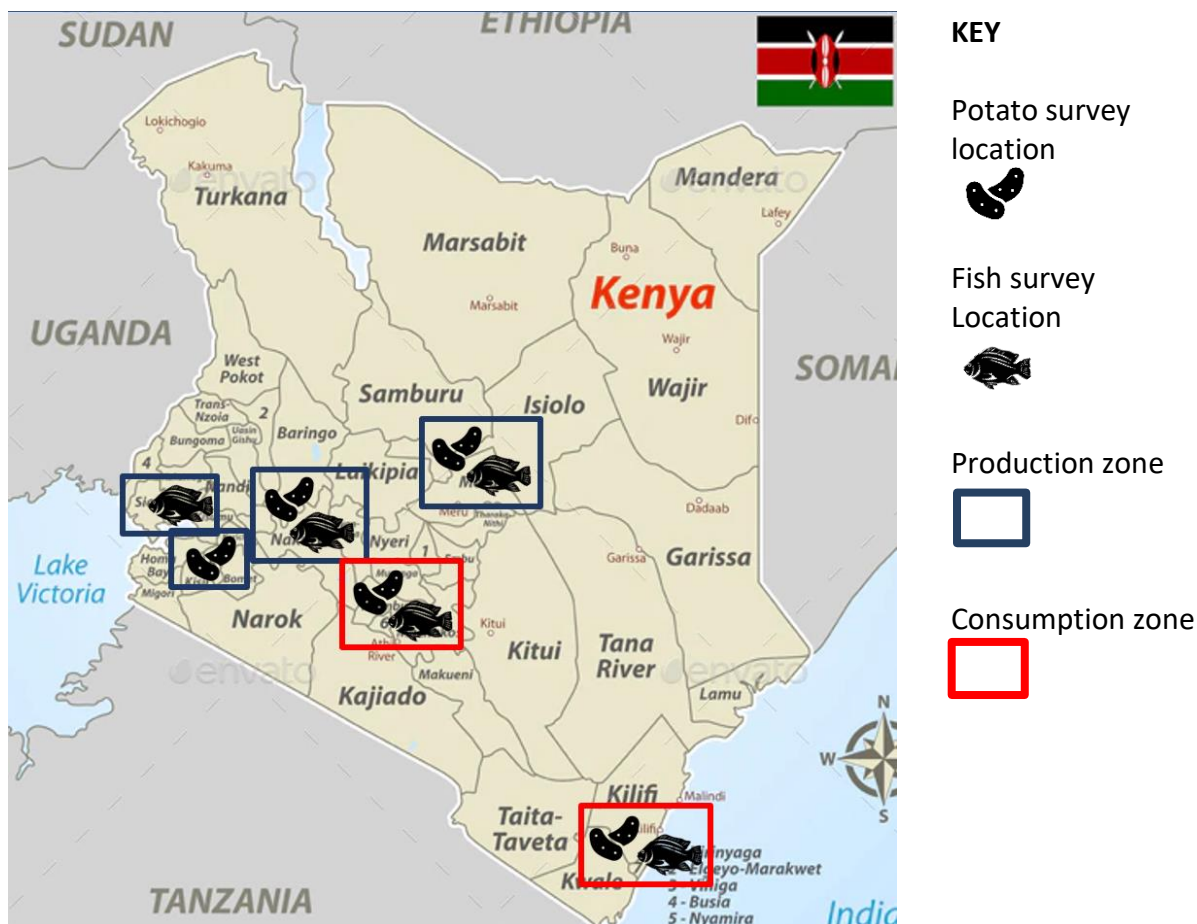


Figure 1 Map of survey locations

The survey was designed to investigate the short- and longer-term responses and pivoting strategies deployed by these actors in face of COVID-19 restrictions. This required identifying three periods of time: (1) representing the situation prior to the pandemic; (2) characterized by high level of government-imposed restrictions and short-term coping strategies by value chain actors; and (3) characterized by restrictions still largely in place and emergence of longer-term adaptation to the pandemic.

The Oxford COVID-19 Government Response Tracker¹ was used to identify the restrictions imposed by the Government of Kenya and their stringency level. An adapted version of the Oxford COVID-19 Stringency Index was developed to focus only on the restrictions most relevant to businesses, namely: workplace closure (Oxford category c2), restrictions on gatherings (c4), public transport closure (c5), stay at home requirements (c6) and restrictions on internal movement (c7). The evolution of the calculated Stringency index and weekly COVID-19 cases in Kenya since February 2020 is shown in Figure 2.

¹ <https://www.bsg.ox.ac.uk/research/research-projects/coronavirus-government-response-tracker>

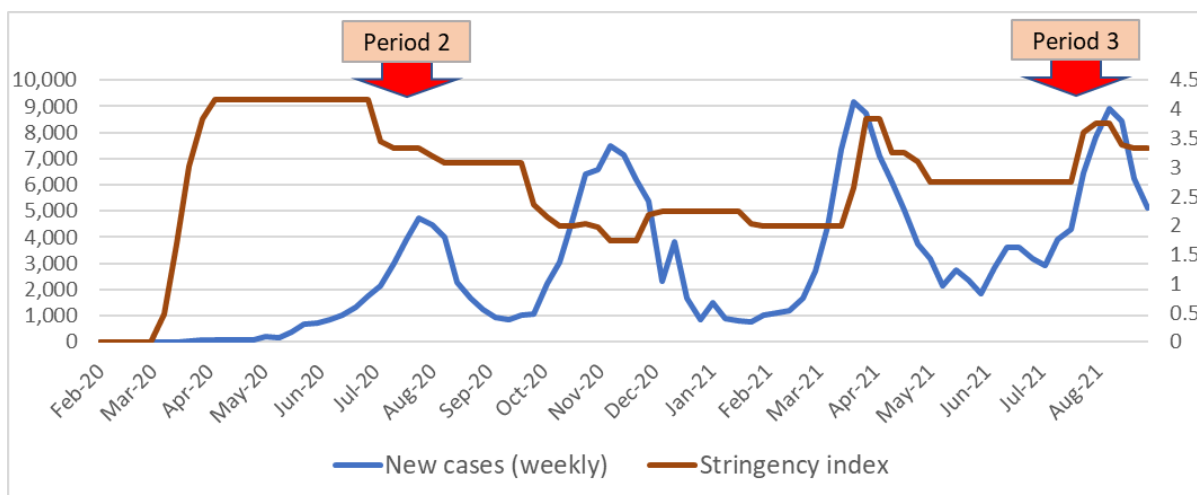


Figure 2 Reported COVID-19 cases, stringency of restrictions and surveyed periods

Furthermore, we considered the issue of seasonality. Unlike fish, the potato value chain in Kenya is characterized by high seasonality in production and marketing because storage is extremely limited, and the majority of farmers sell their potatoes immediately after harvest. Potato is typically harvested twice a year, with some limited off-season production occurring in swamps, valley bottoms and irrigated areas. July-August and January-February are the main production and marketing seasons (Figure 3). In contrast, seasonality for fish is determined more by demand than supply. Fish is generally available year-round, thanks to aquaculture initiatives, with demand peaking around key holidays and festivals.

	J	F	M	A	M	J	J	A	S	O	N	D
Short Rain	H	H								P	P	
Long Rain			P	P			H	H				
Irrigated	P	P			H	H		P	P		H	H

Note: P = Planting; H = Harvesting
 Source: CIP, World Potato Atlas (Kenya)

Figure 3 Potato cropping calendar in Kenya

The best period to investigate the immediate responses of traders and processors to the pandemic was deemed July 2020, when government restrictions were strictly enforced, although below their initial peak, and the first potato season after the COVID-19 emergence was in full swing. In order to limit the effect of other seasonal factors and allow comparability, the same month of the previous year (2019) was considered as base period representing the pre-COVID situation while July 2021 was chosen to explore whether the value chain actors and functions had bounced back from the initial shock and to identify longer-term adaptation strategies. Therefore, the survey focused on three recall periods: July 2019 (Period 1), July 2020 (Period 2), and July 2021 (Period 3).

A structured questionnaire consisting of both open- and closed-ended questions was administered to respondents through Computer-Assisted Phone Interviews (CATI).² Data were analyzed using the statistical package STATA.

² The survey was administered through the KoBo® Toolbox by enumerators hired by NPCK, MU and KMFRI. The research protocol and the questionnaire were reviewed and received ethical approval by the Institutional Research Ethics Committee (IREC) of the International Livestock Research Institute (ILRI). Prior to the interviews, each respondent was informed about the purpose of the study, the scope of the interview, and confidentiality issues. Consent was sought for each respondent before participation. All interviews were conducted in local languages for ease of comprehension. Responses were checked daily by a supervisor to ensure accuracy and consistency.

4. Results and discussion

4.1 Key characteristics of traders and processors

Table 1 summarizes characteristics of surveyed (1) small traders; (2) wholesalers; (3) small processors; (4) medium/large processors for both value chains. The fish sample did not contain any medium/large processors. Distinctions between each category of an actor in the potato value chain are well defined, whereas fish value chain actors often combine multiple partially overlapping roles (e.g. serving as both small traders and processors). For example, in the potato value chain, small traders appear to serve primarily as rural collectors in the main potato production zones, whereas in the fish value chain small traders are found in both production and consumption zones, and are often involved in retail sales, alongside other activities.

As noted above, the survey was designed to cover three production zones each for fish (Nakuru, Meru, Kisumu) and potato (Nakuru, Meru, Bomet), and two consumption zones, the major cities of Nairobi and Mombasa. Mombasa is also an important supply side location in the fish value chain. In the potato sample, small traders are located exclusively in the three production zones, whereas wholesalers and processors of all sizes are concentrated mostly in urban areas. In the fish value chain, the pattern of the spatial distribution of actors is more variable. Small traders are most concentrated in Mombasa, whereas wholesalers and processors are best represented in production zones.

Most actors in the sample are located in either urban or peri-urban areas. As expected, in both value chains, small traders are the most well represented actors in rural areas, but only 29% of small potato traders and 12% of small fish traders operate from a rural base, and the majority have peri-urban trading bases (60% and 51%, respectively). Also as expected, wholesalers tend to be concentrated in urban settings (home to 54% of potato and 73% of fish wholesalers). Medium/large potato processors are also predominantly urban (77%).

The two value chains have distinct gender characteristics. The potato value chain is consistently male dominated in all nodes (72% male overall, ranging from 69% to 76% per node). The opposite pattern is apparent in the fish value chain, where 65% of actors are female. It is noteworthy, however, that women are most heavily represented among small traders (79%) and least represented among wholesalers (56%) suggesting somewhat lower relative levels of representation in higher value roles.

There are relatively few youths (aged 29 or under) in the midstream of either chain, but the average age of fish value chain actors skews somewhat lower than that of actors in the potato supply chain. Three percent of potato value chain actors are aged 29 or under, as compared, 15% of those in the fish value chain. The most common age bracket in both chains is 40-49, accounting for over one third of all respondents.

Table 1 Summary of respondent characteristics, by value chain and segment

		Potato					Fish			
		Small trader	Wholesaler	Small processor	Med/large processor	Overall	Small trader	Wholesaler	Small processor	Overall
Respondents										
Respondents (n)		175	130	143	70	518	140	138	141	419
Respondents (%)		34	25	28	14	100	33	33	33	100
Counties										
		Focus chain								
Production mainly										
Nakuru (%)	Pot. and Fish	30	15	18	16	21	24	38	16	26
Meru (%)	Pot. and Fish	31	14	16	23	21	16	4	25	15
Bomet (%)	Potato only	39	7	8	13	19	-	-	-	-
Kisumu (%)	Fish only	-	-	-	-	-	5	30	30	22
Consumption mainly										
Nairobi (%)	Pot. and Fish	0	31	36	16	20	13	23	16	17
Mombasa (%)	Pot. and Fish	0	33	22	33	19	42	7	14	21
Location										
Urban (%)		11	54	43	77	40	36	73	58	56
Peri-urban (%)		60	40	55	23	49	51	25	33	36
Rural (%)		29	6	2	0	12	13	3	9	8
Gender										
Female (%)		29	25	32	24	28	79	57	61	65
Male (%)		71	75	69	76	72	21	44	39	35
Age range										
Age 20-29 (%)		5	2	3	0	3	11	15	17	15
Age 30-39 (%)		25	13	18	11	18	30	34	28	31
Age 40-49 (%)		29	42	35	49	37	42	33	33	36
Age 50-59 (%)		27	28	27	17	26	11	16	18	15
Age 60+ (%)		14	15	17	23	16	6	1	4	4

Table 2 Characteristics of products processed by potato value chain actors, by year

Main product forms traded (%)	Small processor			Medium-large processor		
	2019	2020	2021	2019	2020	2021
Washed and peeled whole potato	12	12	14	7	9	7
Washed and peeled chopped/sliced potato	6	7	7	0	5	1
Chilled ready-cut chips	10	8	7	16	14	13
Frozen ready-cut chips	4	6	6	3	5	10
Fried chips	59	57	56	10	12	9
Crisps	10	11	10	61	52	57
<i>Number of respondents</i>	143	120	143	3	3	3

Table 2 presents the details of the main product forms traded by small and medium/large-scale potato processors, by year, from 2019-2021. We do not present details of product form traded by small traders and wholesalers as all dealt exclusively in raw, unprocessed potatoes in all years. Smaller processors dealt mainly with fried potato chips (“French fries”), whereas larger processors dealt mainly with fried potato crisps. The share of respondents reporting each product form as the main one traded varied little by year, suggesting that switching to new product forms was not widely adopted as a pivoting strategy.

Actors in fish value chains traded a wider variety of products than those in the potato value chain, in terms of species, product form, and product source (Table 3). However, like potato value chain actors, there was little change in the main reported product types, forms, and sources over the three survey recall years, suggesting that these decisions are relatively ‘locked in’ by factors such as local availability of supply, and the embeddedness of actors in existing networks, and are thus rarely subject to pivoting behavior.

While the table reveals little temporal variability, it does underline the diversity of fish supply, and important differences between value chain segments. Tilapia (sourced from capture fisheries, farms, and frozen imports) is the most common fish traded across all value chain segments. Marine fishes are most commonly traded by small traders, reflecting the concentration of this group of actors in Mombasa on the Kenyan coast. Small processors are most likely to trade Mukene or Omena (small species harvested from freshwater capture fisheries in the great lakes, that are often dried). Wholesalers and processors are more likely to deal with Nile Perch, a high value species harvested from capture inland fisheries than small traders.

Fresh fish are the predominant product form traded by wholesalers (reported by 70% in all years). Wholesalers are also more likely to report trading imported frozen fish (around 20%) than small traders and processors. In contrast, small traders and processors are equally likely to report fresh fish and fried fish as the main product forms traded (a little over 40% each, in each year), with dried/smoked fish the next most important product type (reported as the main product by just over 10%). This points to wholesalers having more access to facilities needed to maintain fresh fish in good condition or deal in frozen fish, whereas small traders and processors are more likely to sell product forms that aid preservation (fried, dried). These figures

also point to a significant overlap in roles between small traders and small-processors, and a relatively low degree of specialization among these actors.

Table 3 Characteristics of products traded by fish value chain actors, by year

	Small trader			Wholesaler			Small processor		
	2019	2020	2021	2019	2020	2021	2019	2020	2021
Main species traded (multiple responses possible)									
Tilapia	47	47	48	70	68	68	65	61	62
Common carp	18	21	22	29	32	30	15	17	16
Nile perch	9	9	9	25	24	22	25	19	20
Mukene/Omena	12	11	10	9	9	8	16	14	13
Catfish	16	11	12	12	12	12	17	21	18
Marine species	35	36	36	7	6	6	20	20	20
Other species	6	4	6	4	5	6	3	3	3
Main product forms traded (multiple responses possible)									
Fresh	41	40	41	70	70	70	44	43	40
Frozen import	6	6	7	21	21	19	2	3	2
Dried/smoked	11	11	11	2	2	2	13	12	12
Deep fried	41	42	41	6	6	8	41	41	46
Live	1	2	1	1	1	1	0	1	1
Source of the main products traded (multiple responses possible)									
Lake fishery	54	57	56	78	79	76	74	75	72
Cage farm	2	2	2	8	8	8	9	10	8
Pond farm	14	10	9	3	5	6	13	14	18
Frozen import	6	9	11	13	12	13	6	2	5
Marine fisheries	27	25	26	8	7	7	17	18	17
<i>N</i>	129	123	121	131	133	135	127	125	136

Lake fisheries are by far the most important source of fish for actors of all types, but particularly for wholesalers (reported by >75%), followed by processors (around 70%). Cage farms (typically large enterprises) are the main source of product for a little under 10% of wholesalers and processors, whereas pond farms (typically small enterprises) are the main source for a little over 10% of small traders and processors. Frozen imports are most important for wholesalers (a little over 10%). Marine fisheries are an important source of fish for small traders who are concentrated in Mombasa, as reported by about 25%, and by processors (around 17%).

4.2 Impacts of COVID-19 restrictions on business operations

Table 4 presents three sets of indicators of the depth of impact of the COVID-19 pandemic on surveyed businesses, by year: the share of businesses operating during July, the mean number of days operated per week, and average volumes traded during those weeks.

The following points stand out:

First at least 15% of businesses in the potato value chain stopped operations during July 2020, with wholesalers most heavily affected, but almost all businesses were operational again in July 2021. In the fish value chain, there was no significant change from 2019 to 2020 in the number of operational businesses, in part because some businesses started trading only in 2020 or 2021, and significantly more of the small processors in the sample operated in 2021 than in 2020 or 2019. This finding may imply that the fish value chain generally has a higher turnover of entrants than the potato value chain.

Second, the number of days operated by businesses in the potato value chain fell by about half in July 2020, compared to 2019. This decline was highly statistically significant, and larger among small traders and wholesalers than processors. The average number of operational days increased significantly in July 2021 for businesses in all potato value chain segments but remained at a lower level than in 2019 (changing from an all-segment average of 5.1 days in 2019 to 2.9 days in 2020, and 3.6 days in 2021). Days of operation for businesses in the fish value chain followed a similar but much less sharply pronounced temporal pattern, dropping from 6 days/week in 2019 to 5.6 days in 2020 (highly significant), and recovering partially to 5.7 days in 2021 (level of significance variable by value chain segment).

A possible explanation for these differences is that the fish value chain is relatively a-seasonal in terms of supply (fish are available year-round), leading to a high degree of specialization in fish related activities, which become a central element in the livelihood portfolios of those involved, whereas the supply of potatoes is highly seasonal, leading actors in the trading segments to enter and exit opportunistically on a temporary basis.

Third, the average quantity of product handled per week during July followed a similar but even more dramatic decline than in the number of operational days per week, indicating that the average quantity traded on an operational day declined alongside the number of operational days. Again, this decline was more acute in the potato value chain than the fish value chain, and more acute among potato traders than among potato processors (Figure 4). The average quantity of potato traded in 2020 across all segments was just 29% of the amount traded in 2019, rising to about half in 2021. More specifically, for small potato traders and wholesalers, the amount traded in 2020 averaged only around 15% of 2019 levels, whereas for processors the reported amount was around 40%.

Table 4 Business operations and trade volumes during July 2019, 2020, and 2021

	Potato						Fish					
	2019	2020	2021	Diff 1	Diff 2	Diff 3	2019	2020	2021	Diff 1	Diff 2	Diff 3
Actors operating business (%)												
Small trader	100	85.1	98.3	0.000***	0.000***	0.082*	92.1	87.9	86.4	0.232	0.721	0.122
Wholesaler	100	76.9	100	0.000***	0.000***	No Diff	94.9	96.4	97.8	0.555	0.473	0.198
Small Processor	100	83.9	100	0.000***	0.000***	No Diff	90.1	88.7	96.5	0.699	0.013**	0.033**
Med/lg processor	100	82.9	100	0.000***	0.000***	No Diff	-	-	-	-	-	-
Mean days operated/week												
Small trader	4.1	2.0	2.5	-17.54***	8.26***	-15.67***	5.6	5.3	5.6	-4.78***	1.79*	-2.30**
Wholesaler	5.1	2.3	3.2	-21.45***	7.89***	-18.39***	6.2	5.8	5.7	-4.42***	-0.68	-4.27***
Small Processor	5.5	3.3	3.9	-13.95***	7.79***	-15.22***	6.1	5.6	5.8	-3.99***	3.01***	-2.33**
Med/lg processor	5.8	4.0	4.6	-8.73***	4.71***	-0.89***	-	-	-	-	-	-
Quantity of product sold/processed (tons per week)												
Small trader	8.9	1.2	2.6	-10.94***	5.69***	-12.08***	0.55	0.39	0.34	-1.01	-0.56	-1.92*
Wholesaler	22.9	3.6	7.3	-10.62***	10.35***	-10.79***	3.61	1.82	1.49	-1.91*	-0.59	-3.45***
Small Processor	8.1	3.6	4.5	-9.37***	8.31***	-8.37***	4.14	1.90	1.55	-1.02	-0.20	-1.63
Med/lg processor	50.1	17.8	29.5	-11.28***	5.31***	-12.25***	-	-	-	-	-	-

Notes: ***, ** and * indicate statistical significance at 1%, 5% and 10% levels, respectively

Diff 1 represents the difference between 2020 and 2019; Diff 2 represents the difference between 2021 and 2020; Diff 3 represents the difference between 2021 and 2019; No Diff means there was no difference

For *actors operating business*, Diff 1-Diff 3 are p-values from two sample tests of differences in proportions

For *mean days operated/week* and *quantity of product sold/processed*, Diff 1- Diff 3 are t-values from paired t-tests

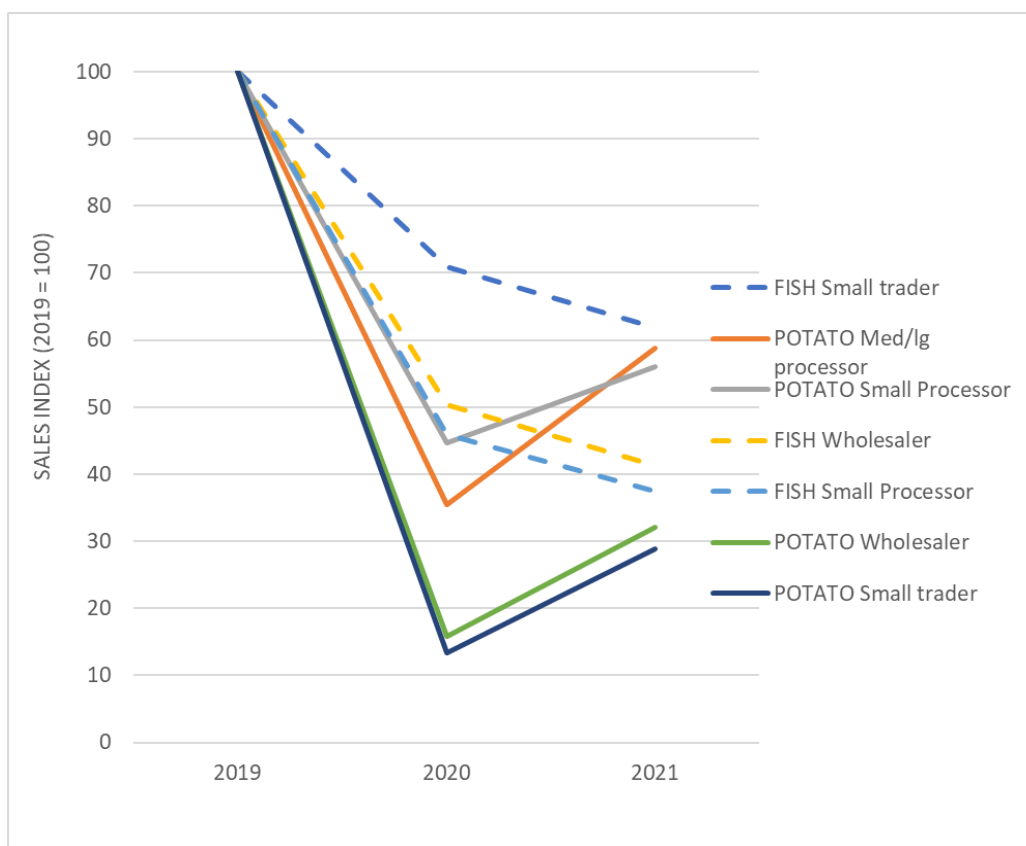


Figure 4 Index of sales volume, by year and actor (2019 = 100)

Actors in the fish value chain experienced an average drop in sales of around 50% in July 2020, relative to July 2019. However, this decline was only weakly statistically significant for wholesalers in 2020. Sales declined further in 2021 for all three actor types. The difference between sales volumes in 2021 and 2019 was highly significant for wholesalers, and weakly significant for small traders, indicating a prolonged deterioration in business conditions.

In both value chains a large majority of actors in all segments who reported a change in sales in 2020 relative to 2019, or 2021 relative to 2020, reported that the COVID-19 pandemic was the main reason (around 75%), or a contributing reason (20-25%), while very few reported that the pandemic was not a factor.

4.2 Impacts on prices

Figure 5 depicts a price index for the average purchase prices of potatoes and fish by traders and processors, where all 2019 purchase prices are normalized to a base value of zero, and prices in 2020 and 2021 represent the percentage point change in purchase prices relative to the base year. Several patterns are apparent:

First, purchase prices for potatoes fell sharply in July 2020 relative to July 2019. Small traders and wholesalers experienced the largest drop in the price of purchased potatoes

in 2020 (33%). The relative change in purchase prices reported by processors was somewhat lower than reported by traders (small 28%; medium/large 21%), suggesting that lower prices at source were not passed on entirely to buyers, perhaps as a result of elevated costs of doing business, particularly related to transport. Low purchase prices paid by small traders, which source most of their product directly from farmers, would also equate to low farmgate prices. Prices recovered somewhat in 2021 relative to 2020 but were still well below 2019 rates – a difference of 26% for small traders, and around 10% for both types of processors, with wholesalers intermediate. These results suggest that in 2021 the profit margins of potato wholesalers and processors might have squeezed relative to small traders in an attempt to secure their supplies following the major shock in the previous year.

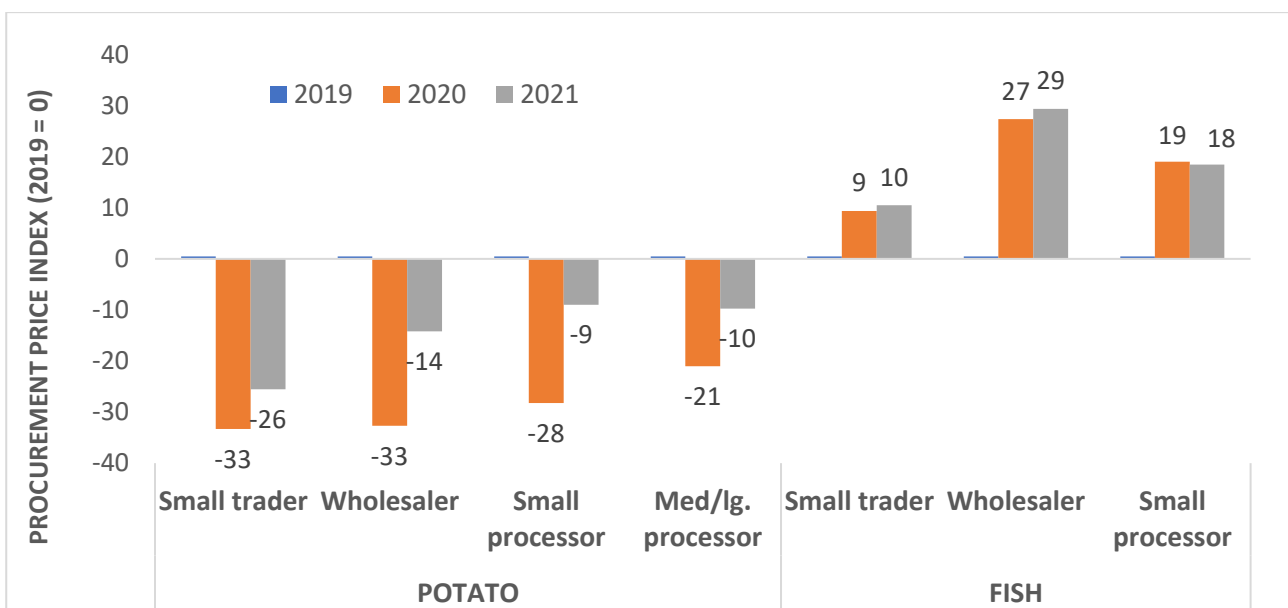


Figure 5 Potato and fish procurement price index 2019-2021, by value chain node (2019=0)

Second, purchase prices for fish increased sharply in July 2020 relative to July 2019 and were even higher in July 2021. This pattern was consistent across almost every species of fish traded, and for value chain actors of all types. Prices paid in 2020 increased most for wholesalers (27%), least for small traders (9%), and at an intermediate level for processors (19%). This scenario may suggest that producers benefitted less from increasing prices (of fish), or were more affected by declining prices (of potatoes), than actors further down the chain. However, while fish producers appear not to have benefited from higher prices received by midstream actors, it is possible that elevated costs of doing business, including higher transport costs, account for much of the apparent disparity.

Third, the divergent pattern in prices for the two sets of commodities may be explained by differences in seasonality, and by differences in COVID-19 containment measures affecting their respective value chains. The sharp drop in potato prices is likely linked to the coincidence of a seasonal peak in supply that occurs around July, coupled with a

combination of more limited market access due to transport and mobility restrictions, and lower consumer demand linked to these restrictions and their income effects. This combination likely resulted in a temporary surplus of potatoes, perhaps heightened by limited access to cold storage facilities, pushing down prices. In contrast, in the case of fish, curfews prevented fishing activities at night, which is normally the most preferred fishing time, and imports of fish by sea from China were disrupted temporarily (Love et al, 2020). Our survey data also indicate that overland trade from Uganda was also interrupted. These factors most likely contributed to constrained supply, even relative to lower demand, pushing up average fish prices.

4.3 Market concentration

The Gini coefficient is an index of inequality, with a value ranging from zero (complete equality) to 1 (complete inequality). We calculated the Gini coefficient of the total volume of sales made by actors in each surveyed node in the potato and fish value chains in July 2019, 2020 and 2021, as a proxy for the degree of market concentration, where a higher Gini coefficient value signifies a higher degree of concentration.

We hypothesized that sales among actors in each value chain node might become more concentrated following the shock of the pandemic. We assumed that larger actors might possess advantages (e.g., greater working capital, closer connections with the authorities, geographically more diverse supply networks, greater digital literacy and access to transport and digital platforms). Such advantages could take on increased significance under a shock like COVID-19, affording businesses in possession of them greater resilience and allowing them to capture a growing share of the market, even if the total volume of sales made by each business declined. The following points stand out from Table 5:

First, fish value chains are much more concentrated (as indicated by the Gini coefficient of sales) than potato value chains, in all surveyed years and nodes. We believe that this finding reflects a higher degree of heterogeneity in the roles of fish value chain actors than is observed in the potato value chain. Fish value chain actors are observed to perform multiple overlapping roles (e.g., processor + wholesaler, or broker + retailer). This may translate into fish value chain actors operating across a wider range of scales per node than actors in the potato value chain, and hence more uniformity and a lower level of market concentration per node among the later.

Second, although there is some variation across nodes and by year, the general direction of the trend in both value chains is toward greater concentration in the wake of COVID-19, as compared to the period prior to the pandemic. Considering the average Gini coefficient for 2020 and 2021, three out of four potato value chain nodes became more concentrated over time – an average increase of 8%, and two out of three fish value chain nodes became more concentrated, by an average of 4%. The highest rates of market concentration were observed among potato processors and small fish traders. The reasons for these differential trends per node and chain are not known.

Table 5 Potato and fish sales volumes and Gini coefficients of sales, by year and value chain node, 2019-2021

Actor	Number of respondents			Total quantity sold (t/week)			* Gini index of sales [0-1]		
	2019	2020	2021	2019	2020	2021	2019	2020	2021
POTATO									
Small trader	175	149	172	1562	177	441	0.51	0.51	0.57
Wholesaler	130	100	130	2929	359	940	0.47	0.48	0.40
Small processor	143	120	143	1148	430	643	0.40	0.65	0.56
Med/lg processor	70	58	70	3449	981	2008	0.24	0.36	0.37
FISH									
Small trader	126	120	118	60	37	34	0.78	0.84	0.79
Wholesaler	130	127	133	461	224	180	0.80	0.86	0.81
Small processor	123	122	131	517	193	206	0.95	0.95	0.95

4.4 Pivoting in response to COVID-19 related disruptions

We hypothesized a variety of pivoting behaviors that businesses might adopt to overcome disruptions to their operations arising from COVID-19. These included: changing the locations to or from which products were sold or sourced; sourcing from or selling to new types of suppliers or buyers; changing the mode of transport used for pickup or delivery; making contracts and selling agreements; and, increasing the use of information and communication technologies (ICT). We discuss findings regarding these and other adaptive behaviors in the subsections below.

4.4.1 Changes in procurement and distribution

In this subsection we examine trends in the share of products sourced and sold, by location of purchase or sale.

In potato and fish production zones (Bomet, Kisumu, Nakuru, Meru) most businesses sourced most of their product locally (i.e., from the same county the business was based in). This pattern is particularly apparent in the potato value chain, reflecting the highly clustered nature of potato production. In consumption zones (Nairobi, Mombasa) a comparatively greater share of product was procured from non-local sources, consistent with their role as demand centers (Figure 6).

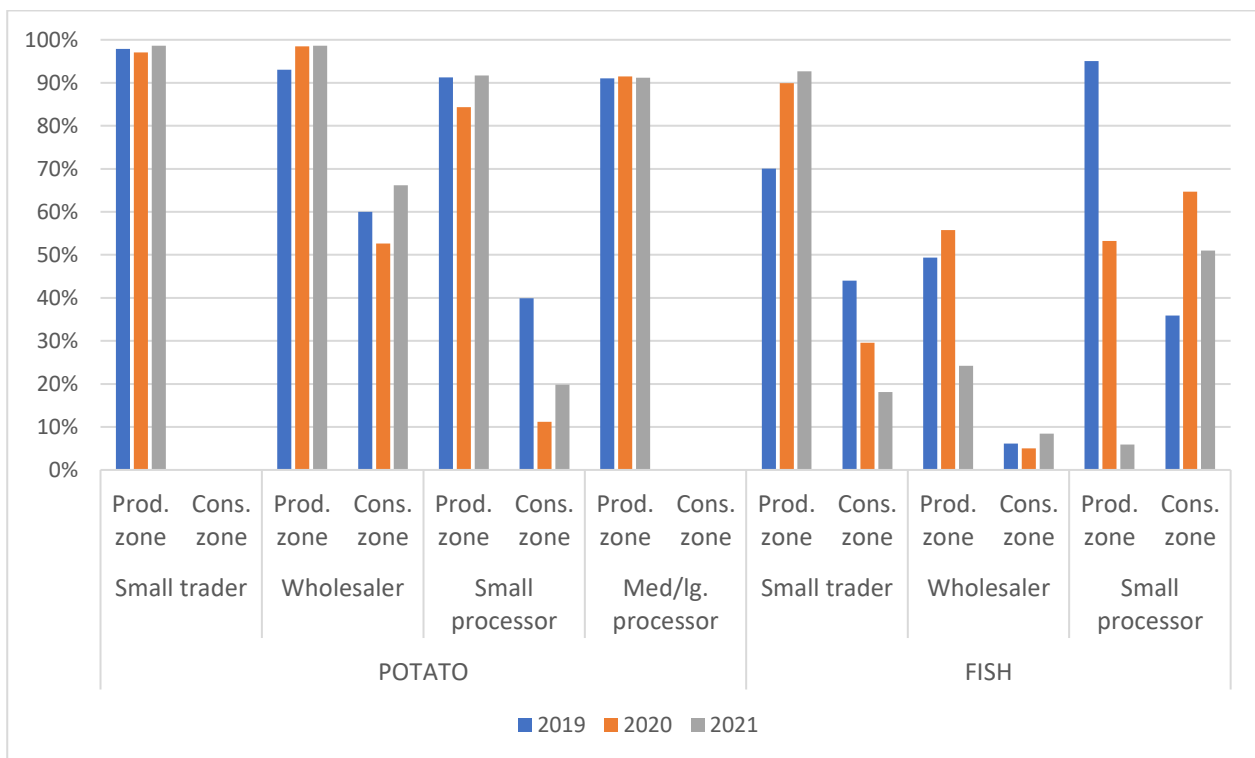


Figure 6 Share of traded product (% of total volume) purchased from local sources, in production and consumption zones, by actor type, and value chain

In the potato value chain, the locations product was sourced from did not change much between years for most actors, particularly those in production zones. Small potato traders, wholesalers, and processors of all sizes in production zones sourced most of their product locally, in all three years. No small potato traders operated in consumption zones and no medium/large processors in these two large cities procured locally. The share of potatoes sourced locally by small processors in consumption zones dropped sharply from 40% in 2019 to 11% in 2020 and remained below 20% in 2021. The reasons for this pattern are not clear but we can hypothesize a relative increase in direct purchase from production areas and reduced reliance on intermediaries based in Nairobi and Mombasa. In the fish value chain, sourcing locally was also more common in production zones than consumption zones, as expected. However, as in the potato value chain, there was no clear tendency to source greater or lesser shares of product locally.

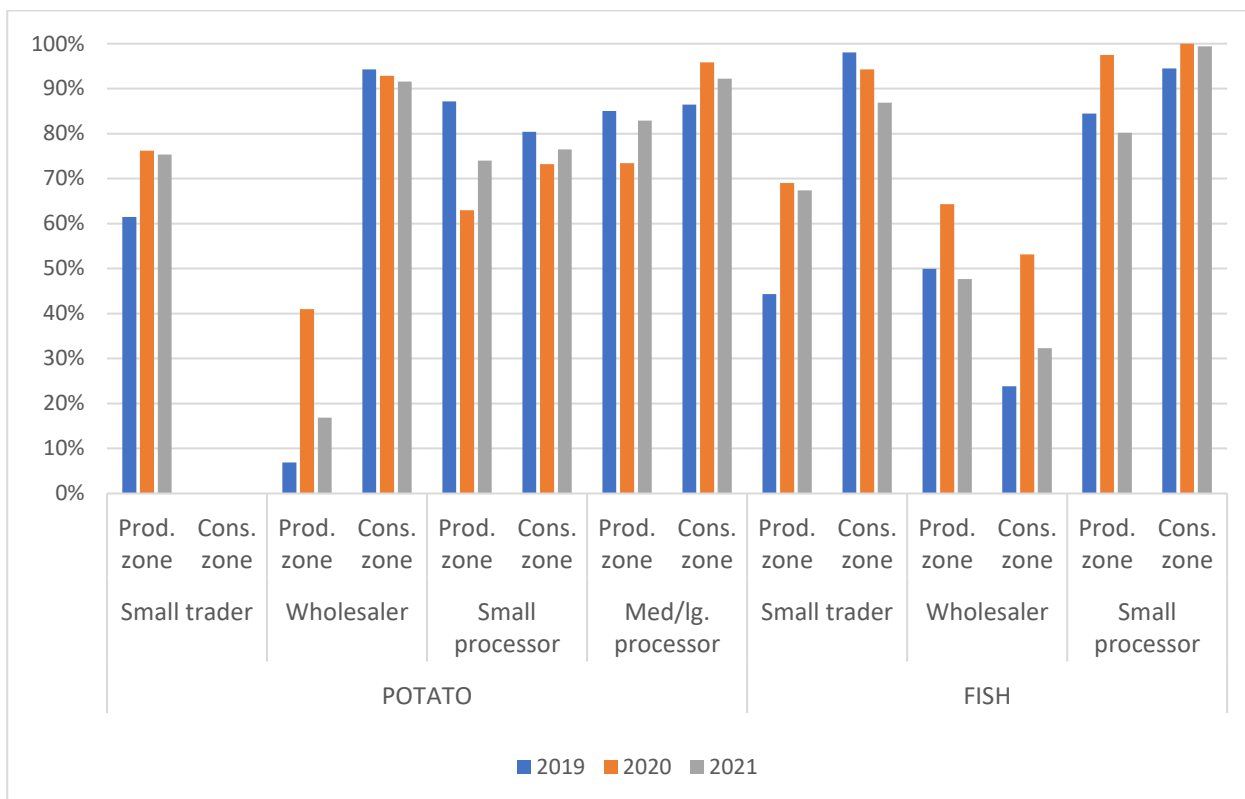


Figure 7 Share of traded product (% of total volume) sold to local locations, in production and consumption zones, by actor type, and value chain

With regard to the geographical distribution of sales, small traders and processors of fish and potato sold most of their product locally in almost all years (Figure 7). This pattern is particularly clear in consumption zones. In production zones, there was a tendency for small traders and wholesalers in both value chains to have disposed of more product locally in 2020, as compared to 2019, with the share of product sold locally rising approximately 15 and 30 percentage points, suggesting that transport restrictions impacted the ability to access more distant markets.³

This is confirmed by the responses of actors in all nodes of both value chains, who consistently reported that accessing transport became more difficult and more expensive in 2020 compared to 2019. Accessing transport generally became somewhat easier in 2021 compared to 2020, but was more difficult on average than in 2019, and remained more expensive than in 2019. There was a tendency toward using smaller

³ It is important to note that these results are highly aggregated and do not allow to ascertain whether the change in geography (share of local vs distant procurement/sale) was determined by an actual pivoting of the actors or rather by the fact that actors which had a certain behavior could have been more (or less) impacted by COVID-19 and related restrictions. In other words, an increase in local sales might not be necessarily due to the actors pro-actively changing their strategy towards more local sales but, instead, by actors which were already selling locally being better able to maintain their business operating than other actors. Therefore, while we could identify certain level of pivoting at meso-level, we need additional analyses to reach meaningful conclusions about pivoting at individual level.

vehicles in 2020 than 2019, consistent with the lower volumes of goods traded, and perhaps with more limited access to larger vehicles making long distance trips, or more limited need for larger vehicles, given the partial pivot toward more localized sales.

Figure 8 underlines the interrelatedness of impacts at each node of the value chain. Between 80% and 100% of businesses in all nodes and both chains reported that their sales had been affected by the impacts of COVID-19 restrictions on their clients.

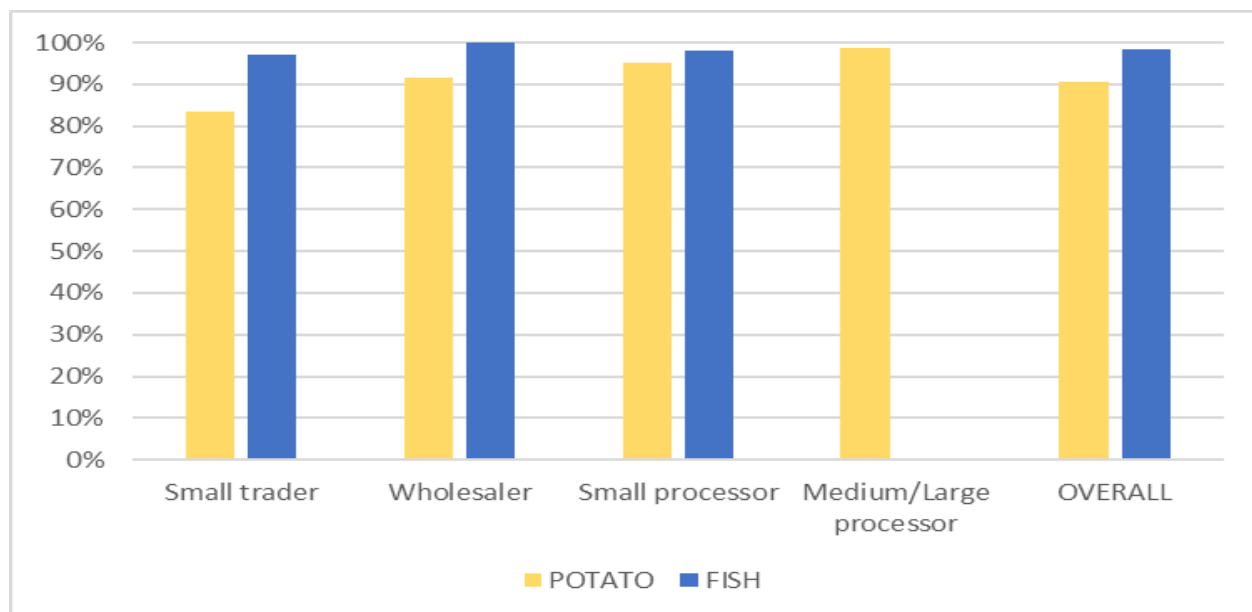


Figure 8 Respondents reporting sales reduction due to the impact of COVID-19 restrictions on clients

4.4.2 Changes in use of formal and informal agreements for procurement and distribution

We investigated whether the pandemic has driven an increase in use of informal agreements and formal contracts in the business transactions of actors with their suppliers and customers for procuring and selling potato and fish products, respectively.

We found that informal agreements with suppliers and customers are less common in the potato than in the fish value chain. Only 13% and 16% of potato actors have ever had an informal contract committing them to buy or sell potato later in the year (Figure 9). This compares with about 40% in the fish value chain (Figure 10). Among the ones who have adopted this practice, the majority of respondents in both chains (54- 62%) indicated that this was not related to COVID-19, implying that they were either already doing it prior to the pandemic or have started/increased this practice during the pandemic but regardless of the pandemic itself. Less than 10% of respondents who reported having used informal agreements had started to do so because of new COVID-19 restrictions, while 30-40% had increased the use of informal agreements because of it. Overall, only a minority of respondents (4-10%) who have started and/or increase the use of informal agreements expect to cease or reduce this practice once the pandemic ends and the COVID-19 restrictions are lifted.

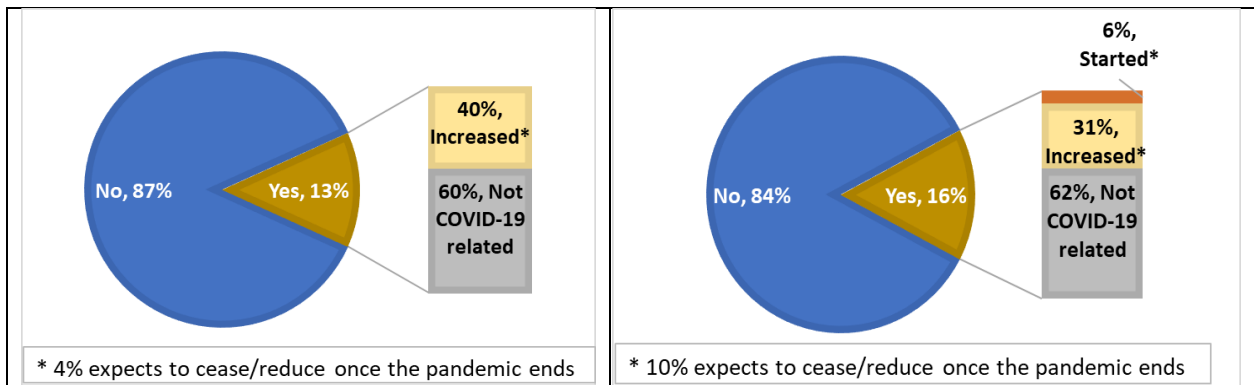


Figure 9 Use of informal agreements with suppliers (left) and customers (right) by potato actors

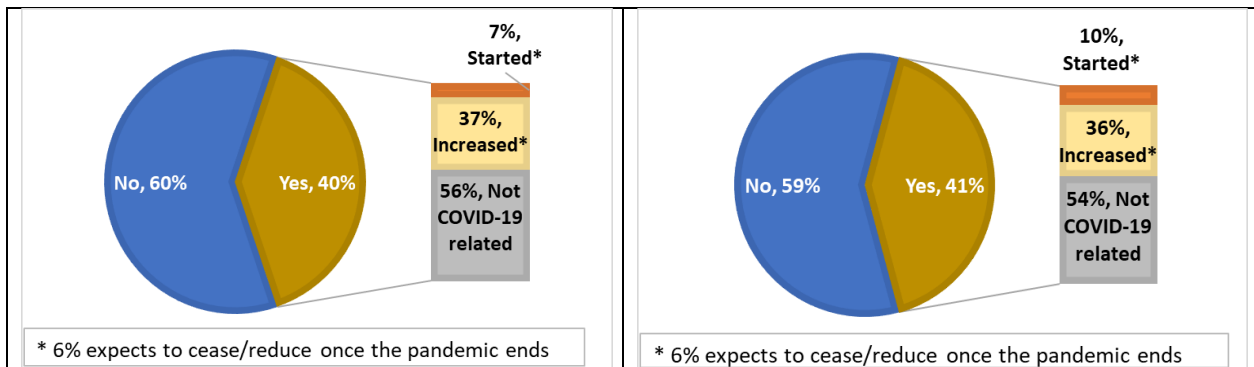


Figure 10 Use of informal agreements with suppliers (left) and customers (right) by fish actors

With regard to formal contracts signed with suppliers and customers, their use is still largely uncommon: only 4-5% and 12-15% of actors have ever used them in the potato and fish value chain, respectively (Figure 11 and 12). In both chains, the vast majority (67-79%) of the actors who reported the use of formal contracts, have not done it in response to the pandemic. Accordingly, between a quarter and one third of them have either started or increased this practice because of the introduction of COVID-19 restrictions, and among those only 20-33% and 6-11% of potato and fish actors, respectively, believe that they will revert to the pre-COVID-19 situation once the restrictions are removed.

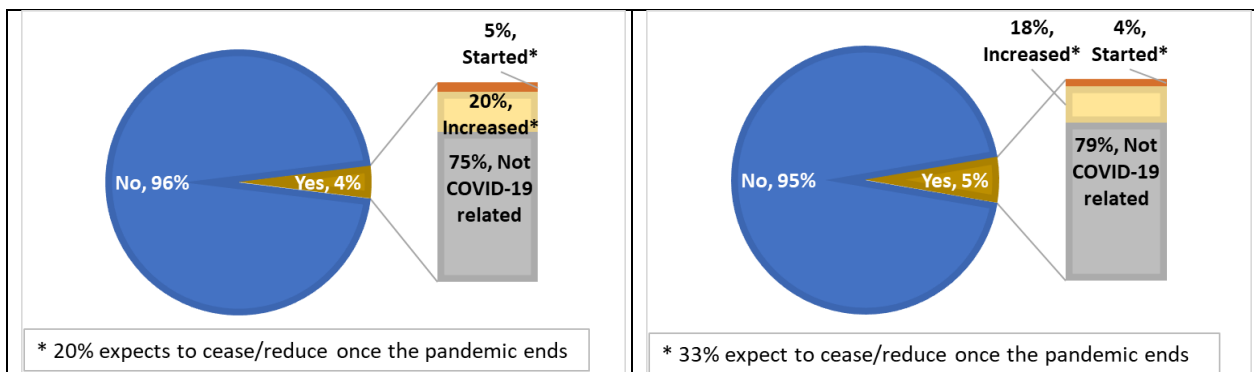


Figure 11 Use of formal contracts with suppliers (left) and customers (right) by potato actors

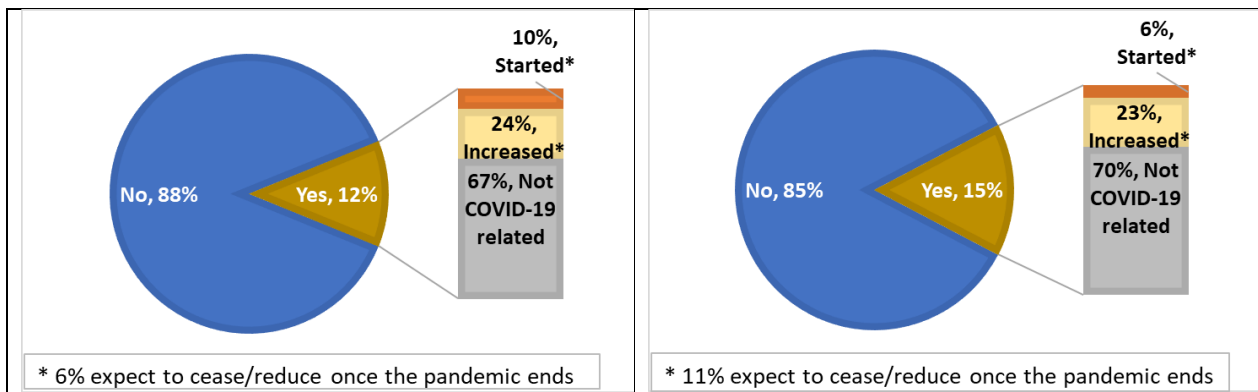


Figure 12 Use of formal contracts with suppliers (left) and customers (right) by fish actors

These results suggest that COVID-19 restrictions have not been a major driver for wider adoption of either formal or informal agreements among value chain actors as a way to secure future supplies and sales. While most transactions in both chains are likely to retain their spot nature in the years to come, the behavior change reported by the actors who initiated or increased the use of these agreements in face of the new government restrictions is likely to be largely irreversible.

Box 1 – Potato formal contracts: did they help maintain the value chain functional?

Contract farming is relatively common only in one of the sampled counties, Bomet, to secure supplies to the local medium-large scale potato crisp processors. While the overall volume sourced by medium-large potato processors dropped by 65% in 2020 and 40% in 2021 compared to 2019 level (see Tab. 4), in the case of Bomet the reduction was less dramatic (35% and 25%, respectively), suggesting that the presence of formal contracts might have helped maintain the access to raw material (for processors) and market (for farmers).

4.4.3 Changes in storage practices

Fish, and to a lesser extent potato, are highly perishable commodities and usually storage of fresh products for the market is extremely rare and limited to a few hours to a couple of days. For instance, in the case of potatoes, farmers store only tubers to be used as seed in the next planting season or ware potatoes for household consumption. Long-term storage of ware potato for later sale (and likely higher price) is almost inexistent in the value chain. Due to the disruption in the chain brought by the COVID-19-related restrictions imposed by the government, some actors might have been unable to sell or move their products. Therefore, besides the spatial dimension and change in geographies (described in Section 3.4.1), we investigated changes in the

temporal dimension of the business transactions. In particular, we looked at possible increases in short- and medium-term storage (defined as the one exceeding 3 days).

We found that 38% and 54% of respondents in the potato and fish value chain, respectively, have stored their fresh products for over three days at least once (Figure 13). However, two interesting aspects clearly emerged. First, 36% of potato actors and 62% of fish actors engaged in such storage had either started or increased this practice because of the pandemic. Second, the change in behavior of these actors is likely to be ephemeral because well over half of them (57-65%) indicated that they plan to stop this practice at the end of the pandemic. Therefore, results suggest that the increase in storage is unlikely to be a deliberate strategic choice, but rather a short-term strategy in face of the difficulty to access the market and which, hence, will likely disappear when the situation normalizes.

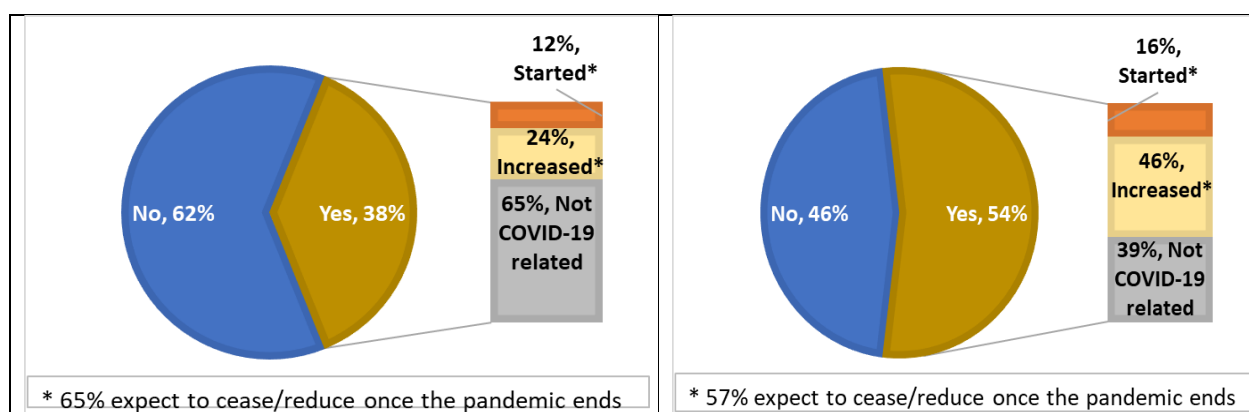


Figure 13 Storage (>3 days) practice by potato (left) and fish (right) value chain actors

4.4.4 Changes in use of ICT tools

The use of the mobile phones for concluding business transactions by call or text is far more common along the fish than the potato value chain (Figure 14 and 15). In the former, about 90% of respondents indicated to have concluded buying or selling transactions by this means; while in the latter only about a quarter of actors have reported so. Among the ones who have indicated to have used phones for business transactions, the majority (with the exception of potato buyers) have started or increased this practice because of COVID-19 restrictions. Given the far larger prevalence of phone usage among fish actors, it is not surprising that most of them reported an increase in this practice while, in the case of potato sellers, the pandemic seems to have led to starting this new practice. It is noticeable that only a small minority (7-10%) of the respondents who started or reported an increase in mobile phone usage due to the pandemic, indicated that they will likely cease or reduce it at the end of the pandemic.

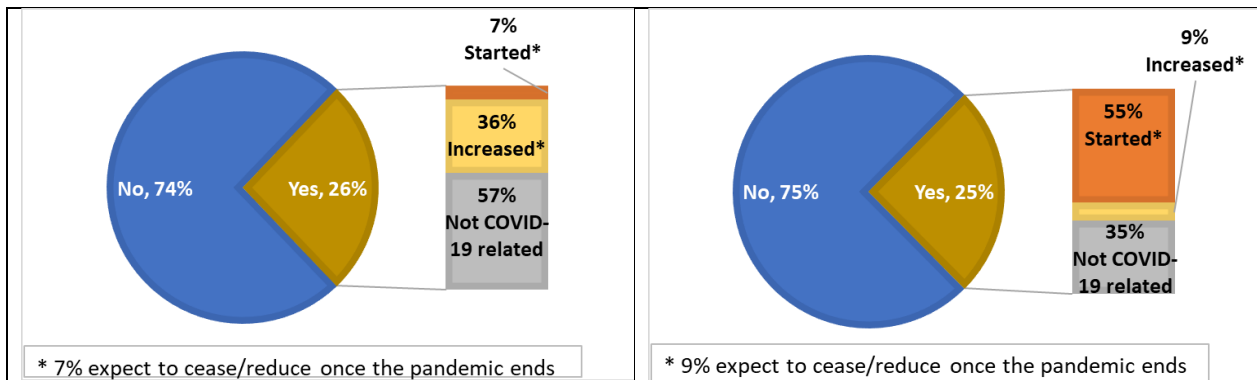


Figure 14 Use of mobile phone for transactions with suppliers (left) and customers (right) by potato actors

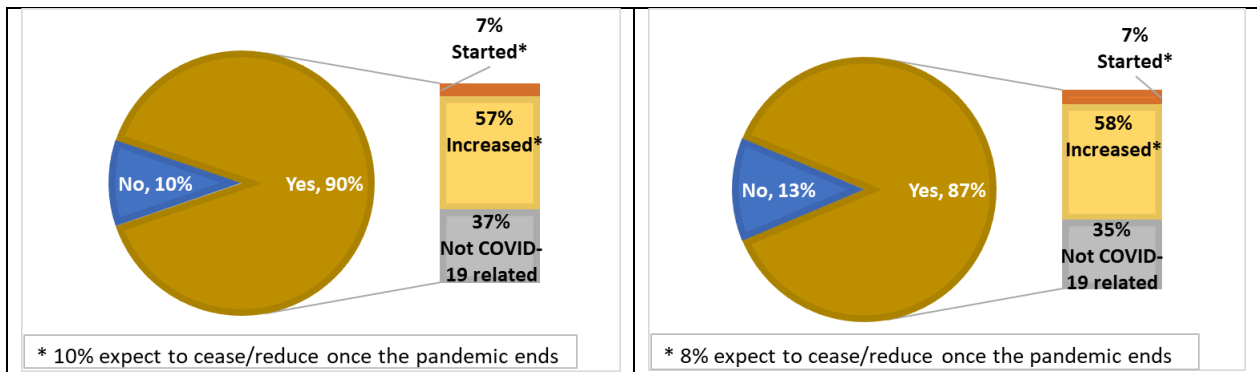


Figure 15 Use of phone for transactions with suppliers (left) and customers (right) by fish actors

Similar findings emerged when looking at the use of internet and social media (e.g., Facebook or WhatsApp) for searching suppliers and customers (Figure 16 and 17). Again, these practices are far more widespread in the fish than in the potato value chain, respectively with about 30% and 5% of actors reporting to make use of these platforms when looking for business partners. In the case of the potato value chain, over 70% of traders who adopted this practice to search for suppliers indicated that this was not related to the pandemic. However, three quarters of the potato adopters indicated to have started and, to a less extent, increased this practice for searching customers because of the challenges brought by COVID-19 restrictions. In the fish value chain, about half of adopters have increased the use of these ICT tools and social media platforms because of the pandemic while some (13-17%) have started this from scratch. Only a minority of the respondents reporting to have started or increased the use of the internet and social media for searching suppliers and customers expect to cease or reduce this practice at the end of the pandemic.

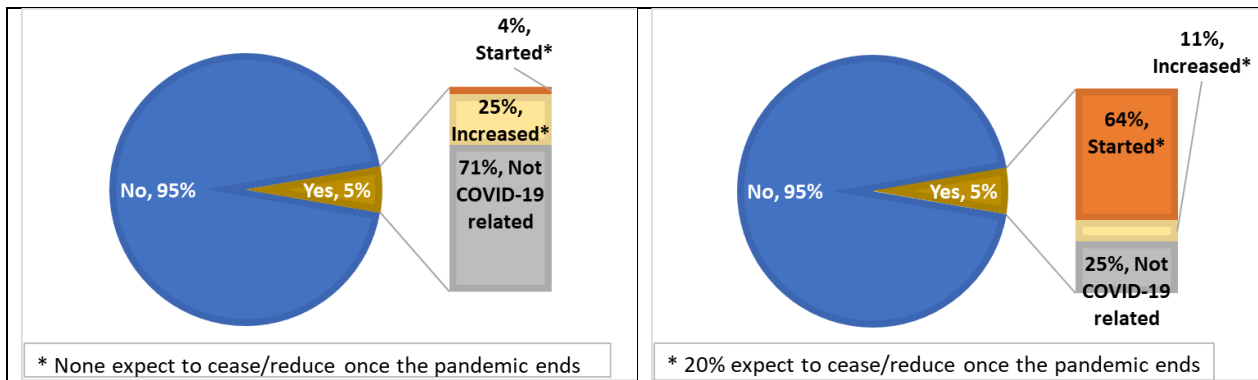


Figure 16 Search for suppliers (left) and customers (right) online or through social media by potato actors

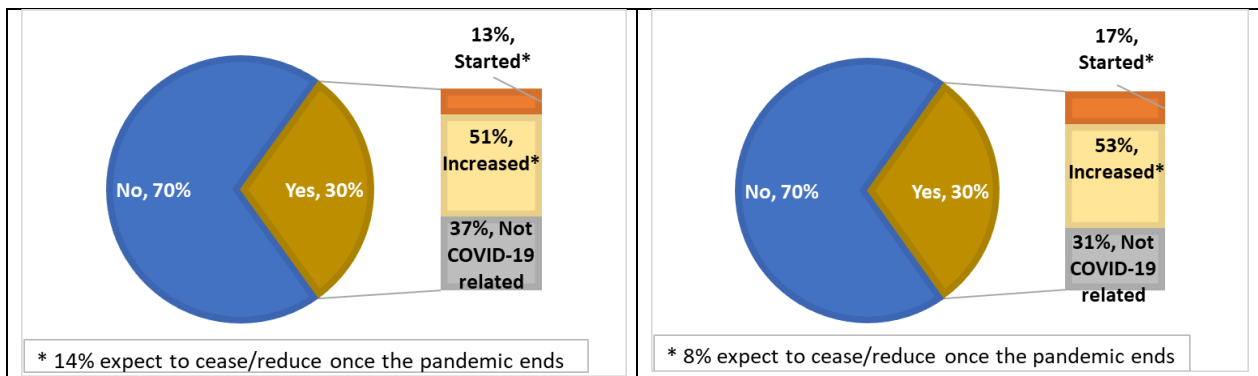


Figure 17 Search for suppliers (left) and customers (right) online or through social media by fish actors

We also enquired whether actual transactions with suppliers and customers have ever been concluded through an online platform or website. While these transactions have been reported by a negligible (1%) share of potato actors, about 20% of fish actors have indicated they use them (Figure 18 and 19). In the case of potato value chain, because of the few observations in our sample, we are unable to draw any meaningful conclusion about the role played by the pandemic in driving the decision of traders and processors to adopt this marketing practice and maintain it over time. Conversely, in the case of fish, most adopters (51-60%) have either started or increased this practice because of the pandemic, and over 90% of them do not plan to reduce or abandon it once the pandemic ends.

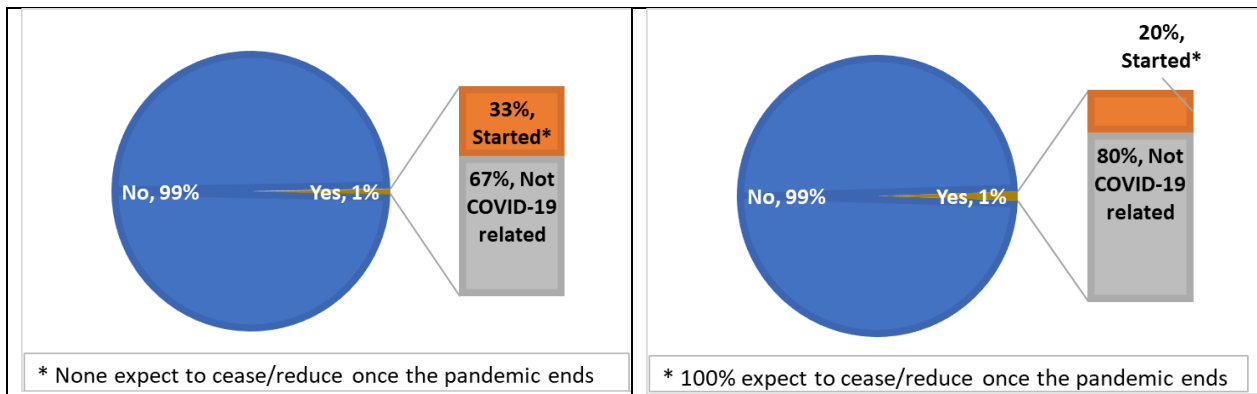


Figure 18 Business transactions concluded with suppliers (left) and customers (right) through an online platform or website by potato actors

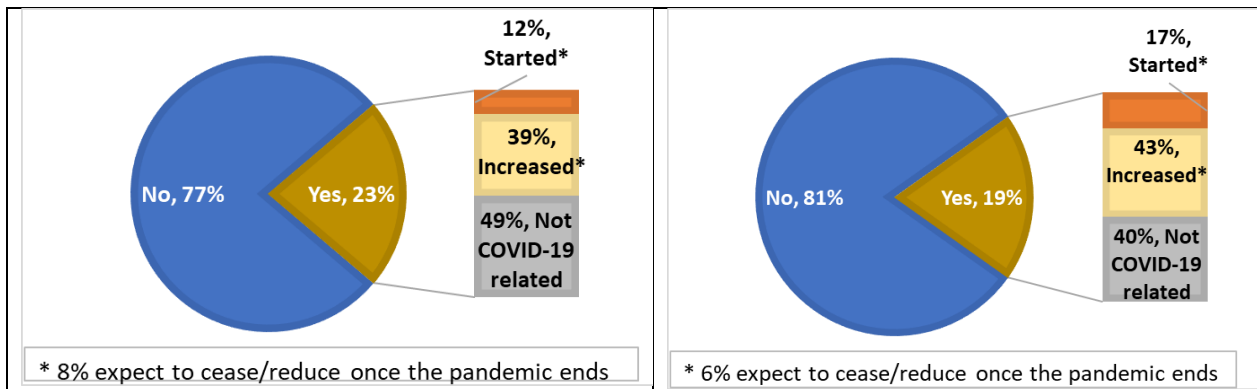


Figure 19 Business transactions concluded with suppliers (left) and customers (right) through an online platform or website by fish actors

Finally, our findings confirm the penetration of electronic payments, such as the M-Pesa (“M” for “mobile”, “pesa” for “money”) mobile phone-based money transfer service, in the Kenyan market.⁴ About 50% and 80% of potato and fish actors, respectively, have used e-payments to send or receive money for finalizing business transactions (Figure 20). Given the spread of e-payments in the country even before the COVID-19 outbreak, it is remarkable that 4% of adopters indicated to have started and 42-65% to have increased the use of these payment methods because of the pandemic. Only a few of them plan to revert to the pre-pandemic situation once the restrictions are completely lifted.

The Kenyan government advised the public to embrace mobile money during the period of acute pandemic. This was aided by waiver imposed on transactions cost for mobile money services. There were no commissions for costs below Ksh 1000. This initiative may have contributed to increased use of mobile money platforms during this period.

⁴ From a small-scale pilot program in 2006, M-PESA has become an outstanding success in Kenya; customer response has been unprecedented. Currently, over 28 million Kenyans use M-PESA to perform tens of millions of transactions every month throughout the country.

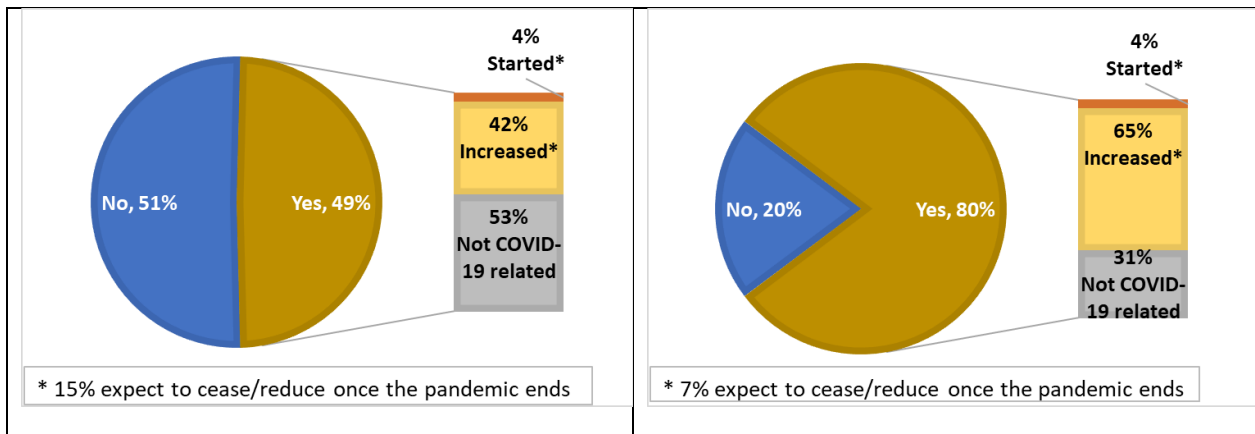


Figure 20 Use of e-payments by potato (left) and fish (right) value chain actors

In summary, the use of ICT tools and associated social media platforms, spanning from the most basic (phones) to the most sophisticated (online sales), seems far more common in the fish value chain than in the potato one. This might reflect the more fragmented nature of the fish chain, characterized by a large number of small actors involved in small business transactions, the unpredictability of supply of fish from capture fisheries which can fluctuate widely from day to day, the highly perishable and high value nature of the product which elevates the level of risk inherent in each transaction and necessitates rapid sales to avoid spoilage, and the more diverse sources of fish products compared to potatoes. All these aspects likely drive a greater need for spatial and temporal coordination among actors in the fish value chain, compared to the potato chain, and thus the use of ICT as a means of reducing transaction costs.

Overall, the pandemic seems to have driven an increase in the breadth and depth of ICT adoption, either by triggering the decision to start (particularly among potato actors) or to increase (particularly among fish actors) the use of these tools, and these changes will not easily revert. While in the long run this might contribute to narrowing the gap between the number of fish and potato adopters, the use of ICT tools will likely remain more extensive among fish traders and processors, at least for the near future.

4.4.5 Other responses to COVID-19 disruptions

Figure 21 shows other specific responses to COVID-19 disruption by traders and processors. In both potato and fish value chains, over 90% of respondents changed their business working hours and almost 40% transported their products over a different or longer route to avoid curfew or travel restrictions. About 70% reduced the number of permanent or seasonal employees in the fish chain, and almost 40% in the potato one. A similar pattern was found with regard to reduction of their salary (60% and 30%, respectively), while only a few indicated an increase in salary. These results suggest the need to reduce workforce costs in face of smaller business turnover, but also likely challenges in accessing labor as many workers might have migrated back to rural areas.

While these responses were largely consistent across the two chains, the mobilization of own savings and assets, and increased use of credit, including value chain financing, for maintaining business operations were far more common in the fish than the potato value chain. We speculate that the higher predisposition to offer and receive cash credit or value chain financing can be explained by underlying long-term relationships and trust within fish value chains, which trade year-round, as compared to the highly seasonal spot market that dominates potato purchases.

Another explanation might relate to the characteristics of the primary production, where fishing activities require continual outlay on daily operating costs (e.g., fuel, labor), as compared to farming where costs tend to be lower and expenditures less frequent (i.e., concentrated particularly around planting and harvesting time). It is commonly observed that credit relations between larger traders, smaller traders and producers are pervasive and persistent in capture fisheries value chains, whereas agricultural credit provision from traders to crop farmers tends to be comparatively limited.

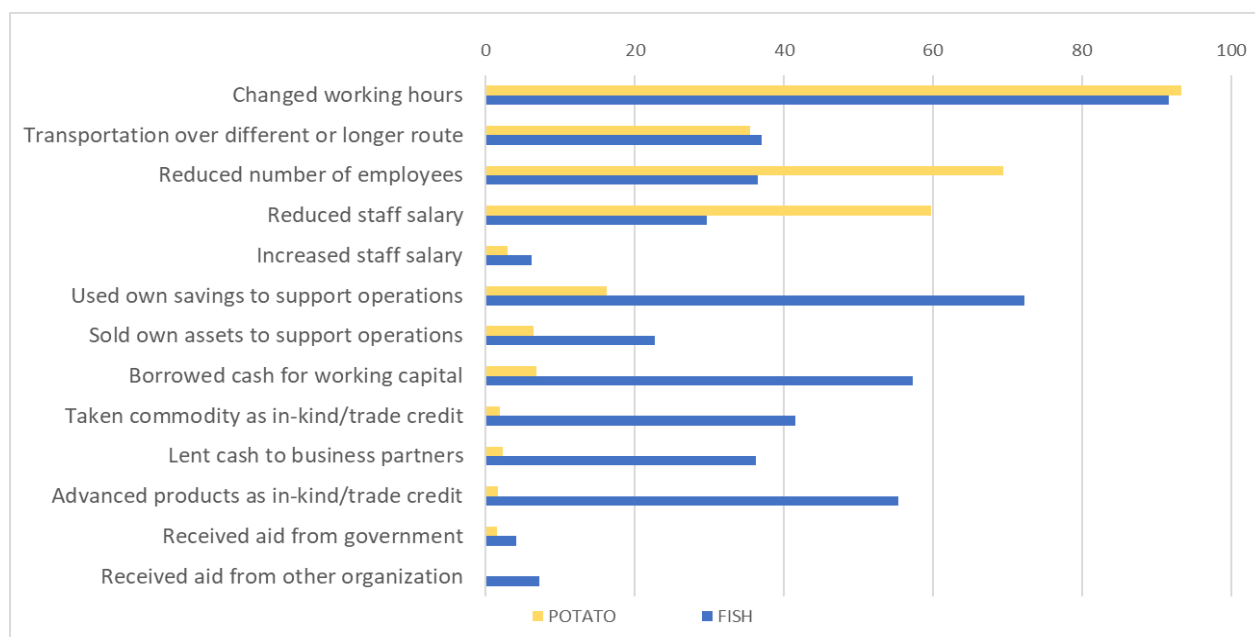


Figure 20 Share of respondents reporting specific responses to COVID-19 disruption

Very limited support has been provided to value chain actors to help them overcome the COVID-19 challenges. Less than 2% and 4% of respondents received aid from the government in the potato and fish value chain, respectively. However, while no actor in the potato chain reported having received support from other organizations, about 7% of fish respondents indicate so. This support was received primarily from Beach Management Units (fisheries co-management organizations) and *chama* (informal micro-savings groups).

In addition, respondents were asked whether payment of bribes to facilitate transport or business operations has increased due to the pandemic. As shown in Figure 21, bribery was more common for actors in the fish value chain than in the potato value chain (reported by 19% and 7% of respondents in each chain, respectively). Fish value chain

actors were also much more likely than those in the potato value chain to report that payment of bribes had started or increased since the onset of the pandemic (as reported by 16% and 45% of respondents in the fish value chain who had paid a bribe, respectively). However, more positively, most respondents who have either started or increased this practice because of the pandemic, believed that this would decline or cease once the pandemic ended (as reported by 67% and 86% of potato and fish value chain actors, respectively).

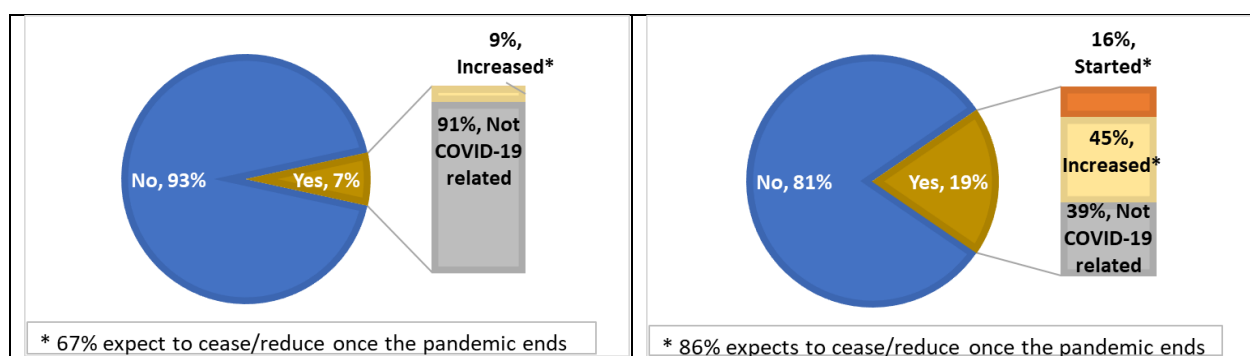


Figure 21 Payment of bribes or other informal payments to facilitate transport or business operations by potato (left) and fish (right) value chain actors

5. Conclusions

- Most businesses survived the disruptions brought by the COVID-19 pandemic and the restrictions imposed by the government of Kenya to limit its spread: at least 15% of businesses in the potato value chain stopped operations during July 2020, with wholesalers most heavily affected, but almost all businesses were operational again in 2021. In the fish value chain, there was no significant change in the number of operating businesses over the observed period.
- In 2020, both the number of days per week in which the businesses operate and the average volume handled on a single day showed a dramatic decline in both value chains. The resulting average drop in volumes handled per week was about 70% compared to 2019 levels for actors in the potato value chain, and about 40% for the ones in the fish value chain. For potato actors, a partial recovery was observed in 2021, with weekly volumes rising to about half of the 2019 level. For fish actors, weekly volume declined further in 2021.
- Change in prices followed very different trajectories in the two value chains. Potato purchasing prices fell sharply in 2020 relative to 2019, with small traders and wholesalers experiencing the largest drop (33%), suggesting that lower prices at source were not passed on entirely to buyers, perhaps as a result of elevated costs of doing business, particularly related to transport. Prices recovered somewhat in 2021 relative to 2020 but were still well below 2019 rates. Unlike potato, purchasing prices for fish increased sharply in 2020 relative to 2019, with wholesalers experiencing the largest increase (27%), and were even higher in 2021. Fish producers appear not to have benefited that much from higher prices received by midstream actors, possibly due to higher costs of doing business, including higher transport costs. These results suggest that producers were more affected by declining prices (of potatoes), or benefitted less from increasing prices (of fish) than actors further down the chain. The divergent pattern in prices for the two sets of commodities may be explained by differences in seasonality, and by differences in COVID-19 containment measures affecting their respective value chains. The sharp drop in potato prices is likely linked to the coincidence of a seasonal peak in supply that occurs around July, coupled with a combination of more limited market access due to transport and mobility restrictions, and lower consumer demand linked to these restrictions and their income effects. In contrast, in the case of fish, the disruption of both fishing activities and imports of fish from China and Uganda likely contributed to constrained supply, even relative to lower demand, pushing up average fish prices.
- In both value chains, despite some variation across value chain nodes and by year, a general trend toward greater concentration was observed in the wake of COVID-19, as compared to the period prior to the pandemic. This might be explained by larger actors possessing advantages (e.g., higher working capital, more diverse supply networks, greater access to transport and digital platforms). which could take on increased significance under a shock like COVID-19, affording businesses in possession of them greater resilience and allowing them to capture a larger market share, even if the total volume of sales made by each business declined. The highest

increase in market concentration was observed among potato processors and small fish traders.

- In both value chains, there was a tendency for the small traders and wholesalers based in production areas to sell a larger proportion of their products locally (i.e., within the same county) in 2020, as compared to 2019, with the share of product sold locally rising approximately 15% to 30%, suggesting that transport restrictions impacted the ability to access more distant markets.
- Actors in all nodes of both value chains consistently reported that accessing transport became more difficult and more expensive in 2020 compared to 2019. The situation improved in 2021 but transport remained less accessible and affordable than prior to the pandemic. This also resulted in a tendency towards using smaller vehicles, consistent with the lower volumes of goods traded, more localized sales, and perhaps more limited access to larger trucks.
- Since the emergence of COVID-19, many value chain actors in both chains have pivoted towards an increased use of informal agreements and formal contracts for their business transactions. Their use remains more widespread in the fish than the potato value chain. Short- and medium-term storage has also shown a sharp increase following the onset of the pandemic.
- Over the last two years, as response to the pandemic, there was also a significant increase in the use of ICT tools and social media platforms for searching and engaging with business partners, and for processing payments. While this was observed in both chains, their use is still much more frequent in the fish value chain.
- With the exception of increased storage, which was primarily a short-term strategy in face of the difficulty to access the market, the vast majority of businesses which have started or increased the adoption of these practices in response to COVID-19 restrictions, indicate that they will continue using them once the pandemic ends. This will likely contribute to enhanced resilience to future supply/demand shocks in both value chains.
- In both potato and fish value chains, over 90% of respondents changed their business working hours and almost 40% transported their products over a different or longer route to avoid curfew or travel restrictions. About 70% reduced the number of permanent or seasonal employees in the fish chain, and almost 40% in the potato one. A similar pattern was found with regard to reduction of their salary (60% and 30%, respectively). These results suggest the need to reduce workforce costs in face of smaller business turnover, but also likely challenges in accessing labor.
- Mobilization of own savings and assets, and increased use of credit, including value chain financing, for maintaining business operations were far more common in the fish than the potato value chain. We speculate that the higher predisposition to offer and receive cash credit or value chain financing can be explained by underlying long-term relationships and trust within fish value chains, which trade year-round, as compared to the highly seasonal spot market that dominates potato purchases. Another explanation might relate to the characteristics of the primary production, where fishing activities require continual outlay on daily operating costs (e.g., fuel,

labor), as compared to farming where costs tend to be lower and concentrated particularly around planting and harvesting time.

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ANNEX A Key characteristics of selected potato production and destination counties

	Nakuru (production mainly)	Meru (production mainly)	Bomet (production mainly)	Nairobi (destination only)	Mombasa (destination only)
Production	2nd largest potato producing county (433,381MT/yr)	6th largest potato producing county (196,000MT/yr)	10th largest potato producing county (26,500MT/yr)		
	Main harvesting season: June-August (season 1)	Main harvesting season: January-February (season 2)	Main harvesting season: June-August (season 1)		
	Larger av. land size and % allocated to potato	Some large-scale farmers	Widespread contract farming with processors		
	A few on-farm stores	Some small-scale irrigation (potato available most of the year)	Higher quality, low yields		
		A few on-farm stores			
Market	>80% of production sold	>60% of production sold	>90% of production sold		
	Main sources of wholesale markets: same geographical area, Narok	Main sources of wholesale markets: same geographical area	Main sources of wholesale markets: same geographical area, Narok	Main sources of wholesale markets: Nyandarua, Narok, Nakuru, Bomet, Meru, Tanzania	Main sources of wholesale markets: Nairobi, Nyandarua, Narok, Nakuru, Bomet, Meru, Bungoma, Tanzania
	Main destination from wholesale markets: Nakuru, Nairobi, Kisumu, Mombasa	Main destination from wholesale markets: Meru, Marsabit, Isiolo, Nairobi	Main destination from wholesale markets: mostly Nairobi, Nakuru	Main destination from wholesale markets: mostly Nairobi, Kitui, Machakos, Garissa, Mombasa, Makeni, Kwale and Kilifi	Main destination from wholesale markets: mostly Mombasa, Kitui, Kwale and Kilifi
		Enforcement of 50kg bag policy in the county (need transshipment in Laikipia town market in Nanyuki county)	>90% of potato delivered to Nairobi sold to crisp processors, rest to SM and upmarket groceries	Nairobi and Mombasa are only markets receiving consignments from Tanzania	Nairobi and Mombasa are only markets receiving consignments from Tanzania
			Some farmers with direct links with market brokers in wholesale markets (if so, arrange transport and receive payment with MPESA)		
Medium/lg processors	Yes	Yes	Yes	Yes	Yes
Main variety	Shangi	Asante	Dutch Robijn	Shangi	Shangi

