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Feed the Future Kenya Crops and Dairy Market Systems Activity

Mango Mid-term Assessment and Learning Report



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DISCLAIMER

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Cover photograph: A farmer stands in front of one of her mango trees. Photo by: KCDMS

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List of Acronyms and Abbreviations

ASNET	Agriculture Sector Network
B2B	business-to-business
BDS	business development services
COVID-19	coronavirus disease 2019
FSP	financial service provider
FY	fiscal year
GEEL	Growth, Enterprise, Employment & Livelihoods
ICIPE	International Center of Insect Physiology and Ecology
ICT	information and communication technology
IPM	integrated pest management
KCDMS	Kenya Crops and Dairy Market Systems Activity
KEPHIS	Kenya Plant Health Inspectorate Service
KES	Kenyan shilling
MoALF&C	Ministry of Agriculture Livestock Fisheries and Cooperatives
MSR	market system resilience
NHTS	National Horticulture Traceability System
PFA	pest-free area
SACCO	Savings and Credit Cooperative
SILC	savings and internal lending communities
SME	small or medium enterprise
USAID	United States Agency for International Development
VC	value chain
VSLA	village savings and loan association

Introduction

Vulnerable producer households in Kenya face recurrent and compounded climate and economic shocks, making it challenging to improve their livelihoods and food security. Increasingly, evidence shows that markets support the well-being of households through the provision of vital goods, services, and income opportunities. Resilient market systems have the potential to buffer sensitivity to shocks and stresses while helping households to recover more quickly from shocks. United States Agency for International Development's (USAID's) Kenya Crops and Dairy Market Systems (KCDMS) takes a market facilitation approach to strengthening economic and nutrition outcomes of producers in 12 counties in eastern and western Kenya. KCDMS interventions are designed to support mango and mango production by providing the necessary market stimulants in the value chains (VCs), including extension services, farmers, cooperative, input suppliers, influencing policy, transport and handling systems, access to financing, private sector partnership, and among others. The program aims to improve production through the widespread use of modern technology in production, provision of extension services, collective bargaining of farmers through cooperatives, private sector partnership, market linkages, and others.

As part of its learning agenda, KCDMS seeks to assess cost-effective methods for evaluating system level outcomes and incorporating learning into adaptive management. KCDMS's market system resilience (MSR) study applied USAID's MSR framework in the Kenyan context to assess levels of MSR in fiscal year 2021 (FY21) resulting from KCDMS programming and informing FY22 work planning. The study was carried out in conjunction with an outcome harvesting study to evaluate KCDMS contributions to resilience (the outcome harvesting evaluation is available separately). The MSR study relates to Learning Topic 6 in the KCDMS Learning Agenda: Collaborative Action, Learning and Measurement for Market Systems. The study report has been updated with endline results in FY23 and recommendations for new programming. The study addresses the following learning questions using qualitative and quantitative methods and participatory learning activities:

- 1) What are the strengths and weaknesses of the mango market system in the Eastern Region in terms of resilience capacities?
- 2) What resilience domains are most important for business adaptation to shocks and stresses, and why?

I. Background

I.1 Overview of markets in Eastern Region

Mango farming is an essential agro-business in the eastern region of Kenya, especially Machakos, Makueni, and Kitui Counties, and a critical livelihood for many who depend on mangoes for both income and food. Also, mango farming can reverse the effect of intensive deforestation and help in soil protection. Encouraging and supporting mango production among small farmers in these counties is important for poverty reduction because mango trees stay longer periods than other kinds while constantly providing income. Mango is an important fruit and highly consumed in Kenyan, and farmers specifically in these counties invest a lot in mango orchards. Numerous challenges face mango producers, processors, and other actors throughout the market system.

Access to quality planting material (seedlings): Generally, there are shortages of un-grafted planting materials of improved high-yielding varieties of mango. Farmers use engrafted planting materials and low-quality indigenous mango seed seedlings. Un-grafted trees take a longer period to bear fruits and produce lesser fruits and quality, whereas grafted trees take only 3-4 years. The exotic varieties include Apple, Kent, Keit, Tommy Atkins, Van Dyke, Haden, Sensation, Sabre, Sabine, Pafin, Maya, Kenston, and Gesine. Lack of adoption of new mango varieties has left productivity at low levels.

Use and access to farming technology. Mango farming is affected by many destructive pests and diseases, leading to yield loss. Some of the pests include fruit fly (*Bactrocera invadens*), mealy bugs (*Rastrococcus invadens*), and seed weevil (*Sternonchetus mangiferae*). Farmers invest little in fruit fly control technology, possibly because they do not understand the importance of using such technology or they lack the skills and resources to use.

Post-harvest losses: Mango farmers lose a large portion of their harvests due to several manageable factors. These factors include pests and diseases, poor harvesting practices, lack of post-harvest storage facilities, and poor infrastructure, especially in road networks leading to markets.

Poor orchard management: Small-scale farmers left mango trees to grow big with little pest and disease control, hoping that the larger their tree, the greater the fruit harvest, but in some cases the reverse is true. Small farmers tend to grow their mango in a scattered manner, give them little care, and only see them as an important crop during the harvesting season.

Return on mango investment: Mango harvesting is seasonal, and the harvest period in the year is known to the farmers and other VC actors. All mango farmers in the country harvest in the same period, and local markets become inundated with mangoes offering very low prices. In most cases, especially farmers in hinterlands hardly break even due to high transport costs, very low market price, and lack of storage facilities. 50% of total fruit value goes to waste due to post-harvest handling and pests. It is estimated that the farmers in the VC receive only 7% of the final product value, whereas vendors, wholesalers, and processors receive 12%, 15%, and 66%, respectively.

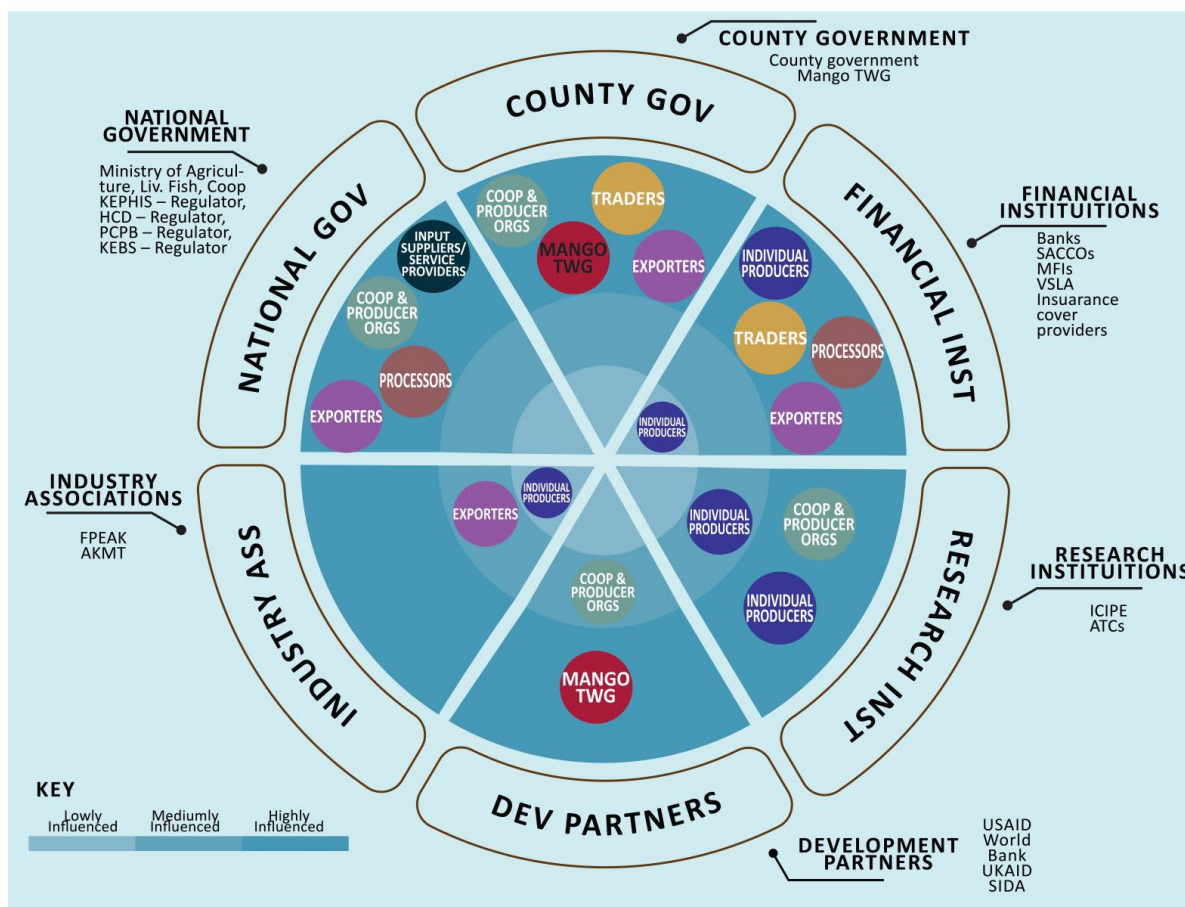
Limited access to financing: Farmers lack critical investment and working capital for their mango farming. Mango farming in the eastern region of Kenya is seen as small-scale and scattered, and rarely attracts financing. Farmers require investment in quality seedlings and grafting materials, pest, and disease control such as hot water treatment and post-harvest storage facilities.

1.2 Mango market stakeholders

The research team facilitated a workshop with KCDMS staff to map out the key stakeholders in the mango market system and their influence on each other. The diagram below shows the mango stakeholder influence as discussed in that workshop (**Figure 1**). The outer layer of the diagram are the stakeholders in different colors and the inner small boxes are the market actors, placed under the stakeholders influencing them. The workshop showed that the national government stakeholders, mostly licensing and regulators, had the highest influence on the market actors. Other stakeholders with high influence include the county governments, financial institutions, and industry associations.

According to the workshop, the national government stakeholders have high influence on most mango market actors aside from individual producers. The county governments also have high influence on cooperatives and producer organizations. The mango technical working group has a high influence on traders and exporters. On the other hand, development partners greatly influence the mango technical working group, county governments, and nongovernmental organizations. Research institutions such as International Center of Insect Physiology and Ecology (ICIPE) have high influence on cooperatives and producer organizations as well as individual producers. Financial actors also have a high influence on market actors such as processors, traders, exporters, and individual producers.

Figure I. Mango market stakeholder map



Note: AKMT = Association of Kenya Mango Traders; ATC = Agri and Co-operative Training and Consultancy Services Ltd. ; FPEAK = Fresh Produce Exporters Association of Kenya ; HCD = Horticulture Crop Directorate of Kenya ; KEBS = Kenya Bureau of Standards; KEPHIS = Kenya Plant Health Inspectorate Service; PCPB = Pest Control Products Board; SACCO = Savings and Credit Cooperative ; SIDA = Swedish International Development Cooperation Agency; TWG = technical working group; UKAID = United Kingdom Agency for International Development.

1.3 Defining MSR

MSR is the ability of a market system to respond to shocks and stresses in a proactive fashion to sustain inclusive market functions that serve vulnerable producers, business owners, workers, and consumers. A market system is a “dynamic space...in which private and public actors collaborate, coordinate, and compete for the production, distribution, and consumption of goods and services” (see USAID’s [Market System Resilience Assessment Framework](#)). KCDMS applies an MSR approach within the context of USAID’s food system framework to understand and address the drivers of resilience for improved income, health, and nutrition outcomes (see [RFS Food System Conceptual Framework](#)). USAID’s MSR framework encompasses eight specific and interrelated domains. Through a participatory, country-led process, RTI adapted definitions of the domains for the purpose of this study (see [Table 1](#)).

Table I. Adapted MSR domains for KCDMS

BEHAVIORAL DOMAINS
<p>Evidence-based decision-making</p> <p>Businesses depend on reliable sources for market data, investing in information gathering and analysis, and confidence in their own and their employees' ability to use digital platforms for business purposes. Early warning information is widely available and used by actors throughout the market system, and the local and national government manages effective pest and disease surveillance programs.</p>
<p>Business strategy</p> <p>Businesses maximize value to customers rather than profit when making their revenue strategy, plan one season or one year in advance, and adopt virtual platforms for marketing and sales. Market actors segment products and services according to customer demographics, use multiple methods for branding their products, and investment in customer service. Businesses also invest in staff capacity development and retention.</p>
<p>Cooperation</p> <p>Businesses are served by business or professional groups; market actors of various types work together collectively in response to disturbances and engage in joint initiatives and partnerships. Businesses work jointly with suppliers and service providers to proactively address issues and resist negative forms of collaboration, such as collusion or monopolies.</p>
<p>Competition</p> <p>The market is open and competitive, with adequate regulation to encourage new market entrants and discourage monopoly control over any aspect of the market. Businesses adhere to agreements despite shocks and generally trust other market actors to treat them fairly. The direction of change in number of new market entrants is positive across market activities, business owners generally have positive perceptions about entrepreneurship, and the market is competitive across the range of market activities. Grades and standards support improvements along the VC and are consistently applied.</p>
STRUCTURAL DOMAINS
<p>Power dynamics</p> <p>There is a balance of power between various actors in the market system aligned with capacity and readiness to fulfill appropriate market functions. Government, private sector, and civil society groups have resources to fulfill their mandates. Marginalized groups have representation through broad-based professional groups and associations who advocate for the interests of the most vulnerable, as well as the majority of their members. Business owners across VC segments believe they can influence issues affecting their markets through inclusion in the policy-making and review process.</p>
<p>Rule of law</p> <p>Formal and informal rules are widely known and adhered to. Disputes among market actors are handled fairly, regardless of business owners' influence or identity, reinforcing the value of being a good actor. Taxation is fair and not unduly burdensome.</p>
<p>Diversity</p> <p>Flexible and dynamic supply and sales chains enable businesses to access different markets, buyers, or suppliers in case of a shock. Specialized services are available to meet a range of market needs, and business owners are willing to engage with start-up businesses and businesses with innovative models. In terms of norms and perceptions, a resilient market system will have women represented throughout the range of market activities, including those with higher value; we will also see business owners showing confidence in the predictability of market trends in order to take risks to grow their businesses or branch out into new activities.</p>
<p>Connectivity</p> <p>Businesses have multiple channels to access finance, both formal and informal, and leverage their business networks to negotiate credit to manage risk and adapt to shocks. Business networks are not based on friend and family networks, so that marginalized groups can enter business networks and agreements on level ground and gain access based on merit rather than identification with a particular group. Cooperatives have robust networks to traders.</p>

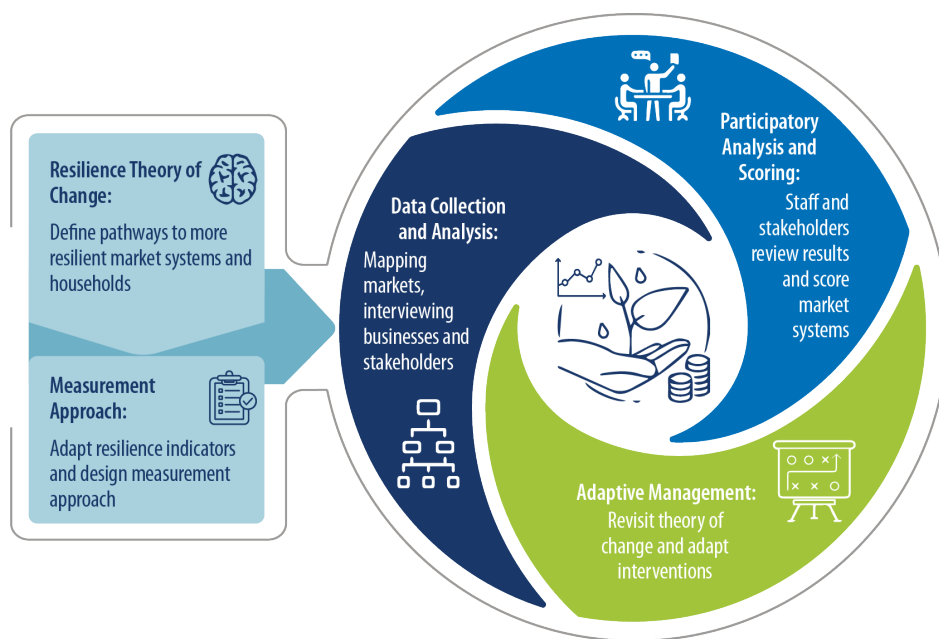
2. Approach

2.1 Participatory design

Participatory design sessions with KCDMS staff led by senior experts were used to select markets and actors for sampling, develop indicator measures, and design data collection instruments and sampling strategies. The process started by developing resilience theories of change for target market functions for the mango market system. Target market function included the following: actors in the mango value chain (VC) can meet local mango demand despite shocks; mango farmers and other VC actors can access productive inputs and services to prepare for, absorb, and recover from shocks; actors in the mango VC can sell their raw or processed mangoes during and after a shock or stress.

As much as possible, we aligned our measurement with domains of market system programming that are within the manageable interest of KCDMS, while bearing in mind the various risks and constraints inherent in the local context. Indicators were developed based on the resilience theory of change, adapted from the operational indicators RTI developed for Somalia Growth, Enterprise, Employment & Livelihoods (GEEL) based on USAID's Market System Resilience Assessment (MSRA) framework. Measurement of indicators was adapted and contextualized; survey and interview/discussion questions were developed for new indicators tailored to KCDMS activities. To the extent possible, instruments drew on existing instruments, either used for Somalia GEEL or for other measurement activities in the project itself. See **Figure 2** for RTP's MSR approach.

Figure 2. RTI's participatory MSR approach



2.2 Stakeholder mapping and qualitative sampling

To better identify the most influential stakeholders on market actors in the mango VC and understand their level of influence, an external research consultant conducted a stakeholder influence mapping workshop with KCDMS staff in May 2021. During the workshop, the team reviewed a set of market stakeholders and market groups prepared in advance by the consultant. Using Mural, the team moved each stakeholder and market group onto a quadrant indicating level of influence and importance of each market stakeholder and market group on the market as a whole. The team subsequently linked each market stakeholder with the groups they influence, indicating high, medium, or low influence level; they then linked market stakeholders with each other, again indicating level of influence. Respondents for in-depth interviews and market actors for focus group discussions were identified and purposively sampled using the results of the stakeholder mapping. A senior member of the research team with fluency in Kiswahili conducted 11 focus groups and 17 key informant interviews with market actors and stakeholders in June 2021.

2.3 Market actor survey

Busara Center for Behavioral Economic was the research partner for the study. The sampling approach for the market actor survey involved mapping businesses and preparing a proportional sampling based on the total number of market actors in each strata. During the 3-day enumerator training, enumerators from each of the sample counties reviewed survey questions and response options and contributed to finalizing adaptation to local contexts. Following the pilot test and debrief, enumerators returned to their homes and conducted the survey in their own counties to minimize cross-border travel due to coronavirus disease 2019 (COVID-19).

The study team conducted face-to-face interviews in June and July 2021 with a random sample of 131 micro, small, and medium enterprises in the mango market system (48 in Kitui, 37 in Machakos, and 46 in Makeni). Sampling strata included smallholder producers, petty traders, input suppliers, processors, commercial producers, service providers, producer cooperatives and exporters. Busara also conducted high frequency checks on the data, which were uploaded daily to Busara's server and reviewed using code to search for missing data, track enumerator performance, and check the quality of the data. Following the completion of data collection, Busara cleaned and analyzed the data in the programming language R to generate descriptive statistics.

2.4 Learning and Adaptation

The KCDMS senior experts led a series of workshops to reflect on MSR findings in conjunction with outcome harvesting results. The workshops revisited the resilience theories of change and resulted in a set of recommendations to guide the remaining 2 years of programming. Key take-aways from the workshops are included in this report, along with updated recommendations based on further learning and analysis over the life of the project.

3. Findings

3.1 Overview of assessment findings

Using a simple 2-point scale of low vs. moderate resilience, we briefly summarize key indicators for each resilience domain. Across all domains, there were some strengths and some weaknesses; therefore, we do not characterize any domain as having either extremely weak or high levels of resilience. The results indicated progress made by mid-term attributable to program interventions based on the program theory of change and highlighted outstanding areas of weakness for the project to tackle in the remaining years of programming. Comparing the relative strength or weakness of each domain contributes to our understanding of the mid-term drivers of resilience as far as business recovery in FY21.

Illustrative results from the outcome harvesting evaluation are included for each domain in text boxes. Outcome harvesting results showed improvements that had resulted from interventions for each domain. Because we do not have baseline information for MSR domains, we cannot establish the extent to which change in the overall level of resilience of that domain can be attributed to KCDMS interventions. In other words, some domains are still at a low level of resilience despite some gains that have been made; alternately, domains that are at a moderate level of resilience, may not have started from a low level, but nevertheless are gaining ground as a result of KCDMS activities.

Evidence-based decision-making

Moderate resilience

- 95% of mango businesses have access to early warning information from radio or television, and three-quarters have access to digital warning systems.
- Only 21% report receiving timely information many times or all of the time; however, 48% believe lower capital actors have the same access to information as higher capital actors.
- 83% of respondents rely primarily on first-hand sources for market information; however, a substantial proportion also turn to friends and family.
- Slightly less than half (46%) of businesses dedicated resources to information gathering activities in the mango VC. Of those businesses, three-quarters dedicated financial resources.

- Most respondents indicate they are comfortable using multiple digital platforms for marketing and are similarly confident in their employees' ability to do the same.

Evaluation Results – FY21

- The project facilitated linkages for farmers to access multiple sources of information, including radio, extension agents, processors, and microfinance institutions. Previously, they relied only on fellow farmers for information on mango production practices and markets.
- Market actors reported an increase in knowledge among farmers on the requirements of local and export standards for mangoes resulting from KCDMS support to the sector. As a result, farmers are voluntarily seeking information, advice, and support from the various market players on how to comply with the standards. KCDMS partners International Center of Insect Physiology and Ecology (ICIPE), county extension staff, and Kenya Agricultural and Livestock Research Organization) trained farmers and nurseries on mango crop management and integrated pest management (IPM) technology application. Marketable quantities increased substantially over the preceding 2 years. Mbitini Cooperative, for instance, aggregated 40 tons of mangoes, up from 15 tons.

Business strategy

Moderate resilience

- 42% of mango businesses plan a growing season or a few months ahead; another quarter plan a year ahead, and only 8% plan less than a month ahead. Two-thirds of respondents reported making plans regarding multiple types of business decisions, including agreements with customers and service providers.
- Of the 51% of businesses with employees, the majority reported offering their staff training and skill-building opportunities in the last 12 months as an effort at staff retention.
- A majority of businesses (62%) have a business strategy that depends on retaining customers over maximizing profit. However, 38% believe it is never a good idea to reduce their profit margin to ensure good value for customers.
- More than half of businesses (58%) have tailored products or services for different customer segments, such as incorporating greater flexibility into business agreements with suppliers.
- The majority of businesses invest in customer service in multiple ways; for instance, most provide customers product-related advice, and 55% have rural agents to reach more customers.
- The majority of businesses report asking customers for feedback; 62% use branding methods to increase the visibility of their businesses.
- 44%, a substantial minority, had set up online platforms in the last 12 months for marketing their goods or services; of those, 43% made at least half of their total sales or agreements online.

Evaluation Results – FY21

- KCDMS partners introduced farmers to different pest management technologies, resulting in farmers adopting a combination of IPM technologies (e.g., traps and solar bags). Farmers reported that the chemicals they used previously were expensive and ineffective compared to IPM technologies. County government reported reduction in post-harvest losses by as much as 30%–40%, leading to an improvement in supply which has reduced price fluctuations and made markets more predictable.
- At the demo sites, farmers saw the effects of the IPM on not only fruit flies, but also on other pests. As a result, farmers purchased traps to manage a variety of pests, supporting a more diverse set of crops which improves the resilience of their income streams.
- KCDMS facilitated processors to acquire equipment for value addition through business linkages or co-funding. For example, Burton and Bamber, and Goshen exporters diversified from export only of fresh mango to processed mango products using equipment procured through KCDMS support; the proceeds from sales enabled them to acquire more specialized equipment and further diversify their product offering.

Cooperation

Moderate resilience

- The majority of producers and petty traders belong to a professional group—about one-third belong to cooperatives, 25% belong to self-help groups and similarly, 23% to producer groups and 19% to village savings and loans associations (VSLAs) or savings and internal loan communities (SILCs).
- Non-producers were also generally involved in groups or associations; 70% belonged to a trade or business association.
- There are robust levels of cooperation between businesses, with most (95%) engaging in shared initiatives or joint partnerships, such as sharing services (34%) or agreeing to joint quality standards (23%).
- The majority of respondents are motivated to help their suppliers and service providers address problems or concerns and a quarter have actually provided support. Linking suppliers to extension services and providing them with cold storage are the most commonly reported.
- Cooperatives and associations are the primary platform for market actors to work together to address problems and are largely effective, according to focus groups. However, smallholders in Machakos and Makueni have struggled to get their issues addressed through cooperatives. Advocacy efforts for receiving government support or services have been largely unsuccessful.
- Smallholders reported collusion between brokers and traders who wait until mangoes are about to spoil before purchasing them, to push farmers to accept low prices. However, the issue is contested between different actors. The brokers collect mangoes in difficult-to-access parts of the region and sell to traders and buyers, including processors and exporters. Low levels of smallholder participation in cooperatives and consistent side-selling aggravate the problem.

Evaluation Results – FY21

- KCDMS demonstrated the value of business-to-business (B2B) forums. Consequently, market actors have started using B2B forums to bring other actors together for commercial purposes. For example, financial institutions such as Bimas have conducted B2B activities to network their farmer customers with service providers. They have also invited other players, such as IPM and input suppliers, and exposed them to potential financial support.
- KCDMS involved all key partners in mapping, certification, establishment, and management of pest-free areas (PFAs) and linked business competitors to fight fruit flies. As a result, market actors have started collaborating in new ways; for instance, establishing joint demos for showcasing technologies and conducting joint training for farmers. Private sector players (such as microlending institutions, banks, and IPM firms) are partnering in new ways related to input supply, skills and knowledge development, sustainable marketing for produce, and financial support to produce more quality mangoes. Farmers and market actors have increased engagement with Kenya Agricultural and Livestock Research Organization to certify mango tree nurseries.

Competition

Moderate resilience

- The mango market is generally open and competitive, in good part because of competition with neighboring counties for export. Whereas most market actors are competitively oriented, producers may be less motivated due to their dependence on brokers and lack of direct market access, alongside the high costs associated with meeting export standards. Although the government is seen as adequately regulating the sector, cooperatives—which are led by political appointees—have largely failed to adequately organize producers.
- Compliance with export standards is supported by county government, donors, and the private sector (buyers and exporters) through training, inspection and certification. Less emphasis is given to local market and local processing standards.
- The majority (61%) of respondents occasionally enter business agreements with suppliers or brokers, and 27% use agreements frequently. More than half (59%) of respondents believe suppliers and brokers can be relied on to adhere to agreements.

- Levels of trust are low, with 30% reporting the customers generally hesitate to trust businesses to treat them fairly; the majority (63%) are neutral on this question.
- 52% report that the number of new market entrants in their industry is increasing; only 9% reported a decrease, indicating the environment is favorable for new business activity.
- Perceptions of entrepreneurship in the mango sector are largely positive, both for starting new businesses and diversifying into crops to offset the risks of mango. However, there are substantial barriers for new mango producers; youth, in particular, prefer to go into trade.

Power dynamics

Low resilience

- Cooperatives are the primary form of representation and collective efforts in the mango sector; however, representation is inconsistent across different actor types and counties and many smallholders only belong to producer groups, limiting their influence and agency.
- Women are well-represented in membership and leadership of cooperatives, as required by regulations governing cooperatives; women take an active role in resolving disputes between businesses.
- Government has substantial influence in the sector, primarily at the county level through licensing and inspections; providing forums extension services and forums for exchange of information; and setting policies, regulations and quality standards. In some counties, the government has helped to expand markets, including engaging international actors for export.
- However, the government's influence is weakened by lack of financial resources and human capital, corruption, and politicization.
- The private sector is the most influential player in the mango market system, driving improvements in quality and meeting existing demand for technical services, training, and technology; it is more efficient in delivering inputs and services than the government.
- Development partners fill an important role by supplementing the government's financial resources and providing trainings and linkages; although they need to be more effective engaging local government, development partners can help with advocacy and awareness raising.
- The level of participation in public meetings to review policies varies due to inconsistencies notifying all stakeholders; however, engagement in the form of public meetings is mandated at village, county, and national levels.

Evaluation Results – FY21

- KCDMS facilitated the amalgamation of smaller co-ops into bigger ones, which allowed them to have greater influence in decision-making processes at the county level. KCDMS facilitated business development service (BDS) providers to train cooperatives on leadership, networking and lobbying. As a result, cooperatives now regularly lobby financial and input supplier market actors on behalf of their members.

Rule of law

Low resilience

- There are four levels of dispute resolution: local administration, generally used by business actors without much social or financial capital; cooperatives, professional groups and association; institutional arbitration mechanisms that mediate between different actors; and formal courts as a last resort.
- Disputes are more difficult to resolve when they involve members of different professional groups or associations (e.g., different business types or locales); farmers, the most vulnerable actors in the system, are more likely to drop out of disputes if they are elevated beyond the local administration. Given that breach of trade contracts between buyers and farmers, pricing and payment disputes between buyers and farmers, and boundary disputes between farmers are commonly reported issues, farmers should be the primary users of dispute resolution mechanisms, which does not seem to be the case.

- The majority (64%) of respondents reported at least one dispute they are aware of; however, a similar percentage (67%) reported that only some disputes are settled. Then 46% indicated some disputes are settled fairly, compared to 37% reporting fair settlement of most or all disputes.
- Perceptions of fairness are very poor, with only 8% reporting that regulations are enforced impartially across social and wealth groups. 81% report that exceptions are made for certain social groups, or for wealthy or influential business owners when laws and regulations are enforced.
- Awareness of laws and regulations is high, with the vast majority of respondents feeling informed about regulations affecting their businesses. However, 53% report they rarely or never interact with county government officials.
- Taxation places a heavy burden on the mango sector, with high taxes levied at all segments of the VC; the impacts include reduced prices paid to farmers and increased costs of inputs that discourage compliance with quality standards. Overall, respondents believe the level of taxation discourages investment and undermines the competitiveness of mangoes for export.

Diversity

Moderate resilience

- A slight majority of businesses (55%) have only one channel for products and services. However, the vast majority of businesses are confident in their ability to access alternate channels in case of a shock.
- 66% of businesses had at least one transaction with a start-up business in the last year; motivations for interaction with start-ups centered on flexibility and efficiency. However, concerns related to risk and lack of predictability.
- Respondents provided multiple examples of taking risks to diversify their products in response to the fruit fly ban imposed on mangoes. Most examples related to producing and trading on other types of crops; however, in Machakos, a cooperative that had established an aggregation centered diversified into processing and selling dried mangoes.
- The mango market system has seen a gradual uptake of specialized services; the greatest success relates to fruit fly traps available for purchase from agrovets. However, the high cost of the traps remains an obstacle and there are low-quality counterfeit options in circulation. There has also been increased demand for spraying, pruning, and grafting services, which has outstripped the number of skilled service providers.
- Men dominate activities that require greater technical expertise, upfront investment, and business networks, working as service providers, transporters, input suppliers, brokers, and exporters, and owning and managing large businesses. Women dominate in low-paid and unpaid activities, including labor and management for production, small-scale trade, processing, and value addition. The greatest obstacle to women's advancement relates to legal prohibitions on land ownership, which is a requirement for accessing finance at scale.
- A substantial percentage of respondents put their resilience capacities to diversify in the face of shocks; 28% of non-producers made changes to products and services, 35% made new investments in their business, and 55% sought out a new supplier or customer base. However, only 10% of producers reported selling in alternate markets.

Evaluation Results – FY21

- KCDMS exposed farmers to other VCs that complement their income sources during mangoes' off-season. As a result, farmers are using the savings from mango sales and VSLAs to start rearing poultry, growing leafy vegetables, green grams, oranges, and lemons. Farmers now have a way of spreading risk and remaining in business throughout the year.
- Processors have diversified to other VCs. For example, Burton and Bamber and Goshen Exporters' advanced their production line from mango to include passion fruit juice and quality dried fruit snacks (mango, pawpaw, pineapple, and mixed fruit). The companies target the European Union market through linkages established during an international exhibition KCDMS supported in 2020.
- KCDMS engaged youth by facilitating training and in-kind grants for acquiring equipment, leading to jobs in service provision for mango production (e.g., pruning, fertilizer application, and spraying) and monitoring

IPM traps. For instance, the Mumbuni Youth Group received training from a KCDMS partner alongside an in-kind grant to acquire equipment for spray services.

- KCDMS partner Faina Innovations introduced solar bags for making fertilizer from infested or rotten mangoes to improve soil fertility, reducing reliance on conventional fertilizers.

Connectivity

Moderate resilience

- Access to loans was relatively high; 64% of respondents applied for a loan through formal channels, including microfinance institutions and savings and credit cooperatives (SACCOs); 67% applied for a loan from a VSLA or SILC. Nearly all loan applications were successful.
- The vast majority of respondents (83%–85%) reported having business relationships outside their friend and family networks. These networks result in new business connections; a smaller percentage reported non-friend and family guarantors for loans. Some reported that they renegotiated credit terms with members of their non-friend or family networks.
- Respondents indicated that brokers are the primary linkage between smallholder farmers and brokers; however, input suppliers connect directly to smallholder farmers. Commercial actors, including commercial scale producers, seedling growers, and nurseries, are connected with trade networks through their associations and cooperatives.
- Cooperatives play a critical role for non-producers in the sector by information sharing, providing specialized services, and linkages to traders, exporters, input suppliers, and brokers.

Evaluation Results – FY21

- KCDMS facilitated B2B linkages between businesses that had not previously done business or worked together through B2B forums and other initiatives. Successful linkages resulting from KCDMS interventions included the following:
 - Faina Innovations, financial institutions, and farmers now jointly plan and implement activities with the county governments.
 - Cooperatives were linked to technology suppliers, including Kenya Biologics and Real IPM Alliance for supply of fruit fly traps; iProcure to agro-dealers to manage stock; iFarm for firms to easily communicate with their farmers; Faina Innovations for solar bags to store damaged mangoes. KCDMS also linked technology suppliers with lead farmers to establish demo farms to showcase their IPM technologies.
 - Cooperatives were also linked with input suppliers, enabling them to provide farmers with timely access to critical inputs and information throughout the year. For instance, Makueni Fruit Processing Limited established a network with input suppliers who supply or distribute inputs on credit to farmers.
 - Agro-dealers and input manufacturers networked through B2B forums and negotiated business terms that have enabled them to maintain input supply and affordable prices during and after shocks.
- Through BDS, KCDMS strengthened and enabled cooperatives to be self-sustaining and provide or link farmers to much-needed services such as extension, inputs, transport, animal health, in-kind credit, and marketing services. The project facilitated cooperatives to set up mango tree nurseries that were then certified by Kenya Plant Health Inspectorate Service (KEPHIS). This guarantees their farmers a steady supply of quality seedlings at friendly prices. Market actors such as Faina Innovations and microfinance institutions report increased customer base and loan portfolio, particularly among mango farmers.

3.2 Shock exposure, response and recovery

Shock exposure and recovery

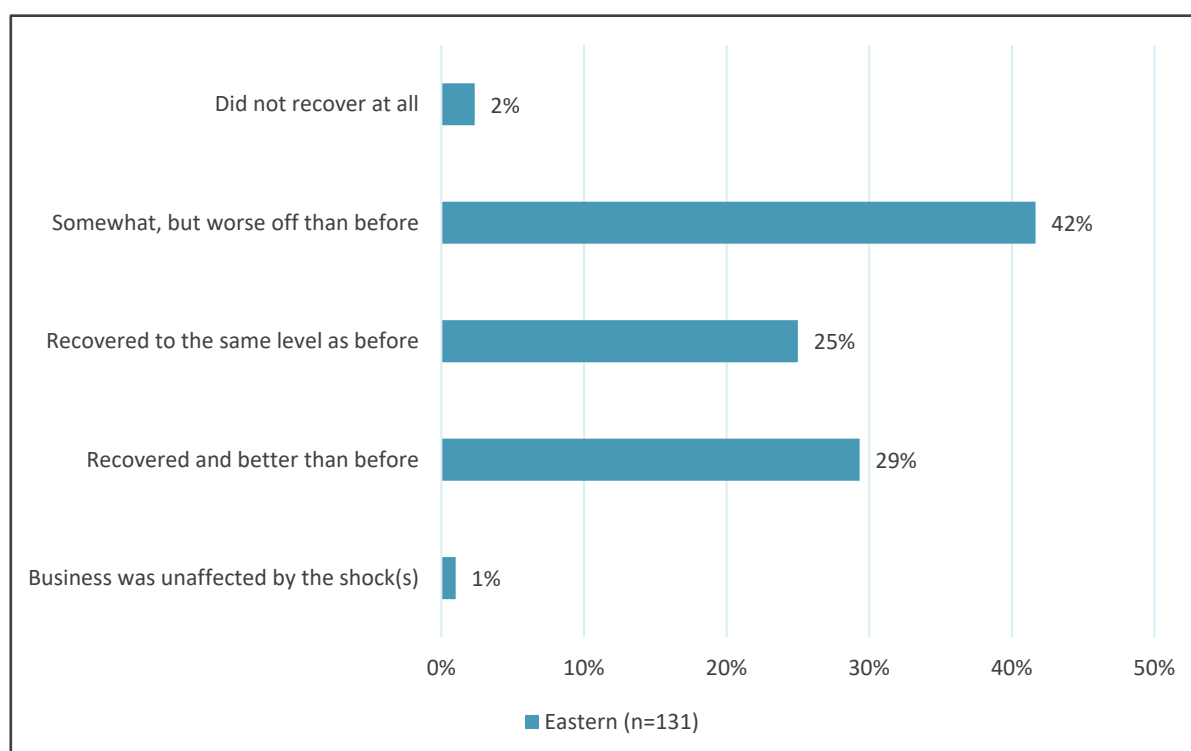
Respondents in the region faced several shocks (see **Table 2**). The most significant shock was pests and disease affecting 93% of the respondents. The majority of respondents were affected by the shutdown of markets and distribution systems due to COVID-19, alongside reduction in mango yields due to drought. Furthermore, 72% of market actors were affected by the mango export ban put in place due to noncompliance with export market sanitary and phytosanitary standards.

Table 2. Shocks and disturbances faced in the market (multiple selection question)

Type of shock or disturbance	Eastern Region (n = 131)
Reduction of quality of mangoes due to pest and disease infestation	93%
Distribution and local market systems shutdown due to COVID-19	81%
Reduction in mango yields due to droughts	80%
Export ban resulting from noncompliance with required standards	72%

A somewhat higher percentage of businesses recovered (54%), while 42% were still worse off than they had been prior to the shocks. On the whole, 29% of businesses reported doing better than they had before the shock, indicating a substantial degree of resilience. See **Figure 3** for details.

Figure 3. Business recovery from shocks

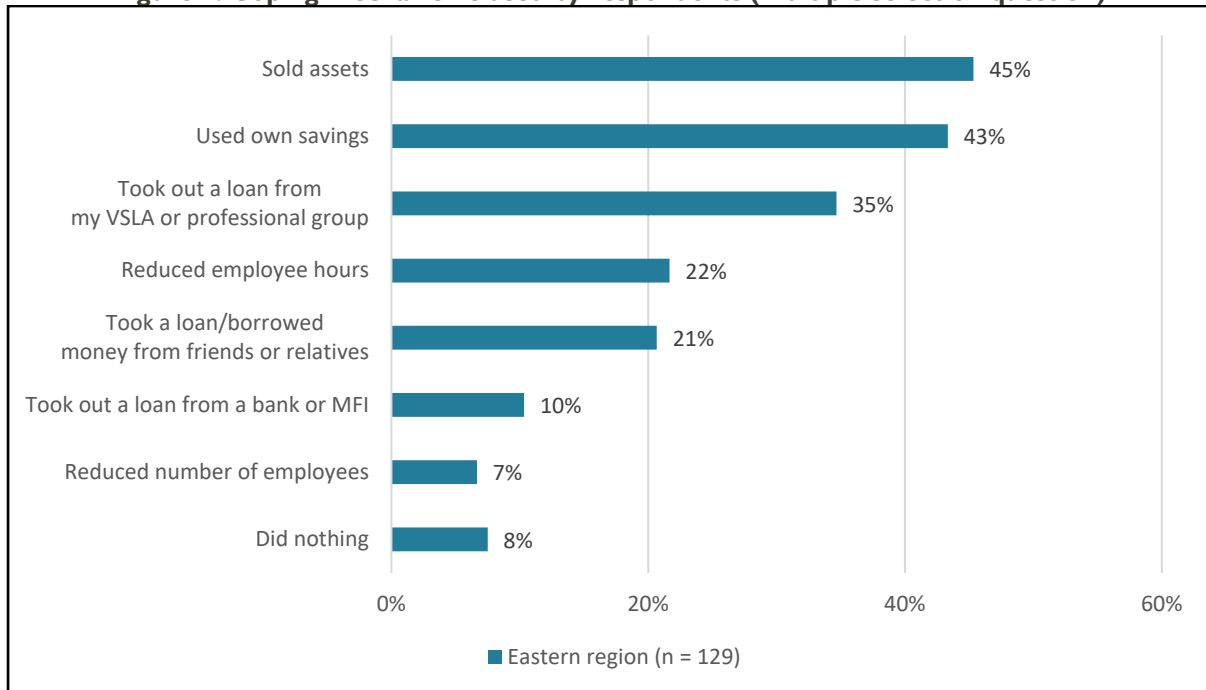


Producers reported lackluster levels of confidence in their support networks, including friends, relatives, savings groups, and VSLAs, to support their recovery in case of future shocks in the coming year. Although two-thirds (68%) were somewhat confident, only 21% were confident and none were very confident. Businesses expressed greater confidence in their risk management systems, including their ability to rely on savings, insurance or renegotiate credit terms to recover; 35% were confident and 9% were very confident.

Coping and adapting mechanisms

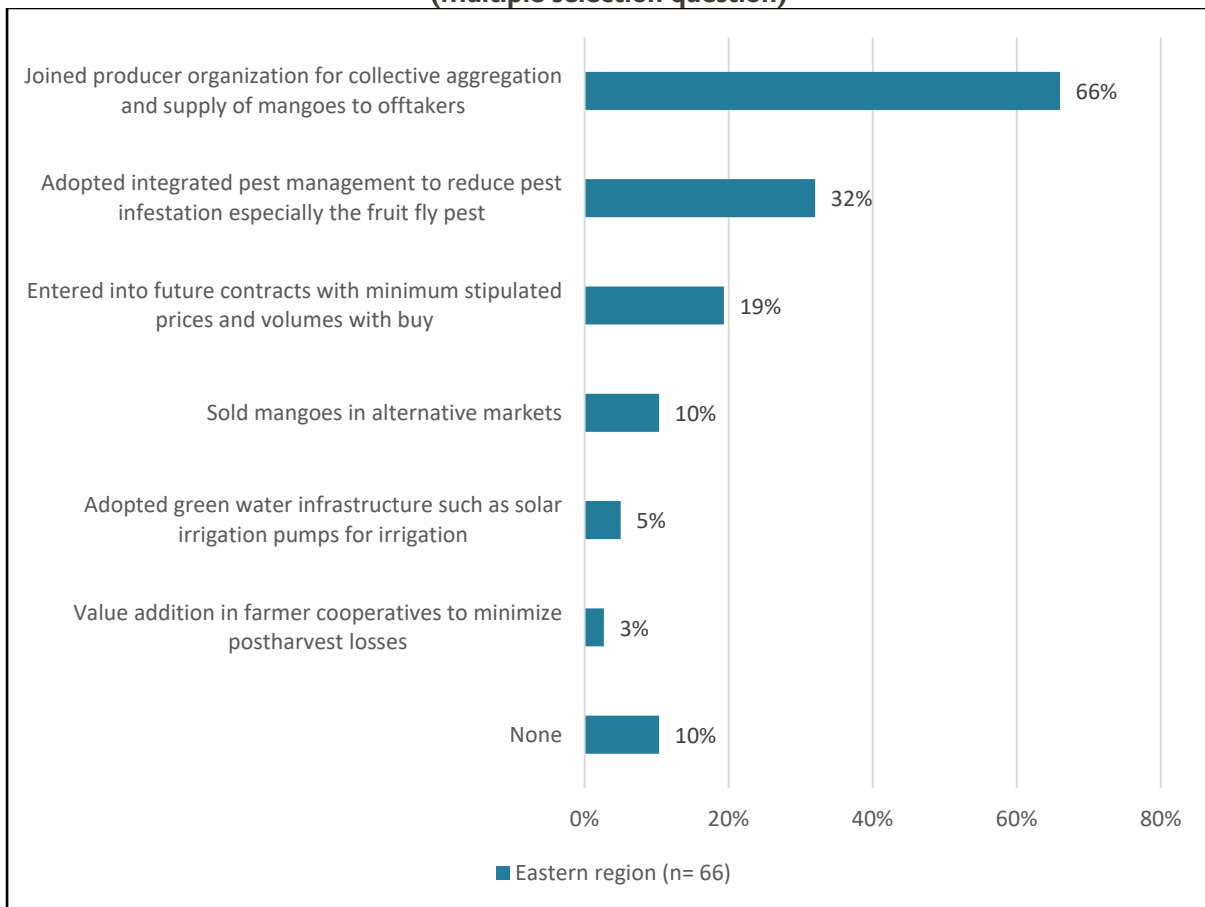
Regarding coping mechanisms, nearly the same percentage sold assets (45%) as used their own savings (43%), indicating a high level of vulnerability. Roughly one-third (35%) took out a loan from their VSLA or professional group, whereas one-fifth borrowed from friends or relatives. Regarding labor impacts of coping strategies, 22% reduced employee hours (arguably an effective long-run strategy, when feasible), whereas 7% let employees go. **Figure 4** provides full details.

Figure 4. Coping mechanisms used by respondents (multiple selection question)



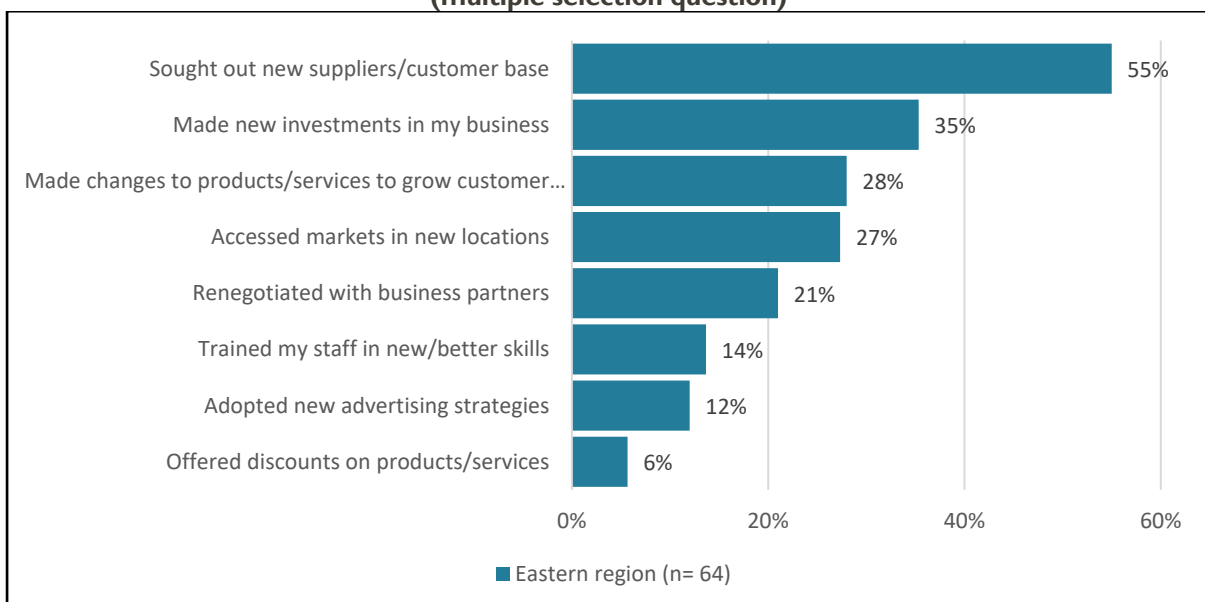
The survey asked respondents what adaptive strategies they had used in the past year to prepare for shocks. For producers, joining producer organizations for collective aggregation and supply of mangoes was the most common adaptive strategy, reported by 66%. Only 32% of producers reported adopting IPM to address the fruit fly infestation. **Figure 5** provides full details.

**Figure 5. Adaptive strategies used to prepare for shocks in the past one year (producers)
(multiple selection question)**



Non-producers reported using a greater number of adaptive strategies and in higher percentages, compared to producers. Seeking out new suppliers and customer base was a strategy used by 55% of respondents, whereas 35% made new investments in their business. Of respondents, 28% made changes to products and/or services to grow their customer base, whereas 27% accessed markets in new locations. **Figure 6** provides full details.

**Figure 6. Adaptive strategies used to prepare for shocks in the past one year (non-producers)
(multiple selection question)**



Key resilience domains for business recovery

Mid-term results showed substantial strengths in the mango sector and key changes in behavior and strategies that indicated readiness to re-start exports. Overall, the nature of **competition** in the sector appears to be largely positive, aside from the ongoing reliance on brokers to fulfill a critical market function. A competitive orientation, favorable for risk-taking, played out in response to shocks, as non-producers sought out new customers and suppliers and made investments in their businesses. The long-standing interaction with the export market, including the profit margins it provided and the need to comply with international regulations, likely shaped this competitive orientation of the market and facilitated faster recovery. As a result, even prior to widespread adoption of IPM and a drive toward export licensing, nearly a third of businesses reported doing better than prior to the shocks.

Low producer participation in cooperatives remained a pain point at mid-term, creating obstacles to structuring the supply chain and incentivizing, as well as de-risking, their adoption of IPM. Nevertheless, positive movement was also observable regarding **cooperation**, with two-thirds of producers reporting having turned to cooperatives for assistance with aggregation in the face of shocks. Producers also had relatively robust levels of access to formal and informal loans at mid-term, indicating KCDMS had already made strides in **connectivity** and was setting up the lending that would be needed for adoption of IPM.

The **power dynamics** and **rule of law** were the two weakest domains of the market system; producers had relatively little influence in advocating for solutions to the fruit fly ban and obtaining better prices. Dispute resolution mechanisms were also unfavorable to the most vulnerable actors in the mango market system, and perceptions of fairness and trust were low overall in the sector. As a result, few producers had adopted IPM at mid-term. KCDMS would choose to take a market-oriented approach to improving the trust, linkages and resource flows in the sector to rebalance risk away from producers and incentivize them to adopt IPM.

3.3 Applying learning to programming

Results from the mid-term MSR assessment and outcome harvesting evaluations contributed to review of the resilience theories of change and adapted programming for the remaining years of the project. This section summarizes the outstanding weaknesses for each domain identified during the MSR assessment, the actions taken to address the weaknesses, and the results from those adaptations. Results are based on project monitoring and evaluation data. The resilience theories of change (see Annex 1) are structured by market function, including the ability of the market to meet mango demand despite shocks, access to productive inputs and services, and ability to find buyers for mangoes during and after shocks.

Evidence-based decision-making

MSR results at mid-term showed only 32% of producers had adopted IPM to address the fruit fly infestation. At that time, less than half of businesses were dedicating resources to information-gathering activities, which are critical for the adoption of improved practices.

Adaptation (Market function 2 – Mango farmers and other actors access productive inputs and services to prepare for, absorb, and recover from shocks): To tackle both the information gap and the reliable supply of fruit fly traps at an affordable price, KCDMS supported KEPHIS to collaborate with mango cooperatives and IPM technology providers to reach a critical mass of producers. Through a strengthened KEPHIS and robust demand for IPM technology, KCDMS aligned market incentives with the steps needed to establish PFAs. The results led to private sector actors, in this case export companies, initiating training for producers on a range of practices necessary for meeting export quality standards. As a result, 100 mango farmers in Kitui County adopted IPM technologies on 400 acres of mango orchards, leading to a significant reduction in the fruit fly population.

In 2022, 6,914 farmers were contracted by KCDMS partner export firms and received export compliance certification. The percent of fruit rejected for fruit fly damage was reduced compared to the preceding year, according to the same source, attributable to more than three times as many companies using Horticultural Crops Directorate packhouses (up to 13 from 4). These results indicate progress toward further recovery from the fruit fly ban that shut down exports in prior years and are attributable to a market system better equipped to manage the shock of fruit fly infestations.

Business strategy

Participation in cooperatives was low at mid-term, yet cooperative membership was critical to addressing the fruit fly infestation and creating the relationships that would make the market system resilient. Further, only 58% of respondents indicated tailoring products or services for their customer base. In the case of cooperatives, KCDMS saw an opportunity to attract membership by supporting cooperatives to develop a business strategy involving diversification into value addition.

Adaptation (Market Function 3 – Actors in the mango VC are able to sell their raw or processed mangoes during and after a shock or stress): Ten mango cooperatives in Kitui county collaborated with the county government National Agricultural and Rural Inclusive Growth Project and KCDMS to process mango flakes, processing a total of 700 kgs of flakes worth KES 420,000, in addition to selling 120 tons of fresh mango valued at KES 2.5 million. These efforts led to an increase in membership from 200 to 343 in 2022. KCDMS co-invested on the purchase and installation of 11 more solar driers to continue to support growing mango flake production by the cooperatives. In the case of mango, membership in cooperatives is an important avenue for successful continuation of IPM practices and management of the fruit fly infestation; cooperatives are also key for procuring inputs and negotiating for necessary support or alternate market opportunities when facing hardships such as drought, or border closures such as those related to COVID-19.

Cooperation

Although the majority of respondents believed it was important to help their suppliers and service providers address problems, only a quarter had found a way to do so. In addition, smallholders' dependence on brokers caused mistrust, pushed down prices and weakened incentives to adopt IPM techniques and improved quality standards.

Adaptation (Market Function 3 – Actors in the mango VC are able to sell their raw or processed mangoes during and after a shock or stress): To address the problem of smallholder farmers selling through informal channels, that offer little in the way of relationships with suppliers and undermine aggregation, KCDMS supported aggregation and market models that enable sustained buyer engagements. To achieve this, KCDMS equipped aggregators with negotiation skills needed to execute flexible, mutually agreeable contract frameworks that simultaneously address buyer demands. KCDMS further partnered with grantees and non-grantees to improve the base of business formalization so that buyers and farmers are investing in improved supply chain practices leading to higher profitability. Following KCDMS support to create PFAs and certified export trade zones, several export companies (Biofarms, Best Tropical Fruits, Goshen Exporters, and Mulla Exporters) started supporting related interventions, including farmer trainings, indicating investment in their suppliers.

By endline, the number of mango off-takers (including exporters, processors, and domestic traders) increased and were linked to aggregators to purchase mangoes. The increase in linkages between buyers and aggregators in addition to improved quality indicates that the sector is developing a more structured supply chain, which enables producers to invest in meeting quality standards and make a return on their investment. Saving costs and meeting higher standards are both critical to sustaining trade in mangoes during shocks, such as pests and droughts, which require buyers and aggregators to work together to address declining supply and higher costs. Finally, buyer–farmer relationships and buyers' willingness to invest in farmers are critical for the resilience of the market system to shocks, such as drought or pest infestations; in case of shocks, we expect to see buyers adjusting the terms of contracts to enable suppliers to recover from the effects of the drought.

Competition

Results showed that trust was generally low in the mango market system at mid-term and about a third of businesses did not use business agreements. Despite strengths in the sector related to the enforcement of mango export standards, more work was needed to level the playing field for smallholders to obtain export licenses.

Adaptation (Market function 2 – Mango farmers and other actors access productive inputs or services to prepare for, absorb, and recover from shocks): KCDMS facilitated the re-design and re-development of the National Horticulture Traceability System (NHTS) system to

include export, production, site selection, land preparation, scouting, sorting, spraying, harvest, packing, shipment and reports. Exporters who tested the system reported it was easy to use and that they are able to trace the produce from their farms with the newly launched mobile application. The NHTS also has been designed to provide information on chemical use to comply with standard requirements from the Horticultural Crops Directorate. Further, the system will be integrated with other stakeholder platforms for registering and licensing farms, famers, distribution centers, exporters, and so forth. As a result, the NHTS system strengthened resilience by providing a means for even and transparent enforcement of grades and standards, an environment that promotes trust and rewards continual improvement, and levels the playing field for new market entrants.

Power dynamics

Mid-term results showed weaknesses in avenues and platforms for smallholders and a range of actors to influence policy-making and access government resources. Cooperatives had gained a reputation as politicized; trust in the local government was low, due to a perception of corruption and lack of qualifications for guiding the growth of the sector. Finally, the level of participation in public discussions and expert consultations, though mandated in the new constitution, is inconsistent and relatively low.

Adaptation (Market Function 3 – Actors in the mango VC are able to sell their raw or processed mangoes during and after a shock or stress): The issue of political appointees for cooperative leadership and favoritism in allocating government resources is a major constraint in Kenya; KCDMS helped to address this vulnerability through support to county cooperative bills and regulations to guide the cooperative movement's development and implementation, including the allocation and utilization of public funds. Other areas addressed in related bills include providing guidance to government, private sector, and farmer organizations for promoting good practices in cooperative development. Overcoming the politicization of appointments and allocations can be expected to increase market orientation of the sector, as well as directing funds where it is most needed and ensuring resources are well utilized; further, greater transparency, accountability and stronger leadership will equip cooperatives to address shocks and stresses in an ongoing way.

To address the limited voice of private sector in government decision-making, KCDMS issued a grant to Agriculture Sector Network (ASNET) to pilot establishing county-level ASNETs to improve coordination of private sector actors for more effective advocacy for sector issues and enhance the voice and space of the private sector through effective policy dialogue with government. ASNET facilitated public-private dialogues to discuss the key challenges affecting the private sector, including the high cost of running businesses, high number of required licenses, high taxes and levies, high electricity and fuel costs, and inadequate participation in policy formation.

Rule of law

Nothing to report.

Diversity

Although two-thirds of businesses at mid-term had some interaction with start-up businesses, addressing concerns related to risk and predictability remained a challenge. KCDMS partners needed to address these hesitations to scale innovative models to improve last mile distribution of inputs. Further, although demand for specialized services had increased as producers began adopting improved varieties and IPM techniques, there was a shortage of providers at mid-term.

Adaptation (Market function 2 – Mango farmers and other actors access productive inputs or services to prepare for, absorb, and recover from shocks): KCDMS used innovative agent network and franchise models through 11 agro-dealers to implement innovative input supply models; input sales through agent and franchise outlets increased to \$23 million of input sales in the last reporting year, compared to \$2.9 million the preceding year. Last mile distribution is critical for market inclusivity and the ability of the market to support innovations is an indication of learning and risk-taking that is crucial for ongoing adaptation to shocks and stresses.

KCDMS supported agribusinesses to engage information and communication technology (ICT) firms to create tailored solutions to enterprise challenges; digitizing supply chains with ICT improves traceability and quality control. Grant and non-grant partners procured ICT solutions outside of KCDMS support, an indication of market change in response to new opportunities. For instance, the technology-enabled distribution company iProcure reached 310 agro-dealers and 1,464 farmers who are actively using the platform. Finally, as a result of KCDMS support to 56 enterprises to acquire ICT equipment, forms were using ICT in their day-to-day operations. The growth of the ICT sector to provide tailored services for agribusinesses is an indication that the market is realizing potential for offering specialized services, which can be critical in enabling firms and the market as a whole to respond to shocks and stresses.

Connectivity

Access to loans was relatively high at mid-term, with approximately two-thirds of respondents applying for loans from microfinance institutions and SACCOs. An overlapping 67% applied for a loan from a VSLA or SILC. Nearly all loan applications were successful. Ensuring full coverage of loans so that more smallholders and businesses could participate in PFAs and export activities was a challenge KCDMS tackled in the remaining years of the activity.

Adaptation (Market function 1 – Actors in the Mango VC are able to meet local mango demand despite shocks): Over the life of the project, 49,986 farmers, individuals or firms accessed finance as a result of KCDMS support; 15,190 of those farmers, individuals or firms accessed finance in 2022. The value of the loans was ██████████ in 2022 alone. The total value of the loans over the life of the project amounted to ██████████. The increase in number of and value of loans disbursed is an indication of increased connectivity in the market as finance underwrites all the business practices and strategies highlighted in this report; further, the stronger the relationships between lenders and businesses, the greater the capacity of the market system to issue new loans and adjust loan terms in case of shocks.

Examples of the shock-sensitive agriculture-oriented loan facilities supported by KCDMS include the following:

- Interventions in the last year of the project including technical assistance to 10 financial service providers (FSPs) to increase their agricultural lending portfolios; as a result of those activities, for example, Yehu Microfinance re-engineered and piloted its agriculture credit products, disbursing ██████████ to 453 smallholder farmers in the first 2 months of its pilot despite the challenges related to COVID-19 market interruptions.
- Another example is that of Faulu Bank, which established agribusiness hubs in KCDMS counties; in the last year, Faulu reached 5,834 smallholder farmers with agribusiness loans valued at ██████████, indicating the ability to manage the risk resulting from previous years' sales impacted by the fruit fly infestation.

4. Recommendations

Evidence-based decision-making

- Information asymmetry was a major challenge faced by KCDMS and a cause of vulnerability for a range of market actors, but especially producers. KCDMS achieved successes by presenting a clear value proposition to farmers on adoption of IPM techniques and of service providers in reaching more farmers. Messages focused on highlighting businesses that were succeeding so that others could copy them (e.g., technology adoption). Identifying platforms for reaching all farmers, especially due to low rates of participation in cooperatives, was critical for reaching adoption of fruit fly management techniques at scale. In this case, KCDMS improved the transparency and feasibility of export compliance certification through exporter investment in suppliers. Future programs should continue to focus on providing evidence of the business incentives for actors across various market functions to create both demand and supply for uptake of improved technologies and practices that will increase resilience to shocks.

Business strategy

- As a result of KCDMS interventions, qualified BDS providers are equipped to provide strategic support tailored to the specific profile of agribusinesses at varying stages of growth and development. Further support should focus on marketing the tailored services they can provide. For example, BDS providers now conduct diagnostic reviews and due diligence for beneficiary farmer groups, cooperatives, and small and medium enterprises (SMEs) to ensure adequate capacity and revenue flows are available to sustain upgrades to ICT platforms, and similar. Alternative off-the-shelf solutions can be found for nascent organizations or firms until their revenue streams strengthen. Another important service is developing turn-around strategies for agribusiness SMEs when impacted by shocks, such as price shocks or export market interruptions.
- Adapted technologies and strategies to reduce reliance on electricity and other scarce resources present opportunities for micro, small, and medium enterprises to improve resilience. Project support for the transition is critical to cover upfront costs and smooth the risk associated with acquisition of tangible and intangible assets. One example relates to the potential of power-usage-effectiveness technologies to reduce grid consumption by more than 30 percent. Due to ongoing challenges related to business continuity and costs resulting from brownouts and other power interruptions, transitioning to power-usage-effectiveness technologies such as solar water pumps and solar chilling technologies should be an area of future support.

Cooperation

- Cooperatives are key for procuring inputs and negotiating market alternatives when facing shocks. KCDMS support to cooperatives resulted in increased membership and diversification into new value addition activities that are less vulnerable to shocks. To continue this positive trend, further work is needed to advocate for professionalizing cooperatives, related, in particular, to recruiting and retaining qualified personnel. To combat politicization of cooperative leadership and resource allocation, BDS providers should assist with revisiting budgets and salary allocations; although programs can introduce incentive systems to reward cooperatives for meeting sustainability and profitability targets.

Competition

- Spray service providers have a critical role to play in the mango market and can help the market system become more resilient. Future programs should focus on strengthening spray service providers by linking them to input suppliers and helping them provide IPM services. Such interventions would specifically build resilience to pest-related shocks, such as fruit flies.
- Processing, traceability modalities and certification for export markets enable suppliers to meet higher standards and save costs, which is critical to sustaining the mango trade during shocks. KCDMS increased the linkages between buyers and aggregators, resulting in a more structured supply chain, thereby enabling producers to invest in meeting quality standards. Successes and lessons learned should be leveraged to replicate and scale these interventions. Apex organizations are well placed to take over this role from the project and need to be equipped to do so.

Power dynamics

- In the Kenyan context, mango apex organizations and mango trade associations play a critical role in the further structuring and strengthening of the sector due to the need to mitigate extractive and illegal activities. For instance, brokers serve a critical function as aggregators at the farm level; however, they can also be extractive. Cooperatives, on the other hand, are well-positioned to advocate with the county government for fair prices. Apex organizations and trade associations can strengthen the attractiveness of cooperatives for producers, to avoid side-selling, and put in place measures to ensure quality and prevent illegal activities that could undermine the export sector. Future programming should continue to replicate and scale KCDMS achievements in encouraging mango farmers to join groups and community-based organizations to benefit from collective marketing.
- Mango trade associations should be encouraged to explore the opportunities and benefits of owning BDS services, enabling them to institutionalize knowledge and ensure continued access to those services. The BDS model has proven successful for strengthening the operational and business capacities of aggregators, improving their bargaining power for issues such as prices, financial access, and policy development and implementation. On the whole, the growth and further evolution of mango associations will enable the market to better manage shocks (such as export market interruptions) and climate stresses (such as declining rainfall).

- An ongoing stress faced by market actors in the Kenyan context relates to heightened political activities during campaign periods preceding elections. For example, such activities can interrupt momentum due to fears of insecurity and channel the efforts and focus of top tier county officials away from market activities. To effectively weather these frequent periods of politicization and interruption to the smooth flow of market activities, associations should engage lower tier officials whose positions will not be affected by elections. Developing these relationships over time will help to sustain continuity of advocacy efforts and effective response to emerging threats despite periods of political interruptions. Further, KCDMS had success using virtual platforms to facilitate policy and advocacy efforts and facilitate in an uncertain environment; integrating virtual platforms into mandatory statutory steps will be helpful in sustaining engagement in the future despite shocks such as COVID-19 and insecurity.

Diversity

- Market and product diversification is key in building market resilience and sustainability. For example, agribusinesses that have ventured into dry fruit products, a nascent market, have penetrated new markets and regions, increasing their ability to buffer shocks to the export market for fresh mangoes. Further investments in the sector should leverage the shift into processing and value added to further support structure along the VC to improve aggregation and reduce smallholder reliance on sales in open or spot markets.
- Agribusinesses must build resilience against market shocks, in part by diversifying their markets and products as well as investments in digital marketing solutions. The successes of KCDMS support for innovative agent network and franchise models indicate the market system is more capable of learning and risk-taking which paves the way for ongoing adaptation to shocks. Future programming should leverage openness to adoption of new technologies and platforms through support to digital marketing platforms that can sustain market and product diversity during logistical interruptions or import or export shocks.

Connectivity

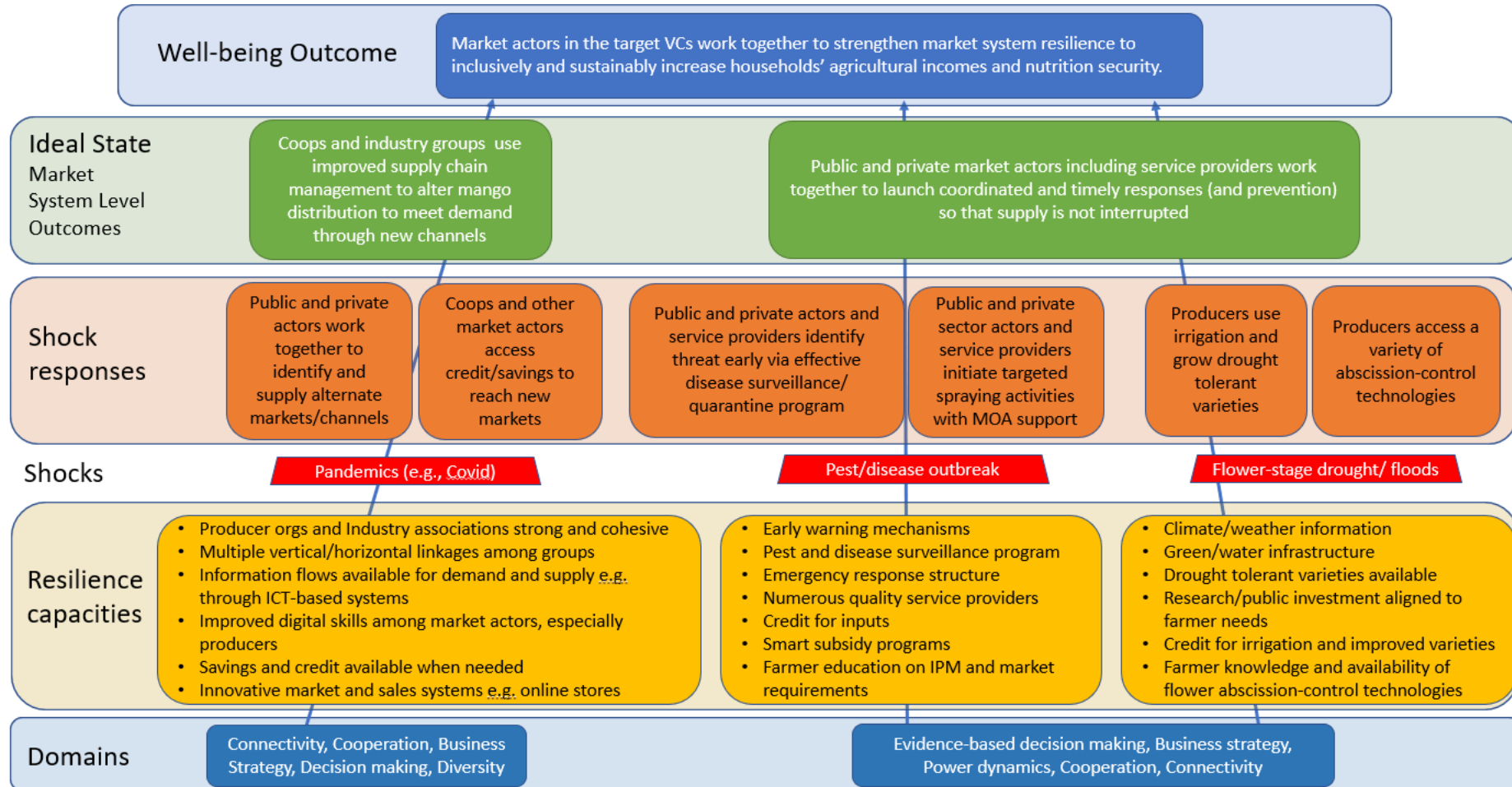
- Taking an ecosystem approach—whereby efforts on the supply side are complemented by demand-side activities, as well as addressing the enabling environment—requires patience and commitment but results in the greatest improvement in MSR. For instance, KCDMS supported the provision of different financing mechanisms in tandem with SMEs development of business plans and strong financial management practices and systems, while also ensuring a supportive regulatory environment.
- Through this process, it became clear that different FSPs, farm types, and agribusiness models need to be considered based on factors such as agro-ecological context, type of VC, demographic profiles, FSP capacity, and so on to tailor products to the risk profile of each. KCDMS successfully used a portfolio approach involving diverse financial instruments offered through a range of FSPs, not excluding patient capital from foundations and bank loans, coupled with grants. Working with diverse lenders and investors produced significant results in tackling the array of shocks and risks associated with climate change, uncertainties regarding the export market, and so forth.
- It is important to build FSP knowledge of VCs and assessment approaches to pinpoint risks and design specific de-risking instruments. Financial institutions (even small ones) desire credit guarantees schemes for agriculture loans so they can lend more to farmers because of reduced or shared risks, but they are often unsure where to start. KCDMS partnered with a local business school to develop tools financial institutions can use alongside BDS providers to carry out credit scoring based on specific business profiles that use alternate forms of collateral. For instance, one microfinance institution started using the number of export fruit trees to determine the value of finance they could provide.
- Success factors for future programs that will invest in building the capacity of credit staff on agribusiness financing include high staff retention and fluid staffing approaches to manage uncertainties in the sector. When such conditions were met, KCDMS interventions resulted in substantial new credit outflows for sectors traditionally perceived as high-risk.
- Future projects need to expand agriculture insurance offerings and link to financing instruments using an integrated approach and increased cooperative and farmer understanding of insurance mechanisms. There is still very low supply and uptake of agricultural insurance. KCDMS intended to initiate interventions with the insurance industry especially those that bundle with credit. However, wider engagement of leading insurance companies, only one organization adopted insurance and the results were not as hoped. There is a need for

further enquiry into the mechanisms, investments, and collaborative approaches that could be viably undertaken due to the importance of insurance in shock-prone operating environments.

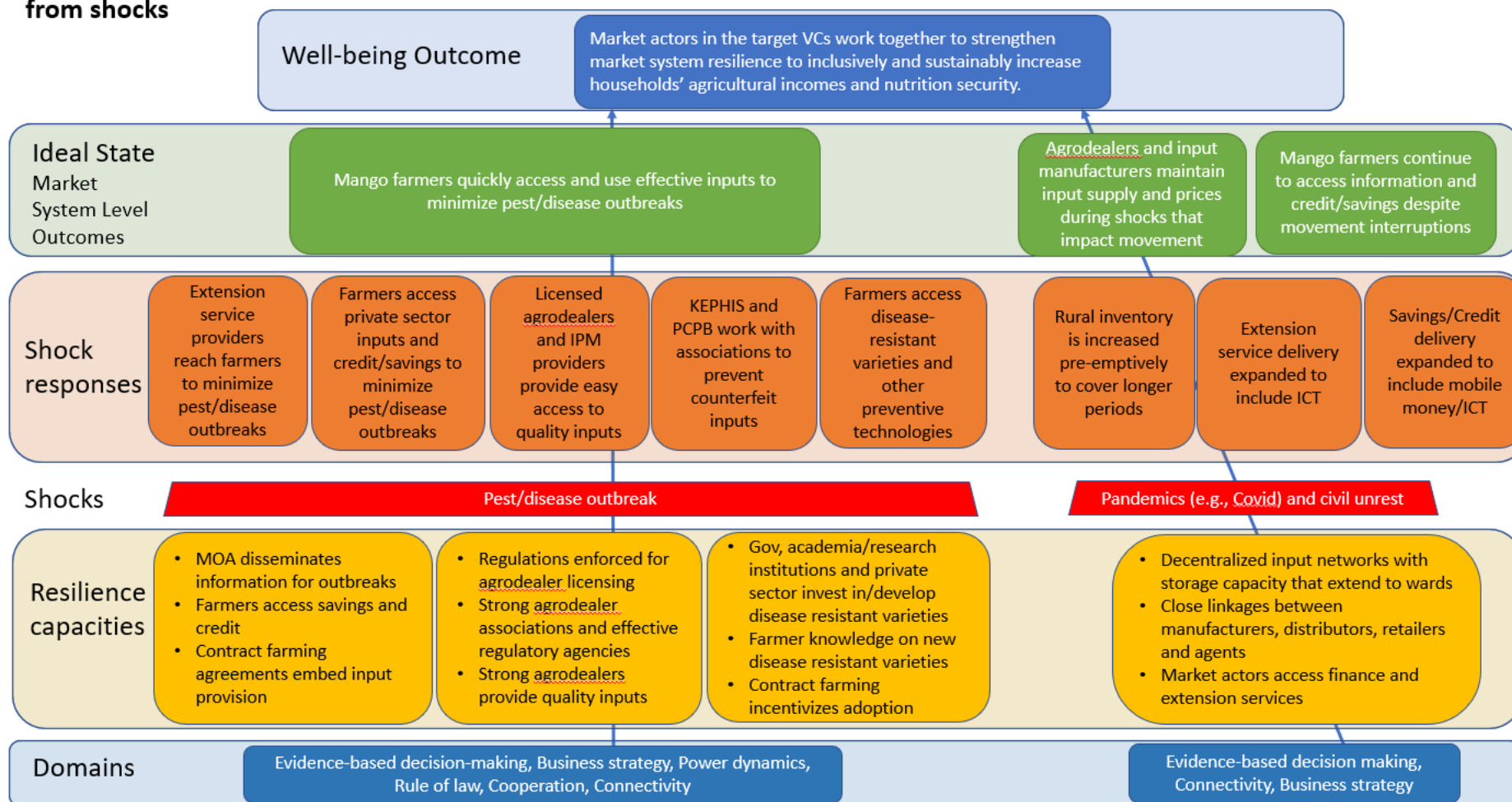
- Future projects should also focus on innovative and agile business models to attract long-term finance and mechanisms that help businesses evaluate these new models. We found that despite the shocks arising from COVID-19, army worm and locust invasion, and flooding in 2019, some businesses continued to access capital. Agile businesses, such as the franchising agro-input model and those that have adopted technology had higher chances, of obtaining external capital.

Annex I – Resilience Theories of Change per Market Function

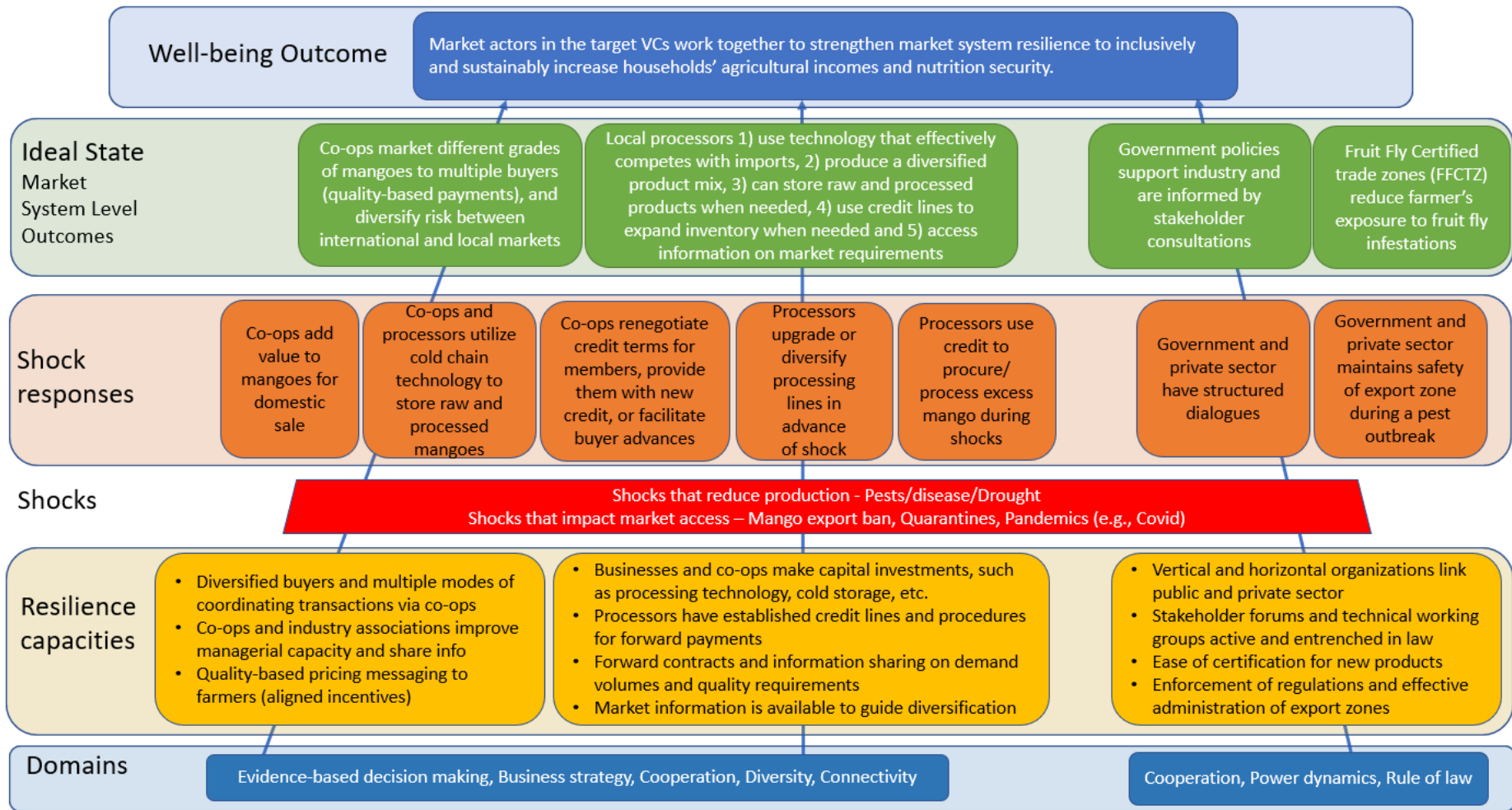
Market Function 1 – Actors in the Mango VC are able to meet local mango demand despite shocks



Market Function 2 – Mango farmers and other actors access productive inputs/services to prepare for, absorb, and recover from shocks



Market Function 3 – Actors in the Mango VC are able to sell their raw or processed mangoes during and after a shock/stress



Annex 2 – Charts and Graphs

Business strategy

Figure 2-1. Planning horizon for business decisions

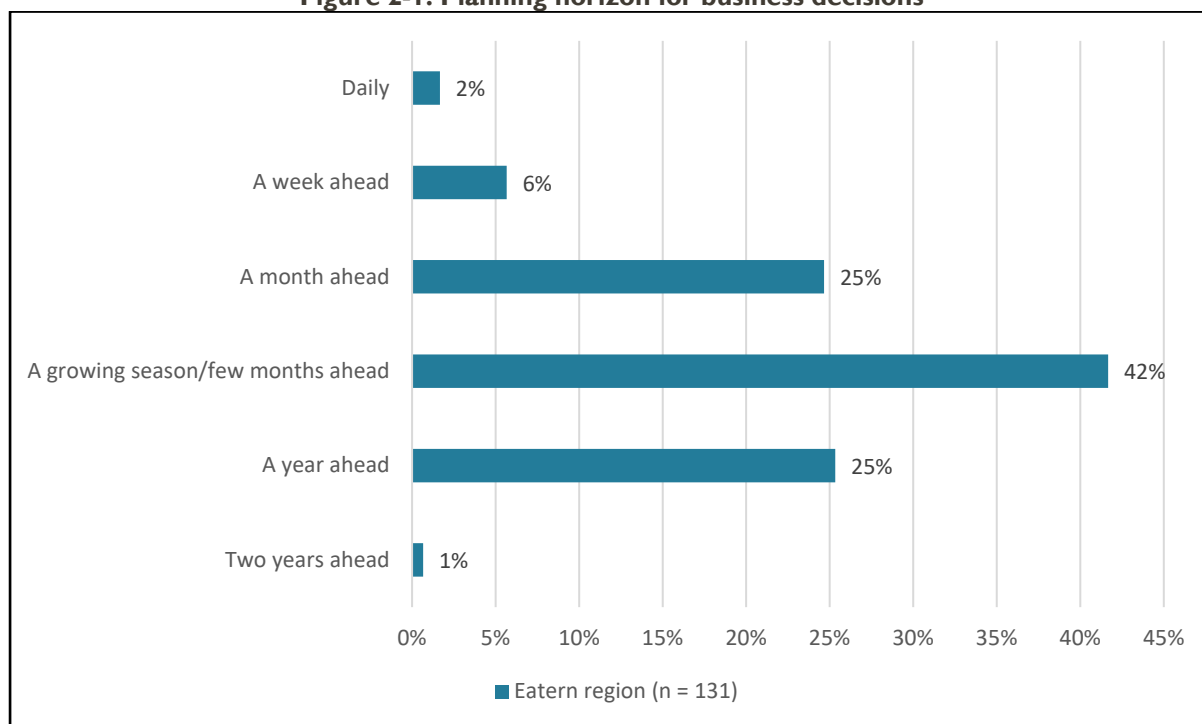


Figure 2-2. Types of business planning actors partake in (multiple selection question)

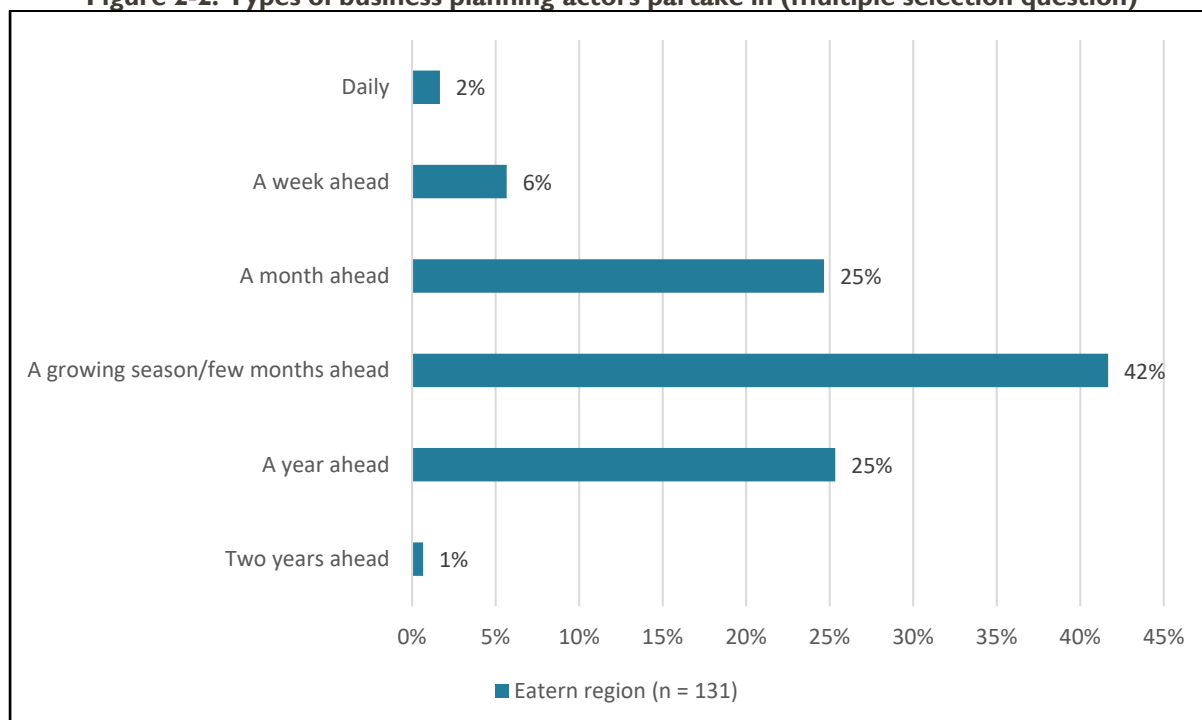


Figure 2-3. Opportunities provided for staff in the last 12 months

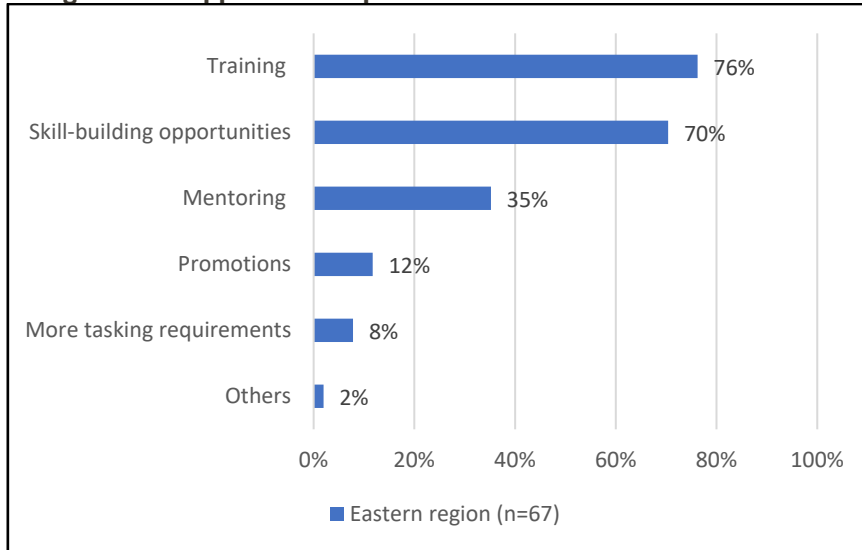
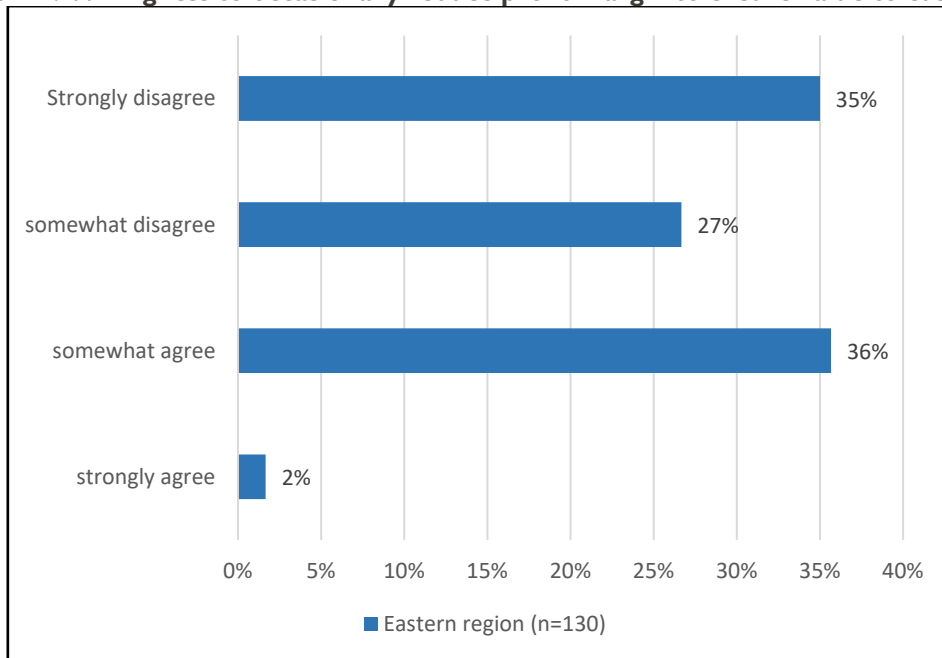


Figure 2-4. Willingness to occasionally reduce profit margin to ensure value to customers



Cooperation

Figure 2-5. Percent of producers belonging to groups and associations (multiple selection question)

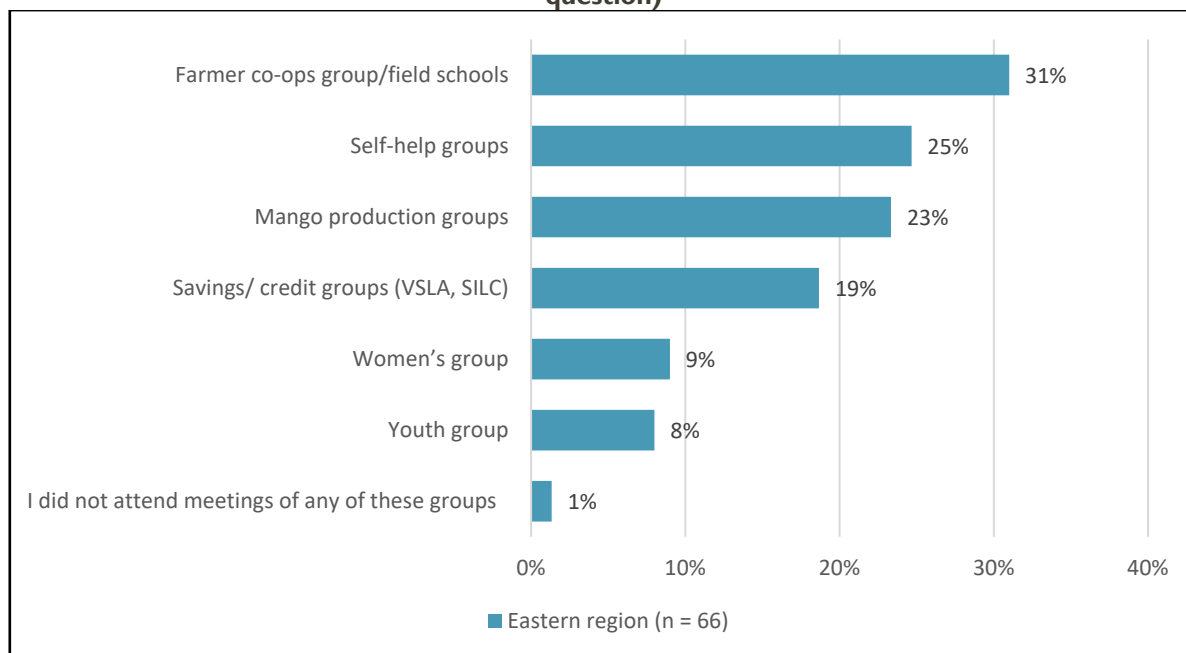


Figure 2-6. Percent of businesses belonging to groups and associations (multiple selection question)

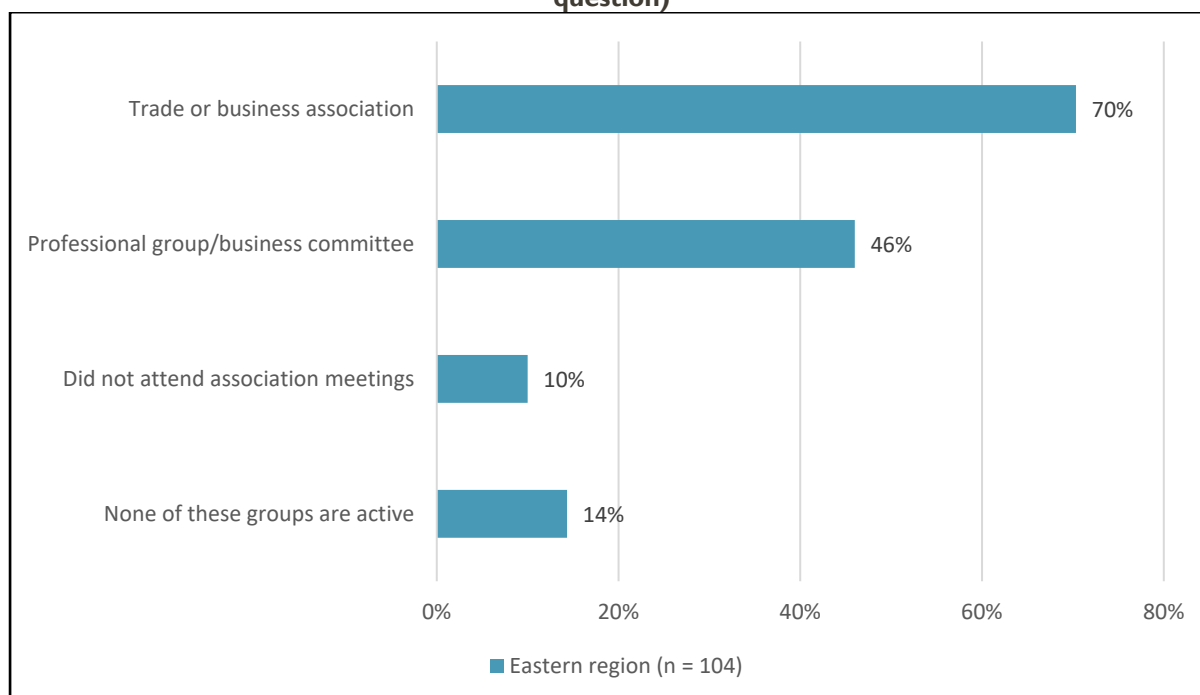


Table 2-1. Types of cooperation between businesses (multiple selection questions)

Type of Cooperation or Join Initiative	Eastern Region (<i>n</i> = 118)
Shared information with at least two other businesses	79%
Shared services such as transportation services, security services, processing services, storage facility, or advertising	34%
Agreed to joint quality standards to try to improve the sector's reputation and/or sales	23%
Jointly advocated to suppliers, government or others to improve business environment (e.g., seed certification, aggregation)	9%
Jointly purchased products or services to meet a threshold or access volume discounts	5%
Joint marketing to provide bundled service or some other benefit to customers	2%
<i>None of the above</i>	5%

Table 2-2. Types of support provided to suppliers and service providers (multiple selection question)

Types of support	Eastern region (<i>n</i> = 35)
Linked them to extension services	53%
Provided them with cold storage rooms to preserve their produce	52%
Encouraged farmers to enter into future contracts with off-takers at stipulated minimum price in advance of the harvest season	39%
Helped to form cooperatives or aggregation centers	33%
Linked them to disease surveillance systems	25%
Linked them to horticulture traceability systems	6%

Competition

Table 2-3. Frequency of business agreements between businesses and suppliers/brokers

Agreements with Suppliers or Brokers	Eastern Region (<i>n</i> = 131)
Frequently	27%
Occasionally	61%
Rarely	9%
Never	3%

Figure 2-7. Businesses experience on adherence to agreements

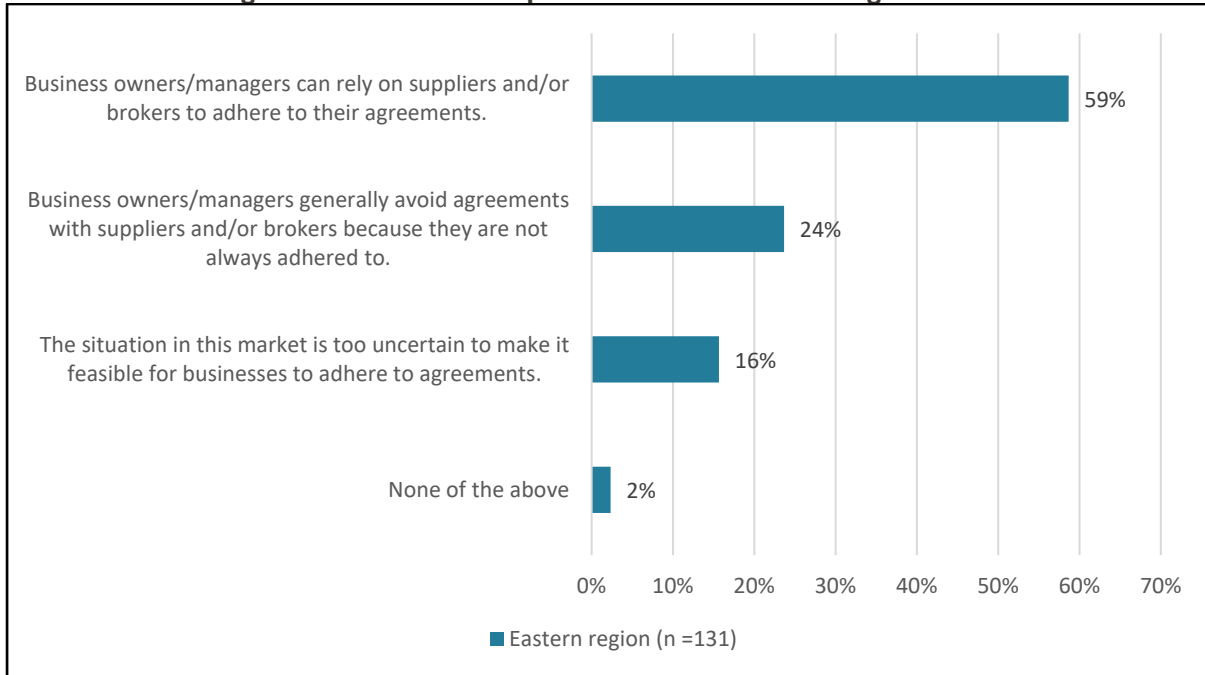
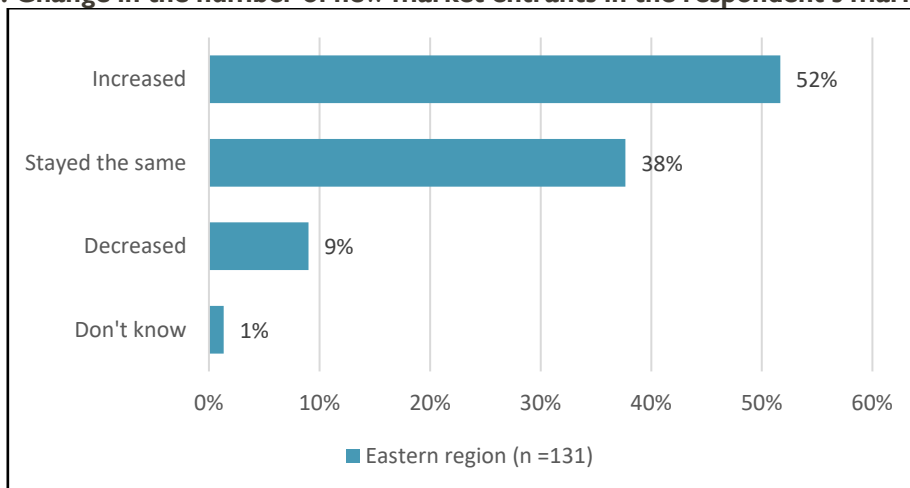


Figure 2-8. Change in the number of new market entrants in the respondent's market segment



Rule of law

Figure 2-9. Number of disputes witnessed by respondents involving competitors in the market

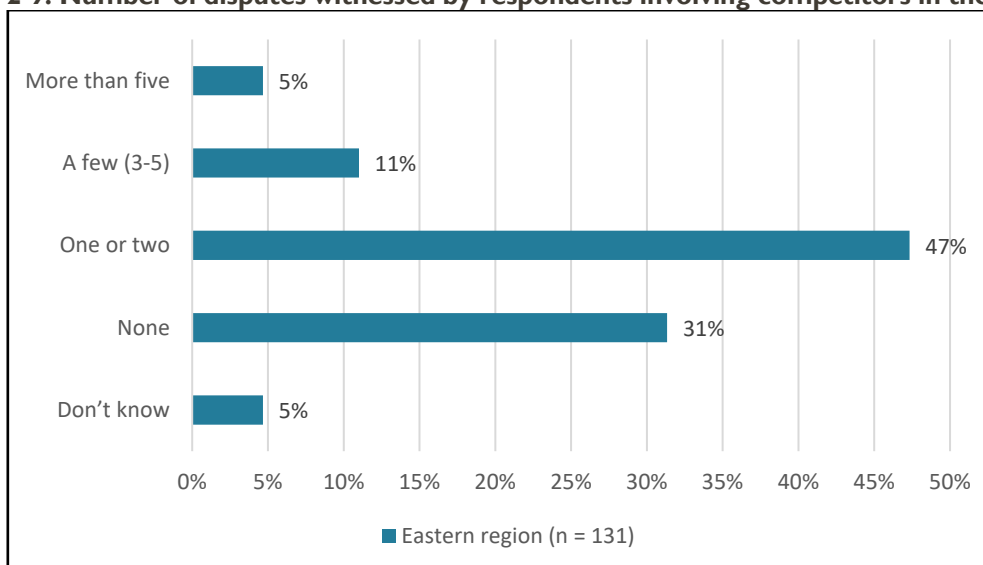


Figure 2-10. Proportion of disputes settled among competitors

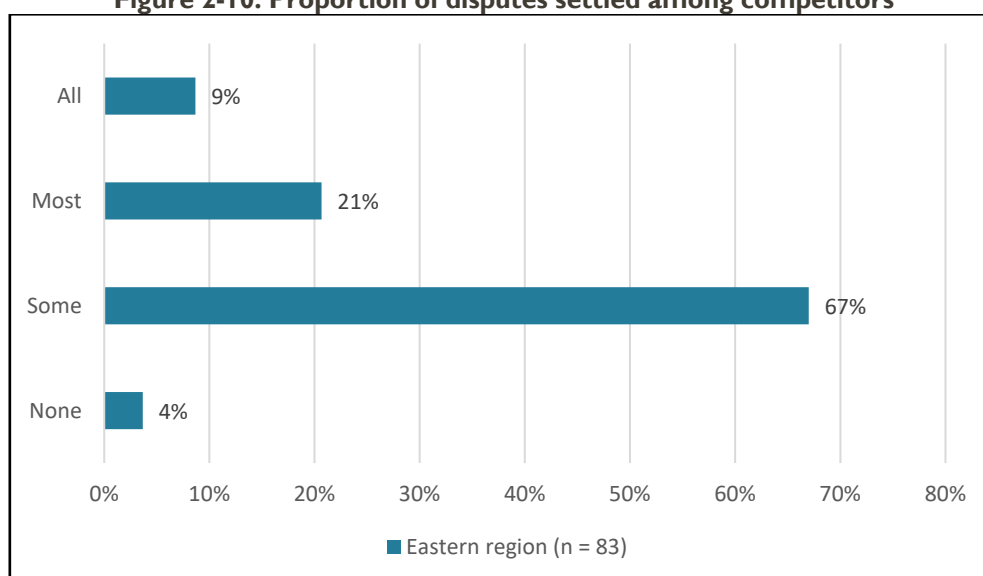
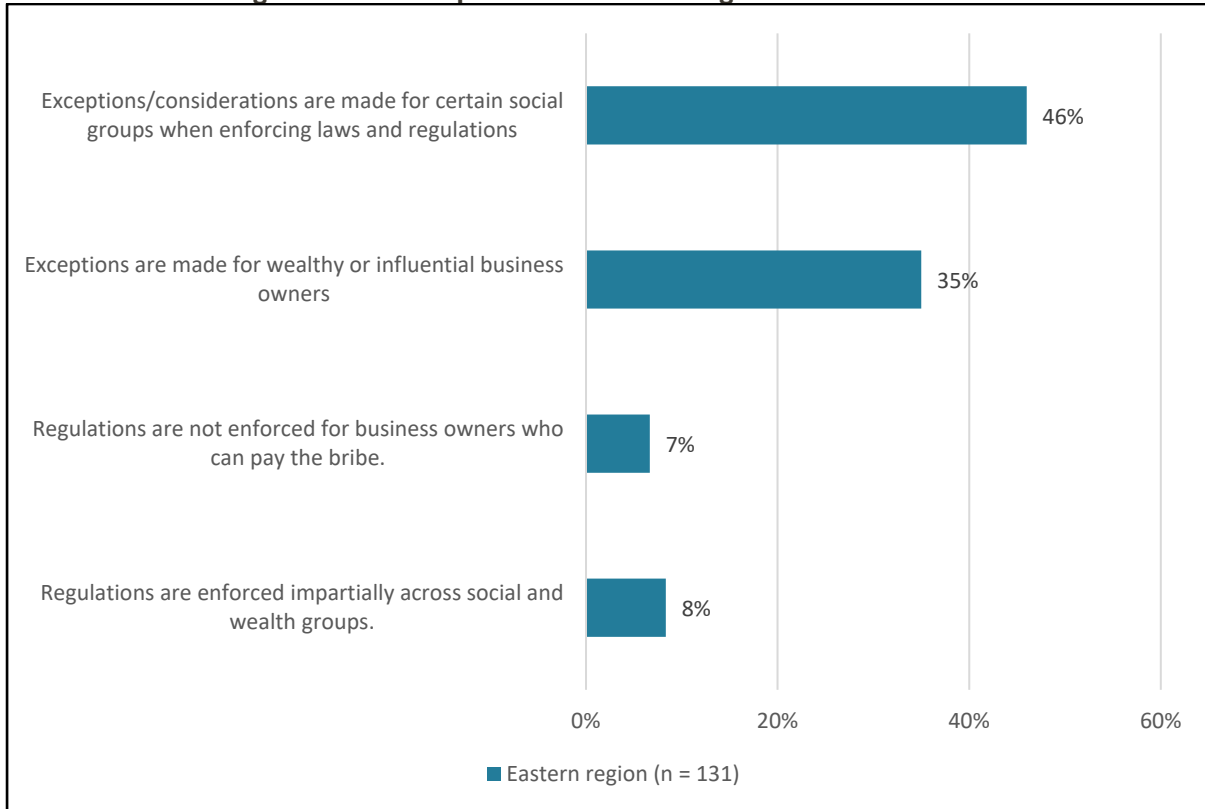


Table 2-4. Distribution of responses on portion of disputes settled fairly

Response options	Eastern Region (n = 131)
Some	46%
Most	20%
All	17%
Do not know	17%

Figure 2-11. Perception of fairness in regulation enforcement



Diversity

Figure 2-12. Number of channels used to source products and services

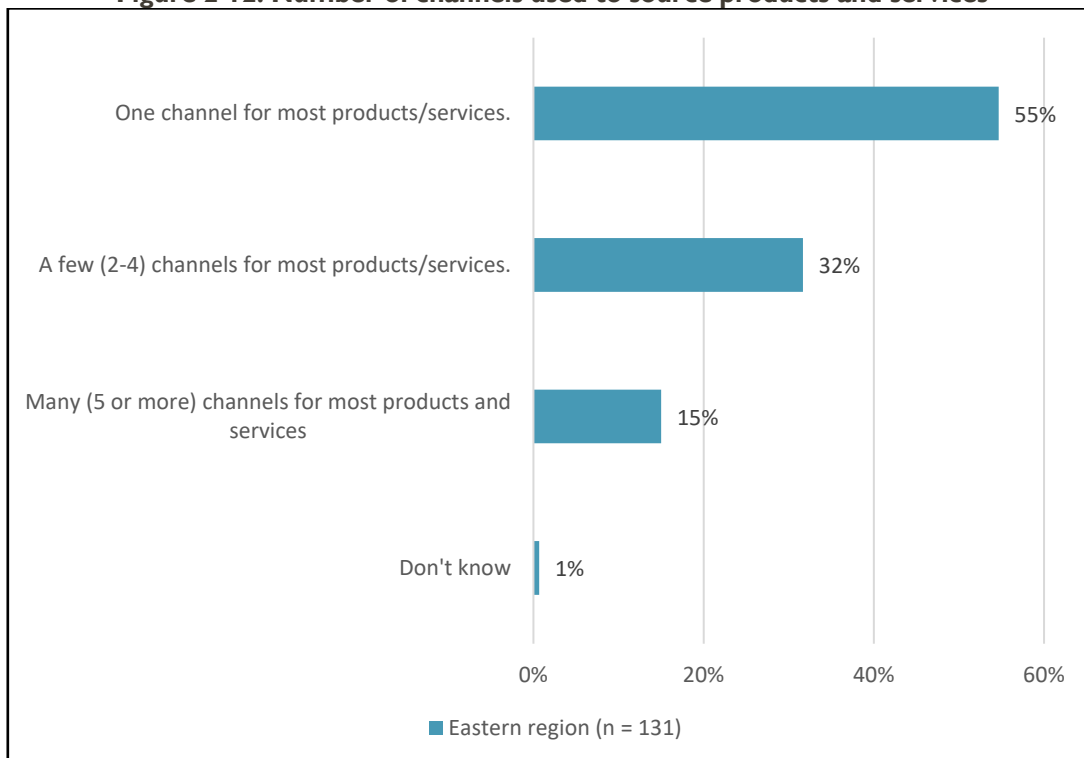


Figure 2-12. Motivation for dealing with start-ups (multiple selection question)

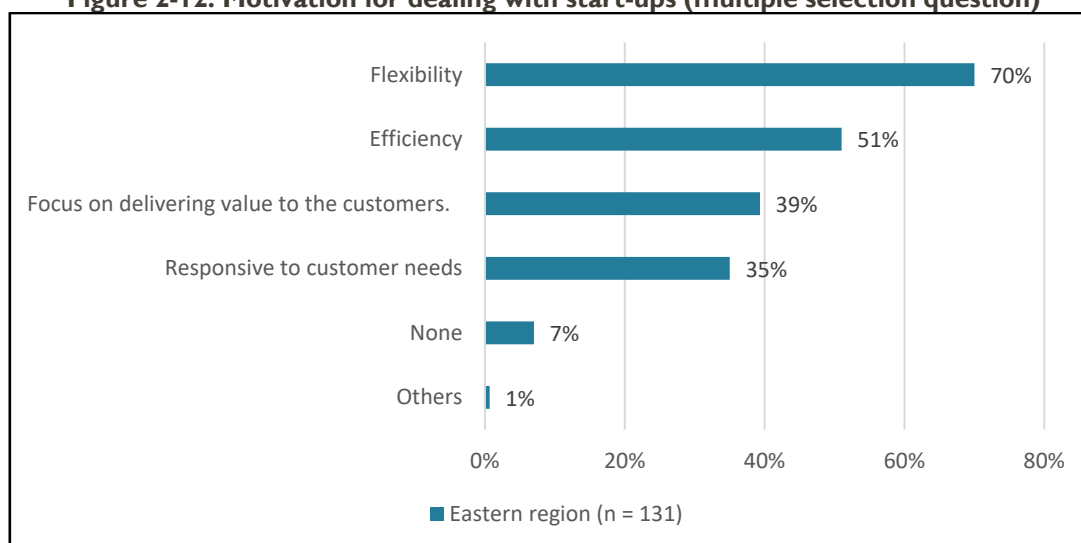


Figure 2-13. Disadvantages of dealing with start-ups (multiple selection question)

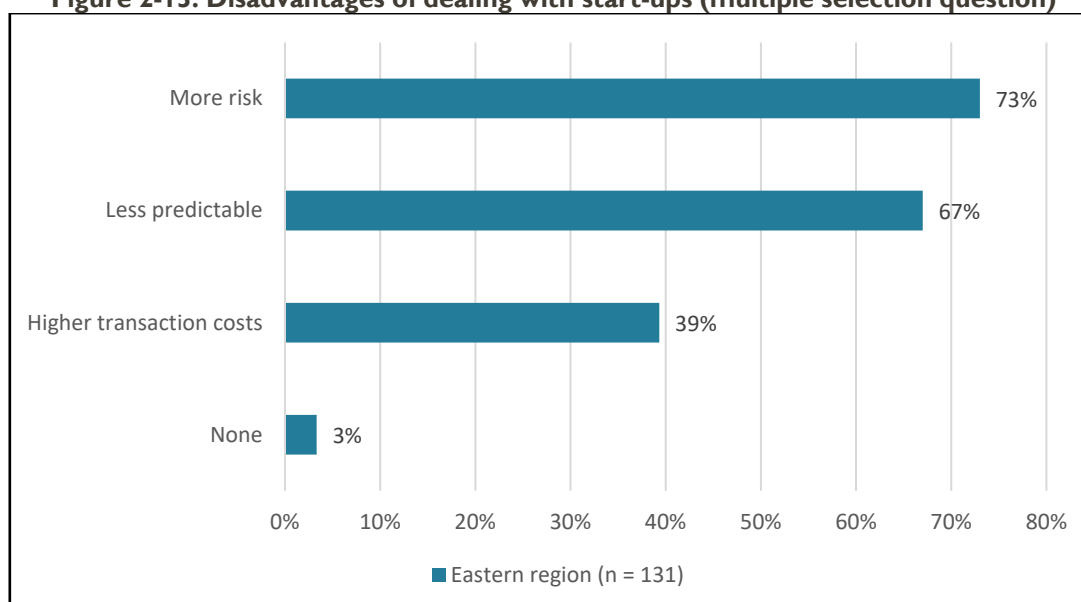


Table 2-5. Businesses arrangements in the past 12 months (multiple selection question)

Type of arrangement	Eastern Region (n = 131)
Business offering a previously unavailable service	38%
Business offering services accessed via digital means	24%
Business using a previously unavailable franchise model	23%
Business bundling services or products in a new way	20%
Other innovative models	2%
None of these businesses	22%

Connectivity

Figure 2-14. Source of formal loans (multiple selection question)

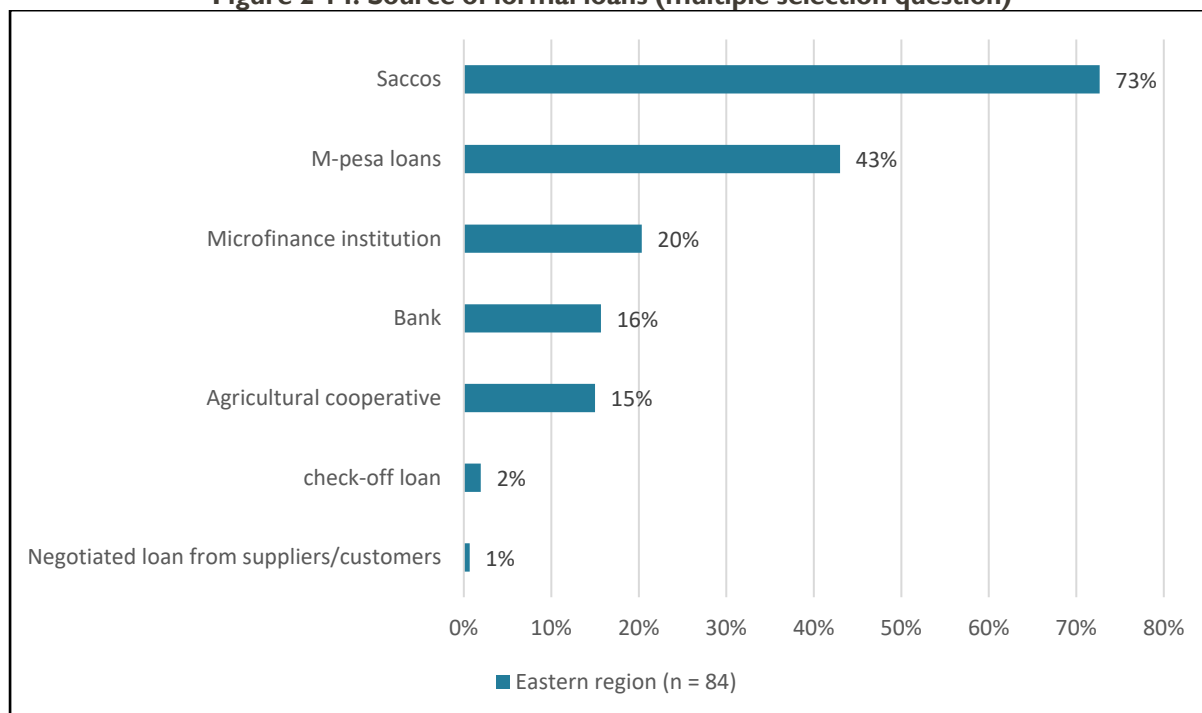
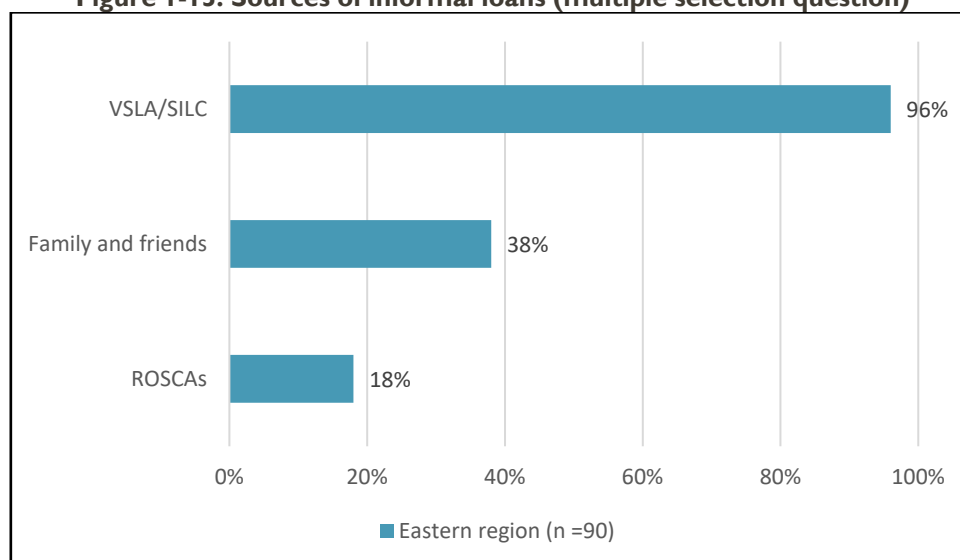


Figure I-15. Sources of informal loans (multiple selection question)





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