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Strengthening resilience in Africa's food value chains

Exploring the concept of resilience and its dimensions given the effects of the COVID-19 pandemic

Haki Pamuk, Rowena Namatovu, Deborah Bakker, Seerp Wigboldus, Jan Ubels and Bart de Steenhuijsen Piters

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Working Paper

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SNV Netherlands Development Organisation (SNV) is a not-for-profit international development organisation that makes a lasting difference in the lives of people living in poverty by helping them raise incomes and access basic services. We aim for premium quality and focus on three sectors: agriculture, energy, and water, sanitation and hygiene (WASH).

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We implement our programmes entirely through project funding awarded by public development agencies, foundations, multilateral banks, governments and the private sector. This requires us to work efficiently, realise effective solutions and invest in operational excellence every day.

CORE-Africa (COVID-19 Response and Resilience Initiative for Food Value Chains in Africa) assists nine DGIS-funded projects in responding to COVID-19, particularly in ways that contribute to resilient food systems and strengthen the coping ability of actors in those systems. Launched in July 2020, CORE focuses on nutritious food value chains including horticulture, dairy, oilseeds, pulses and livestock.

Key words: Resilience, vulnerability, COVID-19, food systems, food value chain, sub-Saharan Africa

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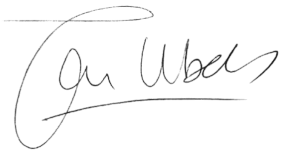
Preface

The COVID-19 pandemic and related measures have brought to the fore a variety of vulnerabilities in agriculture and food systems. Such vulnerabilities often highlight structural challenges of the food value chains and systems concerned. As we continue to deal with the implications of the pandemic, some important questions are: How to respond immediately in the face of shocks and stressors? What can we learn from the impacts of COVID-19? And how can we 'build back better' and act on strengthening the resilience of these food value chains and systems?

In autumn 2020, SNV and Wageningen Economic Research decided that it was relevant to bring together SNV's on-the-ground track record and WUR's research reputation to get to grips more precisely with the concept of resilience and its practical application. Relevant for our own staff as well as for partners and value chain actors, we are collaborating within a variety of programmes and settings. That, then, is what this document sets out to do: help the reader to understand in concrete and specific terms what food value chain resilience is and how it can be pursued in concrete situations and challenges.

This is not a finished conversation. The dimensions and frameworks provided in this document are a first attempt to operationalise our understandings of food value chain resilience. The application to agri-SMEs in this document is just the beginning of our trajectory towards deeper understanding and is presented as an initial example. CORE-Africa, SNV's 'COVID-19 Response and Resilience Initiative for Food Value Chains in Africa', is presently looking more profoundly at resilience in a variety of topics: a) farmer inputs and services, b) consumer market channels, c) digitalisation, and d) hygiene integration in value chains.

With this document we hope to provide the reader with an effective concept to better understand food value chain resilience and a starting point for actively using it. SNV and Wageningen Economic Research will continue to collaborate in deepening understanding of and action on resilience in food value chains and systems. The authors welcome your inputs and feedback.



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1 Introduction

In recent years, increasing attention has been given to food system resilience, not only by policymakers, scholars and development practitioners but also among communities of consumers, agribusiness entrepreneurs, and producers. Prior to 2020, there was already an interest in the topic. However, the impact of COVID-19 felt globally on food production, markets, trade, as well as subsequent food availability and accessibility effects for consumers, has stimulated even greater attention to food system resilience. Now that food system resilience is high on the agenda of many stakeholder fora, confusion about its meaning and practical application is increasing. The term 'resilience' is well on its way to becoming the next buzzword that serves opportunism and popular speech, rather than facilitating real joint understanding and action between actors who need to work together to address the urgent issue of vulnerabilities in our food systems.

In sub-Saharan Africa (SSA), the COVID-19 situation[1] has exposed vulnerabilities in food systems and food value chains – some relatively new, and others already existing. These include farmers facing agricultural input shortages due to import disruptions stemming from border closures and other logistical restrictions, such as delays due to more stringent and lengthier health checks at border ports. Many businesses in all economic sectors have had to cease operations temporarily, permanently or downsize. This has resulted in job losses and ultimately overall decline in purchasing power, affecting consumer demand and preferences for food products. Food processing activities have also been affected as enterprises have adhered to social distancing guidelines. In addition, traders and consumers have faced difficulties accessing physical markets to sell and buy food given stay-at-home measures. Considering the relatively poor health system infrastructure and the number of people already living below or close to the poverty line, the initial predicted impact of the pandemic on sub-Saharan Africa (SSA) was one of devastation. However, at the time of writing, in December 2020, the official number of cases, COVID-19-related deaths and rates of transmission have been lower in SSA than in other regions. Nevertheless, the impacts of the COVID-19 situation across the continent continue to evolve and raise serious concerns.

Emerging evidence from many low- and middle-income countries (LMICs) indicates that small and medium enterprises (SMEs)[2] in domestic and regional food value chains are among those that have been adversely affected by government responses aimed at mitigating the human health effects of COVID-19. Most midstream food-related enterprises in LMICs are SMEs, producing and trading significant amounts of food in value chains and contributing crucial investments. Despite their wide and varied contribution these economic sectors and actors are referred to as the 'hidden middle' (Reardon 2015), while they are all but hidden in LMIC economies. Many SMEs in LMICs operate informally and are therefore not registered and 'captured' by formal institutions, including the tax office. This may explain the difficulties faced by formal institutions in meaningfully engaging them and why they have often been secondary in development policymaking and programming.

[1] COVID-19 situation is used here to express the immediate public health threat of the COVID-19 virus as well as government responses and measures to contain its spread. This also includes economic and social effects that are often the result of response measures rather than the virus itself.

[2] In this paper, SMEs are defined as businesses that employ fewer than 250 employees. Micro-enterprises employ a maximum of 10 employees.

This paper explores the concept of resilience, its dimensions, and proposes a framework for its application in food value chains in SSA. We have written this paper for development actors working with value chains and policymakers, to provide guidance in understanding value chain resilience, areas of vulnerability and, above all, explore plausible pathways and actions to strengthen resilience. Particular attention is given to (agri-)SMEs.[3] Whilst this working paper has been developed in the context of the present COVID-19 situation it is also relevant for broader and more systemic resilience questions and action perspectives. The paper does not aspire to explain everything about food system resilience and SMEs. In this paper we address a double challenge: 1) unpacking food system and food value chain resilience concepts, and 2) applying these to SMEs and coming to meaningful actions. There are many differences in opinion and different angles from which the subject matter may be approached. Resilience has often been used in the environmental and climate adaptation fields. It is important to note that, in response to the COVID-19 situation, this paper seeks to deepen and operationalise the concept of resilience with a particular eye on socio-economic shocks and stresses. As such, this paper provides an initial exploration of the concept of resilience and its application to food value chains and systems, as well as related action perspectives and intervention repertoire. On this basis, and as a next step, SNV Netherlands Development Organisation (SNV) is shaping up a more applied and focused methodological framework, intended to support its ongoing initiatives and in informing new initiatives.

In Chapter 2, various concepts and definitions about resilience and vulnerability are explored. Chapter 3 provides a framework for the application of insights from Chapter 2 to identify and implement resilience strengthening interventions. This framework is then applied to agri-SMEs in SSA in Chapter 4. Chapter 5 provides key recommendations and conclusions.

[3] 'Agri-SMEs' or 'agricultural SMEs' and 'SMEs in domestic and regional food value chains' are used interchangeably here to refer to SMEs that directly engage in agriculture related activities or provide support functions such as digital marketing platforms. References to 'SMEs' includes SMEs across all economic sectors.

2 Making sense of vulnerability and resilience of domestic and regional food value chains[4]

2.1 Background

This chapter introduces selected resilience concepts and perspectives relevant to local food value chains and discusses key considerations for resilience strengthening in light of socio-economic shocks and stresses, such as the recent COVID-19 pandemic.

Shocks: (Unexpected) events which have a disruptive effect. These can have different and/or combined origins and characters such as economic (e.g. stock market crash), political (e.g. a coup), environmental (e.g. drought).

Stresses: Prolonged disruptive pressures.

Risks: The likeliness that a combination of vulnerability and exposure to shock will lead to disruption. Risk, in this view, is a function of the likeliness of shock exposure and vulnerability (effects of shocks and stresses when occurring).

Besides the effects of COVID-19, there are other shocks and stresses impacting food systems that announce themselves, such as climate change, financial crises, resistance against antibiotics, and various zoonoses associated with intensive livestock keeping. These shocks and stresses have triggered changes in society's expectations regarding the outcomes of our food systems, to not only focusing on increased productivity to ensure adequate supply of safe food but, also including for example, less negative impacts of agriculture related activities on the environment and other sustainability dimensions. In recent years, this has entailed increasing attention to the ability of food systems and food value chains therein to remain stable, recover and continue growing or functioning in the face of such shocks – and therefore be more resilient.

Holling (1973) first applied the concept of resilience - human abilities to absorb sudden shocks - to ecological systems in 1973. Since then, its application has been used in many fields including engineering, sociology, socio-political systems, food systems and economic development, amongst others.

For the purpose of this paper, we do not provide a complete overview of the variety of interpretations and applications of the concept of resilience. Rather, we **select, synthesise**, and **summarise** a few useful concepts and present a limited set of helpful perspectives. We consider these perspectives useful for understanding resilience in the context of agri-food value chains. Much of this, however, will also apply to other fields of work.

2.2 Resilience concepts and perspectives

Resilience is about the capacity to prevent and deal with the consequences of vulnerabilities as a result of exposure to shocks or stresses. A basic definition of vulnerability is 'the propensity or predisposition to be adversely affected' (Mitchell and Harris, 2012). This definition provides a general idea of vulnerability, but also begs many questions, such as *What specific thing is vulnerable exactly?* and *Why is something vulnerable?* Vulnerability and resilience are two complementary perspectives on interaction with shocks and stresses: vulnerability relates to the lack of capacity to prevent or withstand negative impacts, and resilience relates to the capacity to do so (Miller et al. 2010). Vulnerability and resilience play out at the same time. However, it is important to note that shocks, stresses, and vulnerabilities can be turned into opportunities when actors are able to respond to shocks, and hence reinforce their resilience capacity.

[4] Domestic and regional value chains here (used interchangeably with local value chains) distinguishes between crop value chains that are largely produced and largely consumed on the African continent from those largely produced but largely consumed outside the continent such as coffee and cocoa.

Vulnerability and resilience depend on context. Resilience and vulnerabilities are influenced by particular geographies (e.g. countries, localities), and conditions (e.g. political, economic, social). General ideas on resilience therefore need to be translated to the specifics of a particular situation. What (potential) shocks and stresses are relevant, what exactly is vulnerable, and to what extent individuals, groups, organisations, countries, etc. are resilient, needs to be translated to the specific contexts and settings. For example, describing desired resilience outcomes for an urban community in Ireland will be different from describing them for an SME in an agri-food value chain in Uganda. Approaches to strengthening resilience will only be as good and appropriate as the understanding about the setting relevant resilience dimensions and dynamics that they are based on.

A common element in resilience definitions that is relevant for local food value chains is the ability to ensure that (core) functions of the food value chain are continued in the face of shocks and stresses. This is achieved by activating absorption, adaptation, and transformation capacities to prevent and withstand the negative impacts of shocks and stresses. Figure 2.1 illustrates how risk management (in anticipation of potential shocks) and disaster management (in response to shocks) involve strengthening and activating resilience capacity. Resilience, in this perspective, concerns the ability to prevent or adjust flexibly to shocks and stresses in order to reduce their impact on (core) functions of the system, such as continued provision of nutritious and affordable food for the consumers despite production shortages in the food system context. Robustness is regarded as a subset of resilience by some (e.g. Meuwissen et al. 2019). Robustness typically applies to physical systems and structures, including ICT. A resilience strategy may include making certain structures more robust to be able to withstand shocks and stresses (see Figure 2.2).

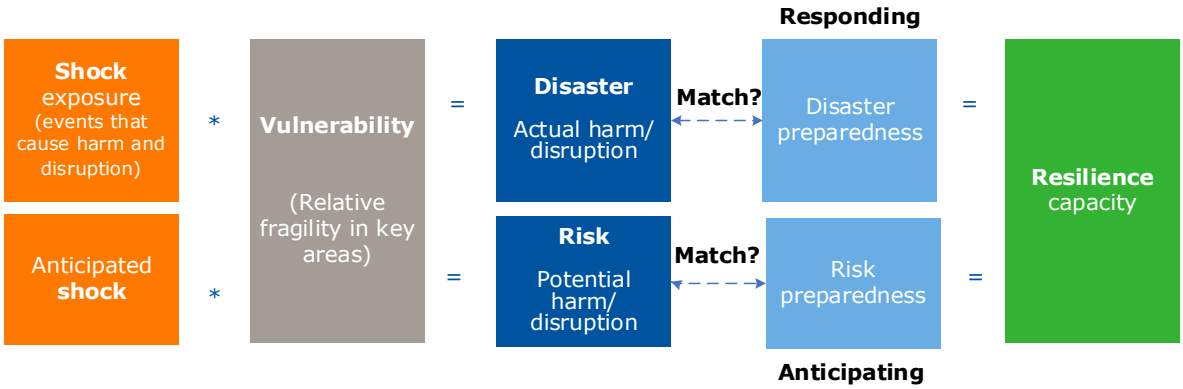

Figure 2.1 *A coherent perspective on key concepts on resilience*
Source: Adapted from McKinsey 2020

The resilience of local food value chains depends on the combined and interactive resilience of all actors and processes in the chain. Neither vulnerability nor resilience happens in isolation; resilience of local value chains depends on how and/or the extent to which risks are shared along that value chain. Some actors take a larger share of risks, for example, farmers may face a higher percentage reduction in their profit margins compared to other actors along the chain. When pursuing understanding of the vulnerability and resilience of any value chain actor, one needs to understand how this is shaped by both their internal state of affairs and by external conditions and connections (Kamalahmadi et al. 2016).

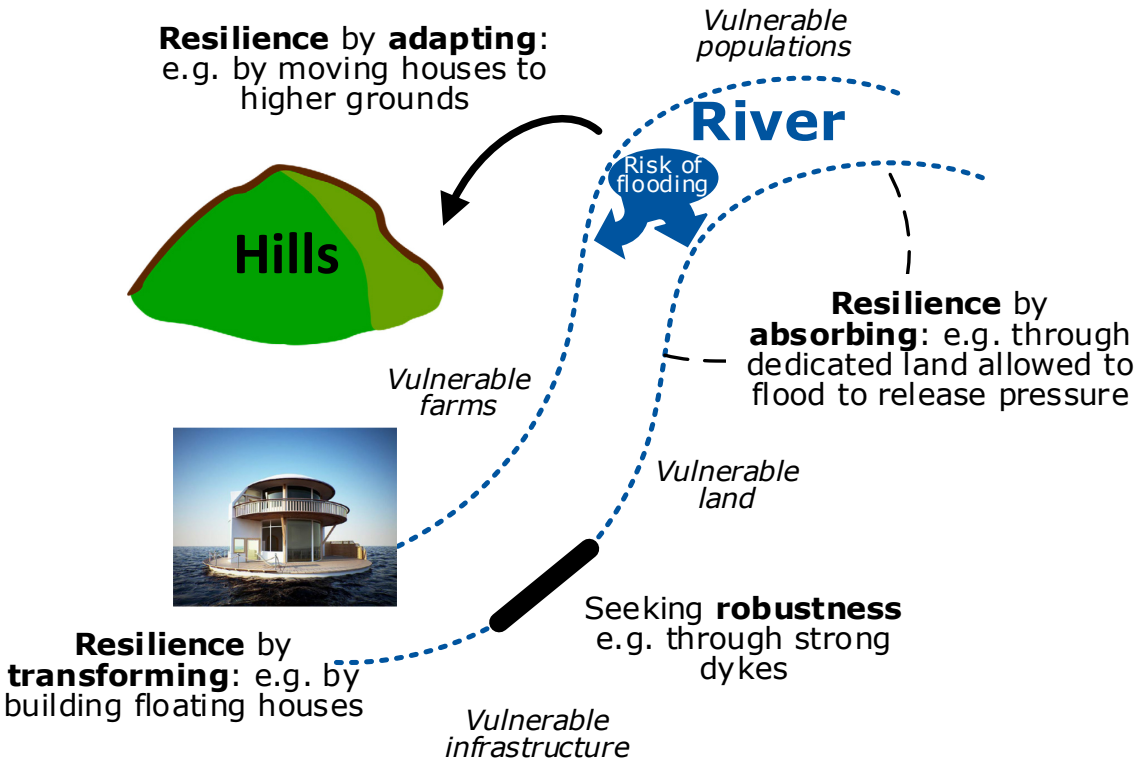

Figure 2.2 *A metaphor to illustrate ways of operationalising resilience*
Source: Authors own

To operationalise resilience concepts and develop resilience strengthening strategies, it is necessary to unpack its dimensions (e.g. resilience subjects and types of resilience) rather than trying to capture it in a single sentence definition. Table 2.1 provides a summary overview of such key dimensions and dynamics related to resilience relevant for food value chains (Wardekker et al. 2020 is a key source for this). The table explains that resilience strategies can be shaped for different **orientations of resilience** (what exactly is meant to be supported/protected through resilience or an ultimate well-being outcome e.g. food and nutrition security, biodiversity?) and what the desired **resilience outcomes/objectives** are (what should be achieved?) and within a specific **resilience timeframe** (pre-, during or post-disruption?). A resilience strategy will also include specific choices about **resilience intervention areas**, (addressing one or more areas of vulnerability) that serve specific **resilience subjects** (what/who is to become more resilient?), and **capacities** that can effectuate resilience. These resilience capacities include:

- **Anticipation capacity**: the ability to access and analyse information to inform plans
- **Absorptive capacity**: the ability to absorb the impact of shocks and stresses to reduce negative impact on basic household, organisation, nation or system functions. It allows for maintaining stability and requires effective coping strategies
- **Adaptive capacity**: the ability of households, organisations, nations and systems to flexibly learn and adjust to shocks and stresses through incremental changes. This also includes the ability to take advantage of new opportunities that arise from disruptions
- **Recovery capacity:** the ability to continue, grow and prosper following a shock
- **Transformative capacity**: the ability to change the structure or nature of the system, which requires inclusive and participatory governance systems.

One can measure the resilience of a food value chain (or specific parts of it) by measuring the resilience capacities that reduce or mitigate the effects of shocks and stresses on its functioning and the wellbeing outcomes (goal) of that chain (e.g. household food security). Resilience is not easily measured. Measuring the resilience level of a value chain and whether its functions continue, is easiest once a shock or stressor to the system has already taken place by making comparisons with pre-shock levels. However, it is also possible to measure the resilience capacities of value chain elements and/or actors to respond to shocks and stresses using proxy indicators before a given shock or stress (Picon 2018).

For example, FAO's resilience capacity index uses proxy indicators for resilience capacity to measure household resilience in a food security context (FAO 2016). These proxies include (but are not limited to) measures on access to basic services (e.g. source of drinking water, distance to water sources, primary schools etc.), household assets (e.g. car, bicycle, machete, tractor, livestock ownership), social safety net (e.g. formal and informal transfers to the households), adaptive capacity (ability to read and write, education level, diversity of income sources) (FAO 2020), combined to construct the resilience capacity index. Indicators of resilience capacities should be measurable attributes of a value chain (e.g., actors' access to finance, education level). These attributes that indicators measure must have the potential to change the effect of the shocks and stresses on the value chain by allowing value chain actors to return to an acceptable level of well-being (Constas et al. 2014). Measurement strategies will likely revolve around the definition of resilience adopted with more robust measures using multiple proxies that measure short term and long-term coping strategies.

Table 2.1 *Unpacking eight dimensions of resilience*

Terms used	Related question	Options and choices	Relevance for guiding analysis and action	
Resilience orientation	GOAL: What exactly is meant to be supported/protected through resilience (ultimate well-being outcome)?	Options: public goods, private goods, including sustainability, inclusiveness, etc.	Being clear about the overall motivation for resilience building in a particular case	GENERAL STRATEGIC DIMENSIONS
Resilience outcomes	AIM/OBJECTIVES: What should be achieved through resilience?	Options: stability (keep services and benefits at same level), predictability (keep expectations the same), coping (keep functions the same), thriving (keep being able to grow/prosper), system transformation (change functions, remove vulnerability) etc.	Being clear about what nature or level of resilience would match the aspired overall (goal) to be maintained	
Resilience timeframe	WHEN: What is the moment that a resilience effort is undertaken vis-à-vis a certain (type of) shock or vulnerability?	Options: pre-disruption, mid-disruption and post-disruption	Informs the choice between different kinds of strategies/interventions: reactive strategies, concurrent strategies or proactive strategies	
Resilience intervention areas	FOCUS: What area(s) of vulnerability can resilience interventions focus on?	A focus is shaped by emerging vulnerabilities and choosing between (or combinations) of intervention areas: targeting different resilience subjects	Understanding high risk areas, key dynamics and interrelationships and ultimately areas in which resilience can be strengthened	CONTEXT-SPECIFIC DIMENSIONS
Resilience subjects	WHO: Who and what can be vulnerable/resilient?	System level: food system, value chain, market system, farming systems or parts of these Actor level/perspective: people and/or units of people such as communities and households as well as public and private organisations/domains within a value chain/food system Other/overlapping perspectives: processes, relationships, governance structures, geographical dimensions etc.	Understanding vulnerability/resilience issues in their relevant context and within specified conditions as well as possible intervention levels	
Resilience capacities	HOW (observed behaviour): In what key ways can resilience be effectuated?	Anticipating, absorbing, adapting, recovering, transforming etc.	Understanding main types and mechanisms of resilience strengthening that allow resilience subjects to achieve desired outcomes	
Resilience assets	RESOURCES REQUIRED: What resources can be deployed to effect resilience?	Internal and external resilience base: capital assets such as human (e.g. skills), social (e.g. relationships), physical (e.g. equipment), natural (e.g. land), and financial	Understanding what resources can be worked with (and not) in reducing vulnerability and building resilience	
Resilience elements[5]	ELEMENTS: What builds resilience?	Many authors suggest elements around: 1. creating/maintaining **diversity** and flexibility 2. **buffers**, redundancy, assets 3. connectivity, (local) interdependency, self-regulation 4. **collaboration** in combination with **reflective learning** 5. **Innovation** (cuts across other elements) (Worstell and Green, 2017)	Understanding general intervention options that will usually reduce vulnerability and therefore build resilience in a particular case	

[5] Also referred to as resilience attributes, characteristics, principles and qualities.

2.3 Some considerations for resilience strengthening in food value chains

Resilience strengthening takes place within the context of national development goals and sustainable development frameworks such as the Sustainable Development Goals (SDGs). The SDGs will remain a key policy framework until 2030. In 2021 the United Nations (UN) Food Systems Summit will be convened as part of the Decade of Action to achieve the SDGs by 2030. Objective 5[6] of the Summit is 'building resilience to vulnerabilities, shocks and stresses', 'ensuring the continued functionality of healthy and sustainable food systems' (UN 2020). The Summit specifically makes a call to 'build back better' after COVID-19. We see resilience as part of a sustainable food system that supports development goals and food system ideals as enshrined in the SDGs. Where non-resilient food systems could limit and sometimes undo progress made towards achieving sustainable development goals. Economic development goals for food systems may focus on profitable production and gainful employment opportunities, while the resilience dimension deepens this by including that ability to withstand economic shocks and stresses such as financial crises or food price crises that are an inherent part of market systems (see Appendix 1).

There are often competing goals, interests, trade-offs and complementarities between sustainability objectives and resilience dimensions. For example, on the one hand, moving from subsistence farming into commercial farming may make a farmer more vulnerable to market related shocks and stresses (e.g. volatility in local market prices). On the other hand, higher levels of income earnings from commercial markets can make farming households less vulnerable. So, commercialisation, as such, cannot be presented as a generic resilience-building strategy. Also, it was long assumed that being well-connected to international market channels would be a prerequisite for actors in local food value chains to strengthen their resilience. However, it has also been suggested that too much market connectivity is likely to expose actors to so-called 'concatenated crises' i.e. shocks and stresses that spread rapidly and interact with each other across the globe. They may find their origin in diverse economic sectors, but particularly affect the world's poor and already vulnerable groups like women and youth (Biggs et al. 2011). This phenomenon has been studied in relation to the effects of the 2008 food price crisis, but also applies to the ripple effects of the COVID-19 pandemic. Considering this vulnerability, or concatenated crises, there is a renewed interest in whether or not shorter, localised value chains might be more resilient to shocks and stresses than globalised chains (see Renting et al. 2003 and Smith et al. 2015). To add to the complexity, in such connected contexts, different actors will have different interests and exercise their power to maintain or achieve interests that may be disadvantageous to others.

[6] The Summit is guided by Action Tracks that are aligned with the Summit's five objectives. See https://www.un.org/sites/un2.un.org/files/unfss-at5-discussion_starter-dec2020.pdf for more information on track 5.

3 Towards a framework for action

3.1 Background

How can development practitioners use the resilience and vulnerability concepts introduced in Chapter 2 to create actionable perspectives that strengthen resilience? In this section, we seek to answer this question by providing initial suggestions and building blocks for creating an actionable resilience strategy in local food value chains for development practitioners.

Research on the impact of COVID-19 on food value chain resilience in SSA has already identified a range of vulnerability areas affecting different actors. Here we offer a structured approach to design strategies to reduce these vulnerabilities and strengthen the response capacity to shocks and stresses. The approach includes four phases which are presented in Figure 3.1.

Specifically, we provide:

- A framework for identifying, mapping and assessing shocks and stresses, vulnerabilities and resilience capacity gaps in local food value chains – applicable generally and specific to COVID-19
- Suggestions on how to make that 'actionable' by identifying useful tools to guide future analysis and actions, including potential entry points for (external) support.

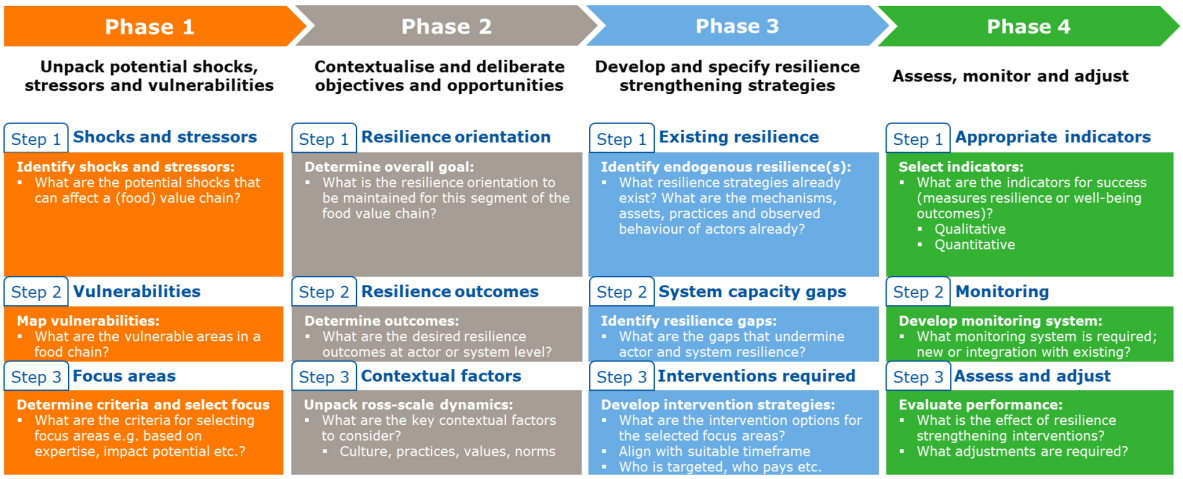

Figure 3.1 *A structured approach to build resilience (resilience strengthening framework)*

3.2 Phase 1 – Unpack potential shocks, stresses and vulnerabilities

Step 1 of this phase is to identify (potential) shocks and stresses. What kinds of shocks and stresses can we expect and when? Are they mainly natural/ecological shocks, socio-economic, political, or otherwise? At what level do these shocks and stresses take place (e.g. local, national, regional, global)? Table A1.1 in Appendix 2 provides example shocks and stresses. What can we learn from previous shocks and stresses in this regard? RAF Learning Lab (2020) resources might be useful to help answer these questions.

Step 2 is to identify areas of vulnerability for value chain actors and the chain or system. Before a shock, this can be done hypothetically, based on previous trends and experiences. During a crisis, stakeholders can be engaged to provide insights on areas of vulnerability, interrelated dynamics, and responses to a shock through information-gathering exercises like surveys and focus group discussions. The WUR's Rapid Country Assessment can be a useful to unpack and understand vulnerabilities in food value chains. The 2019 AGRA report on the hidden middle provides a good overview of what types of SMEs are operating across agri-food value chains and how their activities are interrelated. This can be useful in understanding vulnerabilities to determine entry points for strengthening resilience.

Step 3 is to specify the focus of the resilience strengthening intervention. Who/what is the resilience subject? Is the focus on a particular value chain (subsector)? Is the ambition to target the entire value chain (including production, processing, retail and consumption), or is the goal to focus on a particular activity or market segment? Not all vulnerabilities can be addressed due to budgetary, time and scope constraints. This necessitates making choices that best serve the intended impact and outcomes. For ongoing or new value chain development programmes, it could be areas that align more directly with project objectives and/or what is feasible within a given timeframe. A systemic and longer-term view can be beneficial in developing coherent and complementary resilience strengthening interventions even when targeting specific actors.

3.3 Phase 2 – Contextualise and deliberate opportunities and objectives

The aim of the second phase to is to unpack what 'resilience' means in the context of a particular setting through a political economy lens. It is an important phase to understand the power relations and structures within a particular setting as well as how they are (dis)advantageous to different actors.

Step 1 of this phase is to answer what resilience orientation is to be maintained or developed for this (segment of the) food value chain. What are the priorities amongst competing development goals, interests and incentives? This can be collaboratively developed with stakeholders through engagements already taking place in phase 1.

Step 2 is to unpack what the desired outcomes of a more resilient actor or value chain are. Is there a desire for stability, predictability, growth, transformation, or a combination of these? Around which food system dimensions; accessibility, availability etc.? Are there intermediate outcomes? Once again, stakeholder engagements and a systemic view can be informative here.

Step 3 is to map important contextual factors in the socio-economic, political, ecological or legislative sphere that are likely to impact on resilience strategies and interventions. What are the characteristics of the value chains in question? This step may require consultation with local experts and stakeholders.

3.4 Phase 3 – Develop and specify resilience strengthening strategies

Developing resilience strengthening interventions may require mapping the landscape of related and relevant interventions to obtain an overview of what resilience capacities and assets already exist and what gaps still need to be addressed.

Step 1 is therefore to identify endogenous (existing internal) resilience capacities of different actors in the food value chain. What knowledge and experience is already there and can be built upon? How have actors within value chains responded to previous shocks and disruptions? This step should include identification of resilience assets employed such as different forms of capital (social, human, financial) that facilitate absorptive, adaptive and transformative (resilience) capacities when confronted with a shock.

Step 2 is to identify the resilience gaps, abilities/capacities that can be further strengthened or improved. What capacities and assets are missing that prohibit achieving the desired outcomes? Are there capacities outside immediate focus areas that have an impact? Public sector capacities for example can be important to consider given their impact on enabling environment.

Step 3 is to determine resilience interventions to address those gaps. Submissions from previous phases and steps can come together to inform interventions. The interventions should address specific vulnerabilities, build capacities that will result in the desired outcomes by building on and complementing existing capacities.

3.5 Phase 4 – Assess, monitor and adjust strategies

While there are challenges in accurately measuring resilience, there are mechanisms to assess the capacities of actors before a shock or stress takes place. There are also mechanisms to assess the impact of interventions and integrate them into existing monitoring and evaluation processes. The Resilience Measurement Practical Guidance Note 5 (Picon 2018), FAO's (2016) Resilience Index Measurement and Analysis-II and USAID's Market Systems Resilience: A Framework for Measurement (Downing et al. 2018).

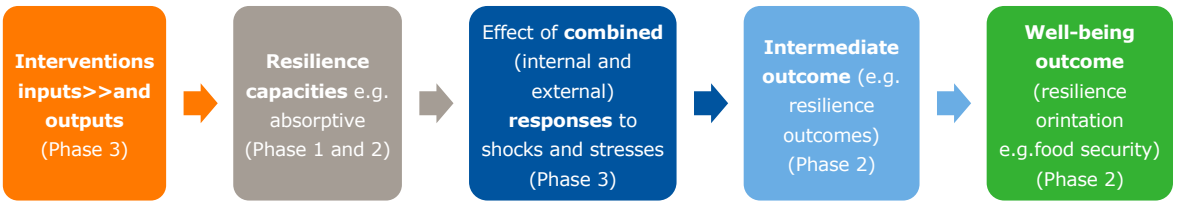

Figure 3.2 *Resilience-focussed result chain*
Source: Adapted from Picon 2018

Step 1 requires defining appropriate monitoring and evaluation indicators for capacities and outcomes. Indicators for capacities often revolve around assets and buffers, but also linkages and collaboration mechanisms, information availability, response mechanisms and alternatives/options available (diversity).

To assess the impact of interventions after a shock or stress, the development of a **resilience-focused result chain** is a useful starting point which, consists of desired intermediate and ultimate (well-being) resilience outcomes, and resilience capacities of the actors leading to those outcomes (Figure 3.1) (Picon 2018). Information for the results chain can come from the previous phases and indicators can be assigned to intermediate and well-being outcomes.

Step 2 involves monitoring interventions, resilience capacities and responses. Appropriate tools for periodic monitoring would have to be developed as well as baseline/endline evaluations.

Finally, in step 3 findings from monitoring exercises are evaluated and reflected upon in order to make adjustments, improvements and generate lessons. Essentially this requires an adaptive planning modality that allows for adjustments on the basis of real-life progress and experience. In a multi-year project this can happen for example through (semi-)annual reflection/learning moments that feedback into strategy/ToC (theory of change) and planning. Monitoring and evaluation plans and tools should be appropriate for the specific context of a shock. For example, given social distancing requirements due to COVID-19, digital tools will be important.

4 Applying the framework: agri-SME vulnerability and resilience during COVID-19

4.1 Background

This section explores the application of the resilience strengthening framework introduced in Chapter 3. It does so by applying the framework to a particular topic: the vulnerability of SMEs in sub-Saharan African food value chains during COVID-19.

For this purpose, we first outline the different roles and importance of SMEs in local food value chains in SSA. In applying the framework, we map and identify shocks and stresses, risks and vulnerabilities agri-SMEs are facing given the COVID-19 situations, and contextualise objectives and opportunities using the example of a sesame processing firm in northern Uganda. Finally, we propose resilience strategies for agri-SMEs and other value chain actors, including some example interventions, and we propose indicators to monitor and evaluate those interventions.

4.2 SMEs in local food value chains in SSA

SMEs are key actors in local food value chains of SSA. It is estimated that there are 43 million micro-enterprises and over 1 million SMEs in SSA (Bruhn et al. 2017). In agri-food value chains, they play many different roles along the chain in urban and rural markets, while varying greatly in terms of size and degree of formality. The report by AGRA (2019) shows that 80% of the businesses that are active in food processing are micro, small and medium enterprises, and they produce about 40% of the total gross value of food in sub-Saharan African value chains. SMEs process or market up to 70% of processed food for developing countries in SSA.[7] Overall, they are the biggest investors in the food value chains through vehicles and equipment purchases and they are expected to continue to play a crucial role over the next 10-20 years (AGRA 2019).

Agri-SMEs have been significantly affected by the COVID-19 situation. Forced closures, social distancing requirements, logistical delays and subsequent financial implications have deteriorated agri-SMEs' operational conditions during 2020. Overall, measures to mitigate the effects of the pandemic have also affected their ability to continue critical value chain functions such as the provision of trade capital. As explained in Chapter 2, the resilience of agri-SMEs will affect the resilience of the entire chain. When looking to strengthen the resilience of value chain actors and the value chain as a whole, the resilience of agri-SMEs becomes critical.

Local food value chains are characterised by many so-called 'midstream' input and output supply chains. Such midstream SMEs provide farmers with required inputs and connect them and processors to retailers and consumers in urban and rural areas. In SSA, agri-processing SMEs play a key role in offering affordable and healthier diets given their familiarity with local consumer segments and tastes. They have the potential to innovate new food products as they can take advantage of their familiarity with local consumers. For example: agri-SMEs in Kenya produce pre-cooked and dehydrated pulses that are quick to cook and nutritious, process and package banana flour to be sold in national supermarkets as well as blend and fortify flours from local ingredients. In Tanzania, agri-SMEs have developed *lishe* (baby food made from mixed grains and pulses), which contributes to improving nutrition (FAO and GAIN 2018; Reardon et al. 2019).[8]

In recent years, while agri-processing SMEs have been central to agricultural development initiatives, other types of SMEs, such as midstream input and output supply chains, have received less attention. These midstream agri-SMEs usually provide first-mile services to farms as processors, packagers, transporters, farm equipment suppliers and wholesalers amongst other services (Farm Africa 2015). Input

[7] Those SSA countries are Burkina Faso, Ethiopia, Kenya, Mali, Malawi, Mozambique, Niger, Nigeria, South Sudan, Tanzania and Uganda.
[8] More examples can be found in FAO and GAIN reports (2018), and Reardon et al. (2019).

retailers link farmers with input markets (Reardon et al. 2019). Other SMEs provide complementary upstream and downstream services, such as financial, crop and animal husbandry and market information services. These services are often bundled by agri-SMEs, such as processors and aggregators, to reach producers more effectively with a combination of key services required. Midstream SMEs are largely part of the informal/semi-formal economy playing a key role in urban and rural markets, as well as providing linkages between the two. Midstream SMEs are also highly interdependent actors; any disruptions they face are likely to affect the entire chain. However, despite their significance in agri-food value chains, the diversity of agri-SMEs and their varied degrees of informality has made it difficult for policymakers to assess their relative influence in the food system and to design policies accordingly.

Table 4.1 provides a typology of midstream input and output supply chain firms, showing the variety of services and products provided.

Table 4.1 *Typology of midstream SMEs in agri-food value chains*

Input or output supply chain:	Role in the supply chain
Midstream input supply chain firms	1. Input retail and wholesale (fertiliser, seeds, and equipment). 2. Mechanisation services and other mobile outsource services like spraying firms. 3. Complementary upstream services like private extension services often linked to input retail and wholesale, providing financial services to farms and other actors in the domestic and trade.
Midstream output supply chain firms	1. Wholesale/brokerage in both domestic and international trade. 2. Logistics (transport and warehousing, and cold chain). 3. Processing (value addition and product transformation). 4. Complementary downstream services, such as finance and digital services for all the above.

Source: Meyer et al. (2019)

In Section 4.3 to 4.5 we apply the framework developed in chapter 3 to real COVID-19 induced effects and hypothetical SMEs.

4.3 Phase 1: unpacking shocks, stresses and vulnerabilities of agri-SMEs during COVID-19

It is important to recognise that the COVID-19 situation has often exposed or exacerbated vulnerabilities that already existed in sub-Saharan African food value chains. Also, vulnerabilities are often linked to and reinforce one another, while shocks and crises can layer on top of one another. For example, across SNV programmes, the COVID-19 situation comes on top of other shocks and stresses such as the security situation in the Sahel region; the climate change induced pressures in both East and West Africa as well as the political unrest in Ethiopia's Tigray region.

4.3.1 COVID-19 shocks and stresses

The COVID-19 pandemic (the public health shock) has resulted in broadly two categories of stresses. In the first instance the COVID-19 outbreak has resulted in coronavirus infections, illness and sadly death, putting a strain on public health, labour markets and health services. Second, measures to reduce the spread of the virus including social distancing rules, lockdowns, increased border controls and reduced public willingness to maintain normal interactions have reduced the mobility of economic agents and goods (e.g. consumers, workers and farm inputs). At the same time, many national governments have deemed the agriculture sector a priority sector, implementing lower levels of restrictions compared to other sectors. Nonetheless, response measures have put stress on the economy; slowing down and altering activities – especially transportation and trade, reducing household income and employment (and therefore demand), as well as having a dampening effect on access to finance as lenders become risk averse.

4.3.2 Mapping the vulnerabilities of food value chains and agri-SMEs during COVID-19

Access to finance, household income and employment, transportation, and trading, are areas of vulnerability facing food value chains in SSA. Overall, agri-SMEs have faced a deterioration in their operational conditions and performances, mainly due to changes in demand for food products, disruption to the flow of goods, reduced access to finance especially in the face of increasing production costs (SF Advisors, RAF Learning Lab and Mastercard Foundation 2020).

In Figure 4.1, we present a generic overview of key vulnerability areas induced by COVID-19 in various food value chains, based on CORE-Africa's project analyses/inventories, country assessments, (rapid) sector assessments by WUR and international publicly available information. The green box shows features within the core value chain while boxes outside the green shaded area are more general social and economic vulnerabilities that impinge on the food value chains. Through the arrows, Figure 4.1 maps general dynamics of how changes in one area contribute to changes in others – thus indicating the connections (and reinforcing loops) between different vulnerabilities.

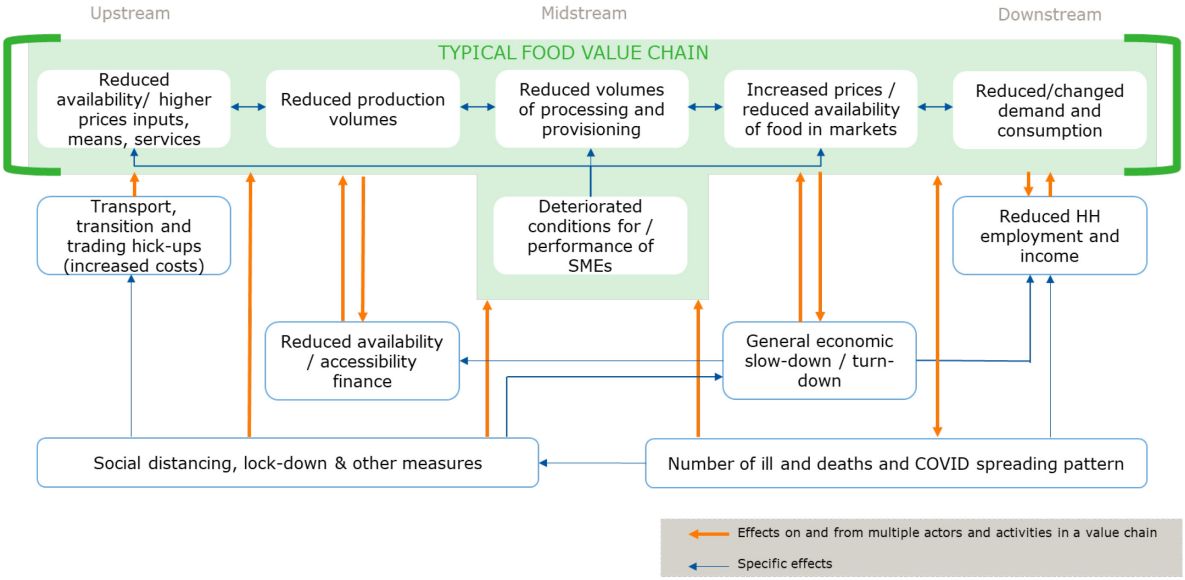

Figure 4.1 *Food value chain vulnerability (and opportunity) areas*
Source: CORE-Africa 2020

Within typical food value chains, COVID-19 related shocks and stresses have reduced availability and increased prices of inputs resulting in lower production levels on the upstream end[9]. Midstream, this has affected food processing and provisioning volumes and, in some cases, increasing food prices and reducing availability of food in markets. Downstream, consumers have reduced or changed their consumption patterns as purchasing power has decreased because of the changes upstream and downstream. A change in consumer preferences has also triggered changes upstream and midstream. Movement restrictions have impacted the flow of goods and people. Table A3.1 (COVID-19 vulnerability overview), in Appendix 3, provides a more detailed overview of those vulnerabilities. Table A3.1 also provides examples of dynamics in different countries that illustrate the mixed nature of the impacts of COVID. For example, food prices of non-perishable food stuffs going up in some places while food production has increased in situations where there has been (temporary) urban-rural migration, often as a result of unemployment in urban areas.

Across different countries in SSA, one of the key impacts of the COVID-19 pandemic on SMEs in agri-food value chains have been **changes in domestic and international demand**. Changes in international demand for agricultural goods were immediately felt in many export-oriented value chains. Changes in demand have also been recorded in domestic markets driven by a combination of decreasing incomes, which forces

[9] In some areas actual production of certain food crops has increased, as in the face of declining incomes and employment, both in urban and rural areas households resorted to growing more food themselves.

consumers to re-prioritise food choices sometimes out of perceived healthier choices for warding off the virus, and social distancing measures (ISF/RAF 2020).

To better understand the initial impact of COVID-19 on SMEs in particular, a survey was performed in Burundi, Ethiopia, Kenya, Mozambique, Rwanda and Tanzania in the first half of 2020. Most firms that participated in the survey were engaged in processing (59%), followed by distribution (38%), crop farming (24%) and retail (20%) sectors with 94% of 363 respondents reporting being impacted by COVID-19 government policy measures (GAIN 2020). This impact manifested mainly via decreased sales (82%), difficulty accessing inputs (49%) and difficulty paying staff (44%) (GAIN 2020). All respondents from GAIN's (2020) survey cited difficulty obtaining inputs or ingredients and nearly all noted difficulty acquiring or installing equipment, disrupted transport or distribution and reductions in production. This creates problems for input retailers, as well as the producers and processors dependent on their services. The main anticipated impacts by surveyed agri-SMEs included shortages of supplies (61%) and transportation and distribution disruptions (49%) with less than 20% of agri-SMEs anticipating making a change in their production focus as a resilience strategy (e.g. towards the production of hand sanitiser) (GAIN 2020).

Transportation and trading bottlenecks have disrupted the flow of goods (and people) hampering agricultural trade of agri-SMEs, and directly affecting agri-SMEs' supply of inputs to farmers in the first of half of 2020. According to the expert panel for WUR's Rapid Country Assessment of Kenya (WUR and SNV, 2020), input delivery and extension services have been heavily constrained due to restrictions in mobility and border closures (WUR and SNV, 2020). So far, this issue has not been reflected in many research reports – the experts noted that the impact on extension services is also underreported. The Fertilizer Alert Brief (2020) that assesses the impact of COVID-19 on the fertiliser sector in Ethiopia confirms the impact of mobility and import restrictions, as well as problems with national distribution of fertiliser. A study from SF Advisors, and RAF Learning Lab and Mastercard Foundation (2020) on the effect of COVID-19 shows that the cross-border import of agricultural inputs, such as antibiotics, fertiliser, or animal feed, has been identified as a key challenge for agri-SMEs in emerging markets and 40% of those agri-SMEs reported a significant negative impact on their ability to source agricultural inputs.

Transportation and trading bottlenecks have also affected access to inputs and raw materials for food agri-processing SMEs. Food processors need a reliable supply of quality raw materials to maintain their operations. According to WUR's Rapid Country Assessment of Kenya, some processors reported having difficulty accessing maize in the first half of 2020. In addition, 55% food processors reported not having enough raw materials to meet current demand (WUR and SNV, 2020). It has been difficult for traders and other raw material suppliers to travel from rural to urban areas, and the supply and quality of those raw materials have been reduced (TechnoServe 2020). In turn, the price volatility of raw material increases as demand fluctuates, and delivery becomes uncertain. TechnoServe (2020) identified a particular risk in dependence on international trade for imported raw materials, like wheat and cooking oil, with evidence of some countries withholding exports, which contributes to increasing global prices.

Another key vulnerability area of agri-SMEs during COVID-19 **is reduced access to finance,** shown by rapid country assessments in Ethiopia, Kenya, and Mali (WUR and KIT, 2020; WUR and SNV, 2020; WUR, 2020). This was an already existing challenge for agri-SMEs in SSA. Across all sectors, the fraction of SMEs that sees access to finance as an obstacle is substantially higher in Africa when compared to SMEs in other global regions. In Ethiopia, Mali, Tanzania and Uganda, the percentage of SMEs from all sectors with a bank loan is less than large businesses (see Figure 4.2). In three of these countries, small businesses have a lower rate of access to bank credit access than medium-sized firms. Agri-SME access to finance from banks has been further reduced during the pandemic, as many commercial banks have had difficulties in serving customers, as their credit lines have become constrained, and foreign currency becomes increasingly scarce.

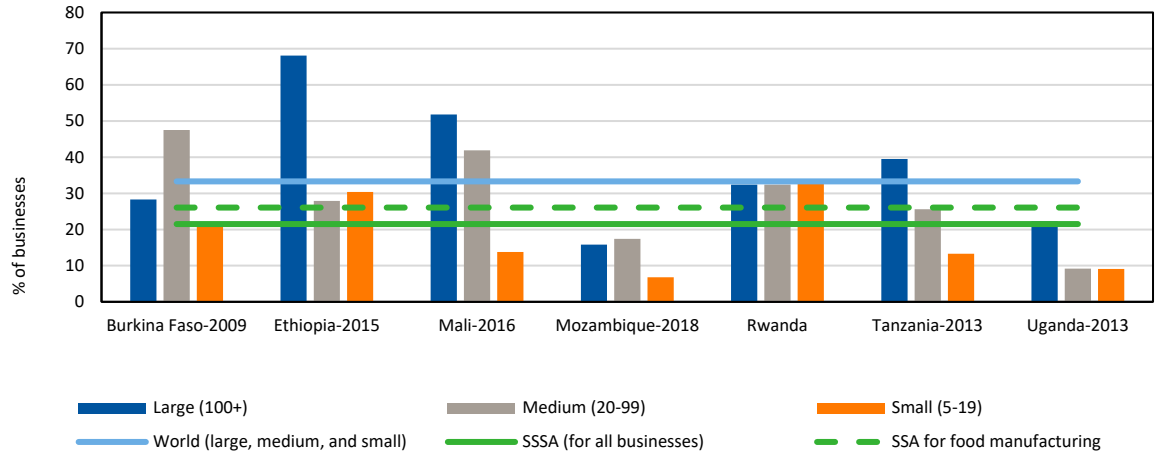

Figure 4.2 *Percentage of firms with a credit line in selected economies by business size, compared to the whole SSA region, SSA food manufacturing enterprises and the world*
Source: World Bank (2020)

Importantly, COVID-19 also opens up business opportunities for SMEs (that are forced) to adopt new approaches, solutions and technologies. For example, transportation restrictions are forcing SMEs to find new ways to distribute their products. SF Advisors, and RAF Learning Lab and Mastercard Foundation (2020) notes how producers and processors that typically serve urban areas have begun to sell their products on e-commerce platforms or social media, and many are leveraging existing platforms. However, for businesses that are serving less tech-savvy urban areas, these opportunities may be more limited.

4.3.3 Focus areas to improve resilience of agri-SMEs during COVID-19

To address the above highlighted impacts on food value chains, practitioners could focus on improving operational conditions and performances of agri-SMEs in SSA to strengthen their resilience during COVID-19. **Specifically, they can focus on these areas that reflect observed vulnerabilities:**

- Downstream market channels, given changes in domestic and international demand
- Availability and access to (high quality) inputs, due to transportation, transition and trading issues
- Integration of hygiene considerations and measures in their operations and interactions
- Access to finance and risk-sharing/management strategies

CORE-Africa has decided to focus on the first and second areas listed above under its resilience component while the third area is the focus of CORE-Africa's hygiene, health and safety component. Access to finance is a cross-cutting issue that remains relevant across all components however as a non-financial institution it is not an immediate focus.

4.4 Phase 2: opportunities and objectives of agri-SMEs in response to COVID-19

4.4.1 Resilience orientation and outcomes

Value chain development initiatives are often oriented towards some form of sustainability goals. In food value chains, food security usually features high on the agenda. **The resilience orientation and outcomes for SMEs will be determined in line with such goals and according to the context, setting and dynamics of the value chains they are operating in.** For example, a sesame grain processing firm in northern Uganda, may be oriented towards inclusion of women and youth in their production and trading processes. Desired (intermediate) resilience outcomes for the SME could be:

- Continued employment of staff during the pandemic (perhaps especially for women and youth) – *stability and coping*

- Maintain supply of sesame output to markets at the same level – *predictability and stability*
- Identification and use of new market channels for sesame output - *thriving*

Our vulnerability analysis for agri-SMEs in SSA in Section 4.3 shows that the resilience outcomes of the sesame processing firm could be improved by developing the following capacities:
- To absorb additional overheads or higher operating costs
- To anticipate changes in international and domestic demand for sesame related food products
- To adapt to changes in demand and mobility restrictions as well as capacity to invest in new market channels
- To recover and fulfil pre-shock processing volumes
- To transform supply chain management structures in a manner that builds trust and strengthens relationships with their supply chain

4.4.2 Important contextual factors concerning agri-SMEs in SSA

While considering enhancing these capacities, there could be important contextual factors to take note of. In the Uganda sesame example this may include:
- Sesame seed input access, availability and supply channels
- Farming systems and production systems of farmers and processors; for example, combinations of crops produced
- Socio-economic trends and dynamics in the areas and communities concerned
- The positioning and priority of the sesame value chain by the government of Uganda; for example, in terms of subsidies, trade facilitation, seed provision etc.
- The role and importance of sesame or edible oilseed multi-stakeholder platforms; and their capacity to address collective issues, foster collaborations on specific vulnerabilities etc.
- Structural challenges and opportunities already facing the sesame sector such as the structure and nature of power relations along the chain
- Overall political stability and societal dynamics between relevant value chain actors, amongst others.

4.5 Phase 3: resilience strategies for agri-SMEs in response to COVID-19

4.5.1 Existing resilience response capacities and capacity gaps among agri-SMEs

To ascertain the existing resilience capacities of the sesame processing firm, the firm can be assessed (self-assessment and external assessment) by answering questions around the required capacities to achieve the desired resilience outcomes. For example:
- What financial reserves and buffers does the company have? For how many months can the company cover its operational costs without generating revenue? Does the company have assets that can easily be liquidated?
- Does the company have access to adequate and reliable market information? Does the company have physical and digital access to markets? What sesame supply chain mechanisms are in place?
- Does the company monitor and identify new market opportunities? Does it have alternative options?
- How does the company currently maintain functional relationships with suppliers, service providers and buyers? To what degree is it able to manage and share risks with others?
- How does the organisation deal with turbulence and changes – internally and externally – that impact the business?

Questions can also be oriented around previous responses to shocks and stresses in the sesame value chain.

The capacity gaps of an SME can be identified by comparing the current state or capacity level with the desired state, perhaps using a rating scale to help prioritise which capacity gaps are the largest. This can inform prioritisation of capacity gaps to address.

4.5.2 Interventions to strengthen the resilience capacities of agri-SMEs

Table 4.2 provides an exploration of possible interventions to improve the resilience capacities of agri-SMEs and other value chain actors with relation to the identified vulnerability areas. For the sesame processing SME, there will be choices made around interventions that are downstream focussed that affect their resilience such as market access or supply chain management and those that are upstream such as input availability.

Table 4.2 *Example interventions to improve the resilience capacities of agri-SMEs and other value chain actors during COVID-19*

Vulnerability areas during COVID-19	Resilience capacities targeted	Desired resilience outcome(s)	Actors targeted	Possible resilience intervention areas and activities
Input availability: - Seeds - Extension - Farm implements - Non-existent markets *e.g. Reduced availability of inputs due import delays/restrictions and mobility restrictions*	**Capacity to anticipate and adapt** to reduced availability of inputs	▪ Diversity of input supply (localisation) ▪ Income diversity (for actors engaged in local seed production) ▪ Stable input availability ▪ Disaster preparedness (e.g. buffers) and governance in place (predictability)	Farmers **Seed multipliers** **Input suppliers/agro-dealers**	**Local seed production:** ▪ Develop local seed multiplication ▪ Invest in local research institutions to develop new varieties **Formalisation of input supply:** ▪ Support formalisation of input suppliers/providers ▪ Early warning system ▪ Support/develop robust input monitoring and information system
Input access: - Income/price - Physical access *e.g. Reduced access to inputs due to lockdown measures and reduced purchasing power*	**Capacity to absorb** increased input prices **Capacity to anticipate and adapt** to reduced access to high inputs	▪ Stable and continued input access	Farmers **Input suppliers/ agro-dealers**	**Financial buffers and efficiency:** ▪ Promote and support formation of savings groups to provide working capital to the farmers ▪ Model suitable/optimal service delivery models **Physical connectivity:** ▪ Use of digital solutions to match demand and supply
Input quality and post-harvest handling - Certification - Storage *e.g. Reduced quality of inputs and outputs due to poor storage facilities*	**Capacity to anticipate and adapt** to the reduced availability and access to high quality inputs	▪ Stable quality of inputs and post-harvest materials	**Agro-dealers** Farmers	**Infrastructure:** ▪ Investment in localised storage options **Strengthening of input supply:** ▪ Support formalisation of input suppliers/providers ▪ Link to standards and certification

Vulnerability areas during COVID-19	Resilience capacities targeted	Desired resilience outcome(s)	Actors targeted	Possible resilience intervention areas and activities
Supply chain management - Quality - Quantity - Price - Timely delivery *e.g. Reduced processing volumes due to production level disruptions*	**Capacity to adapt** to changes in physical connectivity with suppliers **Capacity to absorb** fluctuations in supply volumes **Capacity to anticipate** changes in supply volumes	▪ Stable and continued supply of raw materials ▪ Continued employment of suppliers (farmers) and other actors	**Midstream; food processors, traders, distributors** Farmers	**Physical connectivity:** ▪ Use of digital solutions to link to suppliers or (to continue to) provide services **Financial buffers and efficiency:** ▪ Promote and support formation of savings groups to provide working capital to the farmers ▪ Model suitable/optimal service delivery models **Price stability:** ▪ National level stockpiles of raw materials ▪ Develop early warning systems ▪ Storage capacity of individual firms
Operations and logistics: - Standard operating procedures *e.g. Increased production costs due to transports restrictions/delays and lockdown measures*	**Capacity to absorb/adapt** to required changes in SOPs	▪ Continued operations and employment	**Midstream; food processors, traders, distributors**	**Operational efficiency:** ▪ Optimising business operations and reducing costs
Market access: - Physical access - Market channels - Products and services *e.g. Changes in international and domestic demand for food product and mobility restrictions*	**Capacity to adapt** to the changes and reductions in international and domestic demand for food products	▪ Continued supply of products and services ▪ Growth and diversity from new market opportunities	**Midstream; food processors, traders, distributors**	**Market channels:** ▪ Diversification of supply channels **Products and services:** ▪ Develop strategies to target new market segments
Finance (access and availability): - Internal finance - External finance *e.g. Cashflow constraints due to reduced finance from banks*	**Capacity to absorb** and **adapt** to the reduced finance from banks.	▪ Continued operations and employment	**Midstream; food processors, traders, distributors** **Farmers**	**Access to finance:** ▪ Subsidies and guarantees in various forms/combinations ▪ Development of savings-led groups ▪ Liquidation of assets ▪ Support to digital financial service providers

4.6 Phase 4: emerging indicators, monitoring systems and ways to evaluate

Indicators can be developed for resilience capacities and resilience outcomes. Building on the example of the sesame processing firm and resilience capacities suggested that could achieve the desired resilience outcomes in Section 4.4.1, Table 4.3 provides examples of indicators that could be used to measure those resilience capacities.

Table 4.3 *Example indicators for measuring resilience capacities*

Capacity	Example indicators
Absorb: additional overheads or higher operating costs	▪ Profitability (margins) of existing operations ▪ Amount of financial reserves ▪ Amount and nature of credit lines available
Anticipate: changes in international and domestic demand for sesame related food products	▪ Number, timeliness and quality of relevant (real-time) information sources
Adapt: to changes in demand and mobility restrictions as well as capacity to invest in new market channels	▪ Number and quality of upstream and downstream business relationships and parallel alternative channels ▪ Number/state/quality of digital solutions used ▪ Ability to (re-)negotiate with both suppliers and buyers
Recover: and fulfil pre-shock processing volumes	▪ Number of accessible financial /business/social 'safety nets'[10]
Transform: supply chain management structures in a manner that builds trust and strengthens relationships with their supply chain	▪ Number and quality/relevance of partnerships and coalitions engaged in ▪ Ability to engage in innovation (financially, relationally, technologically)

Continuing with the example of the sesame processing firm, a resilience result chain could also be developed (Figure 4.3). The well-being outcome of the firm's enhanced resilience was identified as *the continued/renewed inclusion of women and youth in sesame production processes and trade during the pandemic*. A resilience intervention input could for example be investment in a digital (sesame grain supply) marketing platform that would improve the capacity to adapt to changes in physical connectivity with sesame producers. This would allow market linkages to be maintained, resulting in continued employment for women and youth as the sesame processor is able to continue generating revenue despite mobility restrictions. Ultimately, this would lead to the desired well-being outcome of the inclusion of women and youth. Such resilience intervention inputs may have a shock as a trigger (in this case COVID-19), but still have advantages in more normal times (or during other shocks and stresses) by reducing costs, increasing transparency and improving reliability. This can make them worthwhile investments in the longer term, beyond the short-term immediate need. Indicators can then be developed to measure employment and inclusion.

To measure the impact of the intervention, the sesame processing firm can be compared to similar firms who did not invest in such a digital marketing platform. Additionally, using a baseline survey to understand pre-shock levels of employment and inclusion for the sesame processing firm and compare them to post-shock levels.

Evaluations could involve interviews with the sesame firm using techniques such as Most Significant Change or Outcome Harvesting. These methods are participatory methods for monitoring and evaluation, collect evidence for what has changed and determine how an intervention contributed to the change both positively and negatively.

[10] For SMEs this could include additional tax exemptions, government mandated loan repayment freezes, furlough schemes etc.

Note that the digital platform is indeed just an example of a resilience intervention. There could be various other interventions – in improving the financial position, in taking lower margins to maintain the supplier base, in improving downstream linkages to reach consumers and keep sales up, in sharing risks with business partners, etc. For all these a similar results-logics can be developed but evaluating these will of course require looking at specific parameters for each and thus measuring other indicators and comparisons.

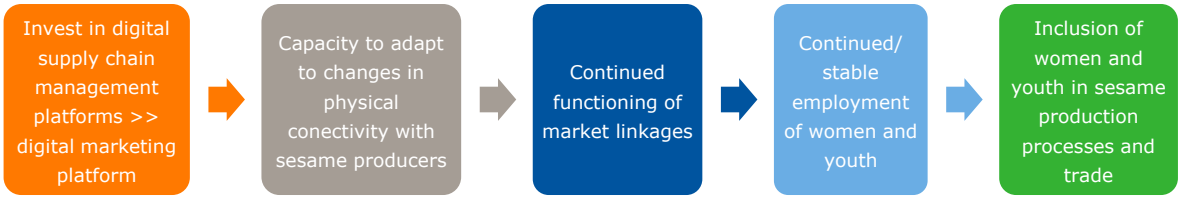

Figure 4.3 *Example of resilience-focused result chain for sesame processor in Uganda*
Source: Adapted from Picon 2018

5 Some considerations and conclusions

Through a local food value chain lens, we have unpacked the concept and different dimensions of resilience. **Sustainable food systems must be able to adequately cope with vulnerabilities and thus must become more resilient in order to achieve desired outcomes consistently over time.** Food systems are vulnerable to various (unforeseen) external shocks and stresses that can destabilise the whole system or impact its respective parts. The recent COVID-19 pandemic has illustrated that the impacts of subsequent response measures, such as mobility restriction, lockdowns, and social distancing requirements, have not been evenly distributed across parts and actors in food systems. The resilience of food value chains depends on the combined and interactive resilience of all actors and processes in and affecting the chain, ranging from producers, via midstream SMEs to retailers and consumers and various support functions.

After distinguishing various resilience dimensions in Chapter 2, we developed a framework in Chapter 3 to unpack vulnerabilities emerging from and exacerbated by shocks and stresses in food value chains, understand the capacities and inabilities of actors to respond and develop resilience strengthening interventions. **Addressing vulnerabilities and strengthening resilience capacity is not a politically neutral game, as it affects the historically constructed relationships between different actors who each have their interests**. This means that food systems and value chains can also be resilient in maintaining structures that are disadvantageous to (some) actors. A food system approach, including political economy analyses, helps policymakers to identify the feedback loops and trade-offs of specific measures.

In Chapter 4, we applied the framework developed in Chapter 3 to agri-SME vulnerability and resilience during COVID-19. **Economic analyses in LMICs have shown that local food value chains and agri-SMEs have been affected by COVID-19**. Though agri-SMEs play a critical role in agri-value chains by connecting farmers to consumers in both urban and rural areas, they often lack access to finance, and good infrastructure to expand and improve their operations. Such constraints make them vulnerable to global and local economic shocks and stresses. Specific to COVID-19, travel restrictions have affected agri-input suppliers negatively given mobility restrictions and trade disruptions, especially for imported inputs. The pandemic has also created important challenges for food processing companies and worsened the economic and finance environments for SME operations in general. At the same time shocks like the pandemic create opportunities for agri-SMEs and other value chain actors to maintain their value chain functions or even expand these. An example is the growth in digital services and expansion of domestic food production as a response to reduced imports. Applying this framework to the realities of value chain actors in their different contexts and settings is a complex process. Shocks and stresses have interrelated impacts, creating vulnerabilities and often exacerbating existing structural issues.

Incorporating resilience thinking to value chain interventions is a deepening and refining of sustainable value chain development. Making the link between vulnerabilities, resilience capacities and desired resilience outcomes explicit, is central to resilience strengthening strategies. Effectively measuring resilience remains an important but challenging topic that requires further research beyond this paper.

While effective resilience strengthening interventions in local food value chains are context specific, key considerations that can apply to different settings include:

1. **The importance of data collection and information gathering exercises**. These are central to understanding vulnerabilities and the exact ways they play out, which will need to inform relevant and precise responses. In the same vein, different categories of SMEs (or other actors) will require different types of resilience-building support. Interventions should be based on a thorough analysis *and* voices of key stakeholders.

2. **Balancing between short-term and longer-term responses**. Immediate responses to shocks and stresses are usually short-term measures that may be unsustainable over longer periods of time (e.g. soft finance or cash transfers to vulnerable actors). Longer-term responses are required to address structural issues, allowing food value chains to become more sustainable and resilient. An early adoption of the medium-long term resilience perspective is essential.
3. **Analysing the trade-off between different goals and objectives**. Resilience strengthening strategies are likely to involve trade-offs between actors pursuing competing and sometimes conflicting goals and objectives. For example, intensification of production may generate economic rewards at the expense of environmental objectives. A careful analysis of trade-offs between different goals and interests of different actors must be part of any adequate resilience strategy. This also includes trade-offs between short-term and longer-term responses.
4. **Digital solutions are likely to remain an important feature of resilience strengthening strategies**. They can a) provide accurate and detailed information, b) enhance the overview of different system parts/dimensions, c) thus improve actors ability to see and make choices, and d) connect actors and help them to collaborate, coordinate with and adapt to each other. In relation to communicable disease situations (like COVID-19) they can also directly reduce the risk of infection. Harnessing the opportunities that these solutions offer in value chain development requires further research.
5. **The public sector has a key role to play.** There are clear indications that during the pandemic, the policy to prioritise the agriculture sector by national governments likely reduced the impact of lockdown measures for the actors in the sector. Additional finance measures in some countries also played a meaningful role. Given the long-term nature of resilience strengthening, in general the public sector can play an important role in strengthening the enabling environment and subsidising or stimulating key investments such as in infrastructure, the digital environment, national stockpiles or other collective interests that cannot be addressed by private players alone.
6. **Monitoring the progress made to enhance the resilience capacities of value chain actors to respond to shocks and stresses is feasible** and can be part of any resilience building intervention. However, actually measuring the resilience of a food value chain is only feasible when a shock or stress has had its effects. Further attention to measuring socio-economic resilience in value chains is required.

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Appendix 1 Sustainability and resilience

This section seeks to clarify the relation between sustainability and resilience. Many people see them as close/overlapping in some ways. However, a value chain or food system can be considered (traditionally) sustainable without showing characteristics of resilience.

'Traditional' sustainable development goals (sustainability) have focused on economic viability, social inclusion, reducing negative environmental impacts and the creation of an enabling environment through efficient and effective institutional setups (UNDP 2016). These overlapping and interconnected development goals (and dimensions) are shown under the orange shaded area in Figure A1.1. The desired outcome has been an end to poverty, protection of the planet and ensuring that people enjoy peace and prosperity (UNDP 2016). For agricultural food value chains this has translated into a desire to have food systems that meet the needs of present and future generations for its products and services, while ensuring profitability, environmental health, and social and economic equity (FAO 2018). Overall, the orientation of 'Traditional' sustainable goals has been towards *doing things better, now and for the future*.

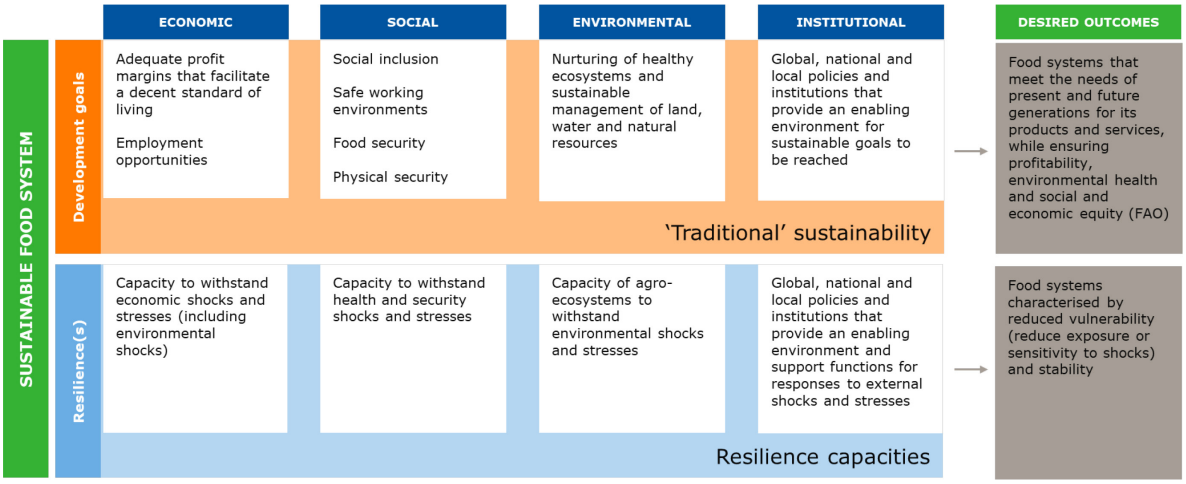

Figure A1.1 *Sustainability and resilience in the context of agri-food systems*
Source: CORE-Africa, 2020

In pursuit of sustainability, national and local systems have faced shocks, such as the global financial crisis of 2008, the food price crisis of the same year and from 2010-2012. These shocks expose and/or create vulnerabilities along the same economic, social, environmental and institutional dimensions as the development goals (see blue area in Figure A1.1). In many contexts, vulnerabilities caused by different risk factors can be layered on top of each other, influencing and worsening one another. Where these vulnerabilities are addressed, they enhance progress towards the achievement of sustainability. It is important to note that resilience capacities do not linearly enhance development goals - capacities are also interlinked across dimensions. For agricultural food value chains, the desired outcome is a food system characterised by reduced vulnerability, stability and transformation. This can require interventions that differ from those seeking to address sustainability.

With the onset of COVID-19 and its related response measures, it has once again become apparent that there is a need to strengthen system wide capacities to effectively respond to vulnerabilities triggered by shocks. Without doing so, shocks which are likely to be a recurring feature of integrated globalised systems, could undo or halt progress made towards sustainability. In this way, rather than *doing things better, now and for the future*, resilience is oriented towards *preparing better, now and for the future*.

A value chain or system can therefore be considered (traditionally) sustainable without showing characteristics of resilience. Further, actors or systems can be resilient in NOT *doing better* and/or NOT *preparing better* where the political economy exhibits unequal power relations. Sustainable food systems must exhibit both traditional sustainable development goals as well as resilience(s). Agri-food interventions must, therefore, address both aspects specifically.

Appendix 2 Example mapping of shocks and stresses

Table A2.1 *Shocks, stress by geographical impact, risk level, frequency and impact area*

	Shock (event)	Stress (prolonged disruption)	Geographical impact	Risk level (likelihood of occurrence)	Frequency	Impact area
Socio-economic	Stock market or housing market crash	**Economic crises** e.g.: Financial crises, food price crises, exchange rate crises, inflation, reduced output/production (GDP)	International/ regional	Very high	Cyclical	▪ Income ▪ Employment ▪ Productive capabilities ▪ Food and nutrition security ▪ Price stability ▪ Investment opportunities and outlook
	Pandemic	Public health crisis, economic crises	International	Medium	1 every 100 years	
	Epidemic	Public health crisis, economic crises	National	Medium	1 every 5 years	
	Trade wars	Economic crises	International/regional	High	Uncertain	
	Legislation	Uncertainty	National/international	Medium	Uncertain	
Political	Coup d'état	Economic crises capital flight/reduced investment, physical insecurity	National	Depends on region	Uncertain	▪ Physical security and governance ▪ Investment outlook
	Post-election violence		National/regional	Depends on region	Election cycle	
	War (civil, regional, world)		National/regional/international	Depends on region	Constant	
Environmental	Drought	Prolonged over multiple seasons, fires, economic crises	National/regional	Depends on the region	Seasonal	▪ Livelihoods ▪ Food and nutrition security
	Heavy or erratic rains	Soil erosion, flooding, economic crises		Depends on the region	Seasonal	
	Pests and disease infestation	Food price crises		Depends on the region	Seasonal	

Appendix 3 COVID-19 Vulnerability mapping

Table A3.1 *COVID-19 vulnerability map*

Category / food system dimension	Direct areas of vulnerability	Indirect areas of vulnerability	Links to other causes /areas	Examples
FOOD PRODUCTION	**Availability of and access to inputs reduced** • Border closures stopping importation • Logistical/transport disruptions causing delays • Difficulty accessing finance and/or forex due to uncertainty and unfavourable loan terms • Availability of labour inputs reduced due to travel restrictions and reduced mobility	**Reduced farm/food production** • Input prices increase (reducing demand for inputs and reducing income for input dealers) • Production costs increase • Lack of (pre-)finance	Transport bottlenecks Availability of/access to finance Net income of farming HH reduced	• Seeds in Ethiopia, veterinary products (several countries), lack of availability of inputs as input providers cannot do business as usual • Food production affected in next cycle • Post-harvest losses and food waste • Casual labourers unable to access working places • Exception in UG: increased production due to re-migration to rural areas
FOOD PROCESSING AND PROVISIONING	**Operational conditions for SMEs worsened** • Forced closure and reduced operating hours • Social distancing requirements • Lack of supply / demand • Increasing numbers of sick employees	**Reduced/inefficient food processing and availability** • Increased operational costs and inefficiencies • Downsizing • Reduced turnover/profit for SMEs and financial reserves limiting pre-financing for next season • Unreliable volumes	Food prices increase Net income of HH reduced Transport bottlenecks Availability of/access to finance Spread of COVID-19	• Lack of other products makes rural-urban flow one sided in Rwanda • Issues with border crossings affecting transhumance in livestock causing economic, health and conflict issues where large number of cattle get stuck • Restaurants and food stalls forced to close • Input providers move much less volume (Kenya and other places)

Category / food system dimension	Direct areas of vulnerability	Indirect areas of vulnerability	Links to other causes /areas	Examples
FOOD BUYING AND CONSUMPTION	**Net income of HH reduced** • Unemployment (especially in urban areas due to lockdown measures, closure of businesses and general economic downturn) – migration to rural areas • HH without safety nets • Reduced remittances • Farmgate and market food prices falling (perishability and over supply)	**Reduced and changing demand** • Changes in consumption preferences (sometimes due to misinformation/lack of awareness) • Reduced demand (expensive/perishable food products) • Increased demand (non-perishables/staples)	Net income of HH reduced (requiring reprioritisation of preferences) Operational conditions for SMEs worsened Transport restrictions	• Casual labourers with no social safety nets • Fall in demand for expensive/perishable products like dairy and vegetables • Decreasing food prices as people moved back to rural areas
FOOD SYSTEM LOGISTICS	**Transport bottlenecks** • Social distancing requirements and curfews • Border closures or delays due to testing requirements • No load on the return • Prices of transport rising • Needs for post-harvest storage and treatment rising	**Prices rising and varying across VC/system functions** • Increased costs for a range of items (transport, distribution, storage, etc.) • Increased food prices for consumers • Local oversupply of previously exported food products (reduced prices) • Mobility of actors reduced	Availability of/access to finance Operational conditions for SMEs worsened Availability of/access to inputs	• Transport prices up in Rwanda • Staple prices up in Uganda • Value chain (pre-)finance hampered across the chain in Kenya due to inability of processors / traders to play that role / increased risk averse behaviour
FINANCE	**Availability of and access to finance (farms and SMEs) reduced** • Increased risks reducing willingness to lend • High interest rates • Unfavourable loan terms • Reduced forex earnings from exports • Changing world market dynamics/prices	**Overall national/global economic contraction** • Reduced capital expenditure • Inflationary tendencies	Operational conditions for SMEs worsened Availability of inputs reduced Net income of HH reduced	
HEALTH CONTEXT	**Spread of COVID-19** • Risk of infection • Increased number of cases, hospitalisations, deaths	**Reduced overall public health** • Stressed healthcare systems • Decline in quality of healthcare for other health issues • Reduced overall public health	Availability of/access to inputs (labour) Transport bottlenecks	

Appendix 4 Examples of intervention repertoire

Table A4.1 *Examples of reactive (short-term) intervention repertoire.*

Where has it been applied?	Who implemented it?	Summary	For more detailed reading.
Global	The Sustainable Trade Initiative (IDH) and its partners	IDH has facilitated and funded a COVID-19 insurance product for 180,000 farmers under its cotton and tea programs in the country. compensates for the loss of income farmer families in case they are infected.	https://www.idhsustainabletrade.com/news/180000-smallholder-farmers-provided-income-security-through-covid19-insurance/
Rwanda	Africa New Life (Rwanda)	Distribution of food items to the most vulnerable households	https://www.africanewlife.org/covid-19/
Sierra Leone	World Bank	World Bank transfer cash directly to the most vulnerable households.	
Tajikistan	World Bank, Targeted Social Assistance system	Tajikistan, provision of time-bound cash transfers to food-insecure households with children under the age of 2.	https://www.worldbank.org/en/news/press-release/2020/04/02/tajikistan-gets-world-bank-financing-to-respond-to-covid-19-pandemic
Uganda	World Bank and Uganda government	Hired tractors and ox-plows to communities that have traditionally relied on hand hoes	https://www.agriculture.go.ug/the-agriculture-cluster-development-project-acdp/
Nigeria	CGIAR Agriculture for Nutrition and Health (CGIAR-A4NH) Flagship Food Systems for Healthier Diets and the Dutch Ministry of Agriculture, Nature and Food Quality, Wageningen University and Research (WUR)	Use of tomato crates monetary bonuses and behavioural interventions	https://www.wur.nl/en/Research-Results/Research-Institutes/Economic-Research/show-wecr/How-simulating-social-behaviour-can-help-reduce-post-harvest-losses.htm
Chad		Establishment of community cereal banks	https://www.ifad.org/documents/38714170/41096076/TC_PADER-G_IA+report.pdf/29f2e2dc-d474-697e-d487-be4d632425b1
India	Local social and help groups together with the government.	Social Help Groups and women groups have set up community kitchens across the country to feed stranded workers, the poor, and the vulnerable.	https://www.worldbank.org/en/news/feature/2020/04/11/women-self-help-groups-combat-covid19-coronavirus-pandemic-india#
Global	World Food Programme (WFP)	Distribution of personal protection items, Interagency Emergency Health Kits, anaesthesia kits, sprayers, stretchers, thermometers, body bags, and water purification supplies, as well as logistics, support equipment to farmers	https://reliefweb.int/report/world/chain-covid-19-cannot-break-how-world-food-programme-will-continue-its-work-saving-and
Sierra Leone	World Bank	Emergency financing under the ongoing Smallholder Commercialisation and Agribusiness Development Project. Initiatives with inputs, land mechanisation	https://www.worldbank.org/en/topic/agriculture/brief/food-security-and-covid-19
Democratic Republic of the Congo	World Bank, WFP and the government	frequency and quality of food price and stock data, around main urban consumption centres affected by COVID	https://www.worldbank.org/en/topic/agriculture/brief/food-security-and-covid-19

Where has it been applied?	Who implemented it?	Summary	For more detailed reading.
Kenya	IDH, Mastercard, Rural Agricultural Finance Learning Lab, Mastercard	Agri-wallet providing trade and input finance to under-served farmers, buyers and input providers, using provides a blockchain-based digital wallet the account in which savings and credit are 'earmarked' specifically for spend on income-generating activities. Partnerships with 15 Agtech start-ups to change the delivery of inputs, soil testing, crop insurance, credit, extension advice, and market linkages, to enable farmers to overcome COVID constraints especially in remote areas	https://www.idhsustainabletrade.com/uploaded/2020/03/SDM-Case-Report-Agri-wallet-Kenya.pdf https://projects.worldbank.org/en/projects-operations/project-detail/P154784?lang=en
Bangladesh	FAO, Ministry of Agriculture, city corporations in Dhaka government	Dhaka city corporation in Bangladesh established farmers' markets in Dhaka Bangladesh to enable farmers in rural Dhaka directly in the city. After COVID-19 these markers are supported by FAO in Bangladesh and city corporations to improve food availability in Dhaka. Dhaka F	https://tbsnews.net/feature/krishoker-bazar-safe-vegetable-farmers-team-explore-dhaka-market
Haiti	World Bank, The Resilient Productive Landscape project	Emergency funding to benefit family farmers to cover seeds, fertilisers, support to land preparation through ploughing.	
China, EU	Government	No stop for food product transportation	https://www.unescap.org/sites/default/files/China-25Jul.pdf

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