



Food and Agriculture Organization
of the United Nations

Sustainable food systems

Concept and framework

WHAT IS A SUSTAINABLE FOOD SYSTEM?

Food systems (FS) encompass the entire range of actors and their interlinked value-adding activities involved in the production, aggregation, processing, distribution, consumption and disposal of food products that originate from agriculture, forestry or fisheries, and parts of the broader economic, societal and natural environments in which they are embedded.

The food system is composed of sub-systems (e.g. farming system, waste management system, input supply system, etc.) and interacts with other key systems (e.g. energy system, trade system, health system, etc.). Therefore, a structural change in the food system might originate from a change in another system; for example, a policy promoting more biofuel in the energy system will have a significant impact on the food system.

A **sustainable food system (SFS)** is a food system that delivers food security and nutrition for all in such a way that the economic, social and environmental bases to generate food security and nutrition for future generations are not compromised. This means that:

- It is profitable throughout (**economic sustainability**);
- It has broad-based benefits for society (**social sustainability**); and
- It has a positive or neutral impact on the natural environment (**environmental sustainability**).

A sustainable food system lies at the heart of the United Nations' Sustainable Development Goals (SDGs). Adopted in 2015, the SDGs call for major transformations in agriculture and food systems in order to end hunger, achieve food security and improve nutrition by 2030. To realize the SDGs, the global food system needs to be reshaped to be more productive, more inclusive of poor and marginalized populations, environmentally sustainable and resilient, and able to deliver healthy and nutritious diets to all. These are complex and systemic challenges that require the combination of interconnected actions at the local, national, regional and global levels.

WHY TAKE A FOOD SYSTEMS APPROACH?

CHANGING FOOD SYSTEMS

A food system must be considered in the context of rapid population growth, urbanization, growing wealth, changing consumption patterns, and globalization as well as climate change and the depletion of natural resources. The developments in food systems have yielded many positive results, especially over the past three decades in developing countries. These results include the expansion of off-farm employment opportunities as food industries have developed, and the widening of food choices beyond local staples, thus satisfying consumers' preferences in terms of taste, form and quality.

However, the associated rapid structural transformations have also resulted in increasing and significant challenges, with potentially wide-reaching consequences for the state of food security and nutrition. These include the many highly processed, high-calorie and low nutritional value food items that are now widely available and consumed; limited access of small-scale producers and agri-enterprises to viable markets; high levels of food loss and waste; increased incidences of food safety, and animal and human health issues; and an increased energy-intensity and ecological footprint associated with the lengthening and industrialization of food supply chains.

Therefore, a better understanding of how a diverse range of food systems functions is critical to ensuring that these systems develop in such a way that minimizes their negative impacts and maximizes their positive contributions.

LIMITATIONS OF CURRENT APPROACHES

The complexity of food systems requires a more holistic and coordinated approach. Many food security and nutrition challenges are complex problems whose solutions are contested and which transcend disciplinary, divisional, and institutional boundaries. In increasingly globalized food systems, these challenges result from interactions across different scales and levels. They require integrated actions taken by all stakeholders at local, national, regional, and global levels, by both public and private actors, and across multiple fronts- not only in agriculture, but also in trade, policy, health, environment, gender norms, education, transport and infrastructure, and so on. It requires a synergetic merging rather than a destructive clashing of the ideas emerging from these various angles.

Traditional food security programs tend to adopt a production-focused approach, which seeks to directly influence food security through increasing the supply of food. In a few regions of the world, particularly Sub-Saharan Africa, inadequate food production is still the major cause of food and nutrition insecurity. However, the dramatic pace of food system changes over the past decades has brought about complex interactions and feedback loops that impact food security and nutrition in many different ways. The focus on food production leads to the neglect of other areas in which the root causes of the food system underperformance, as well as the leverage points to bring about the biggest impacts can often be found. Furthermore, the interwoven interactions and feedbacks in the food system mean that direct interventions in one area risk creating or exacerbating problems in another.

Recently, other approaches that employ systems thinking have gained momentum. The value chain (VC) development approach, for instance, uses systems thinking to examine the way value is created and captured not only by producers, but also by other stakeholders, including workers, governments and consumers. Essentially, VC development emphasizes systemic analyses and integrated interventions to improve the chain's performance. The VC development approach nonetheless focuses on one particular commodity and therefore tends to overlook the interdependencies of different VCs. Farmers, especially smallholders, often combine growing a variety of crops with livestock, fisheries and/or forestry activities, and the nutritional status of consumers depends on diets made up of multiple commodities. Achieving broad-based developmental impacts, thus, requires taking a broader look at the interactions of all food VCs at the food system level.

Another increasingly popular approach- the market systems approach- recognizes markets as complex adaptive systems to address systemic constraints to market linkages that can affect multiple value chains (for instance, strengthening linkages to financial services for farmers). While it can overcome the VC approach's "one chain at a time" limitation, the market systems approach tends to be constrained to one market and as such subject to a similar narrow perspective challenge as the VC approach.

THINKING HOLISTICALLY

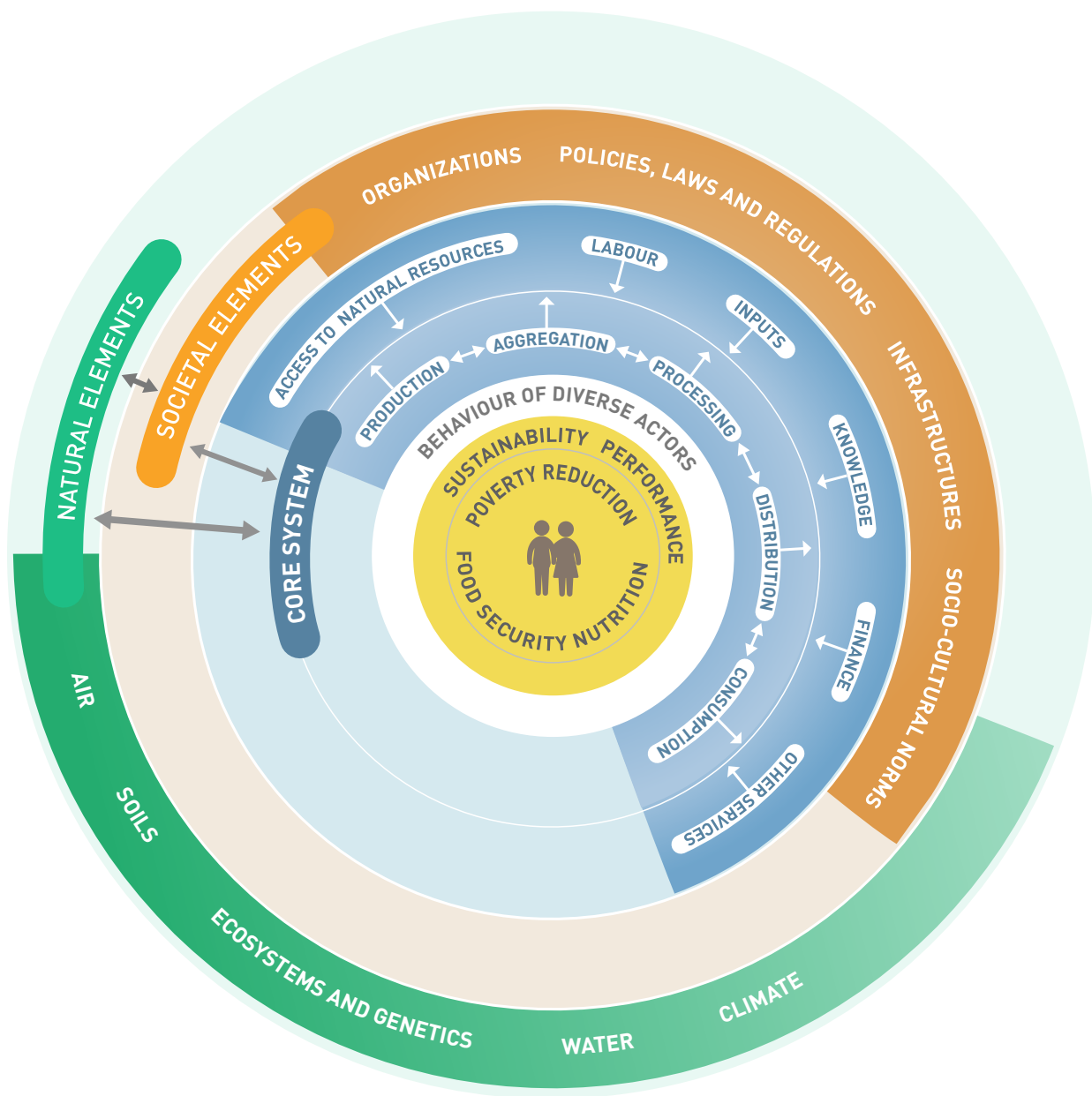
A food systems approach is a way of thinking and doing that considers the food system in its totality, taking into account all the elements, their relationships and related effects. It is not confined to one single sector, sub-system (e.g. value chain, market) or discipline, and thus broadens the framing and analysis of a particular issue as the result of an intricate web of interlinked activities and feedbacks. It considers all relevant causal variables of a problem and all social, environmental, and economic impacts of the solutions to achieve transformational systemic changes.

As such, the food systems approach addresses the limitations of many traditional approaches to improving food security and nutrition, which tend to be sectoral with either a narrowly defined focus that leads to technical fixes, which are subjected to the scope of one ministry or public agency, or which use systemic thinking to tackle objectives but are limited to sub-systems. Encouraging development practitioners and policymakers to see the bigger picture will also help facilitate multi-stakeholder collaboration and policy coordination at different levels to promote a more balanced relationship and jointly address future challenges. While there will clearly be trade-offs to be made (i.e. between key priorities of the food systems: inclusive poverty reduction, increased agricultural productivity, improved nutrition, and enhanced environmental sustainability), there will also be opportunities to simultaneously accomplish multiple objectives. A food systems approach can help identify such synergies, as well as facilitate the coordination needed to achieve them.

HOW IS THE FOOD SYSTEM STRUCTURED?

The *food system wheel* framework is centred around FAO's main goals, which include poverty reduction, food security and nutrition (Figure 1). These are embedded in the broader performance of the system, referring to the three dimensions of sustainability: economic, social, and environmental (elaborated in the next section). Such performance is determined by the behaviour of diverse actors, or the conduct of stakeholders in the food system (people-centric). This conduct in turn take place in the structure of the system, which consists of a core system, societal elements and natural elements. The core system includes a layer of activities through which food products flow (production, aggregation, processing, distribution and consumption, including waste disposal) and a layer of services supporting the flow. These activities are embedded in a societal context and a natural environment. The former includes all related policies, laws and regulations, socio-cultural norms, infrastructures and organizations. The latter includes water, soils, air, climate, and ecosystems and genetics.

FIGURE 1 THE FOOD SYSTEM WHEEL



Source: Author's own elaboration.

WHAT IS SUSTAINABLE FOOD SYSTEM DEVELOPMENT?

In sustainable food system development, sustainability is examined holistically. In order to be sustainable, the development of the food system needs to generate positive value along three dimensions simultaneously: economic, social and environmental (Figure 2).

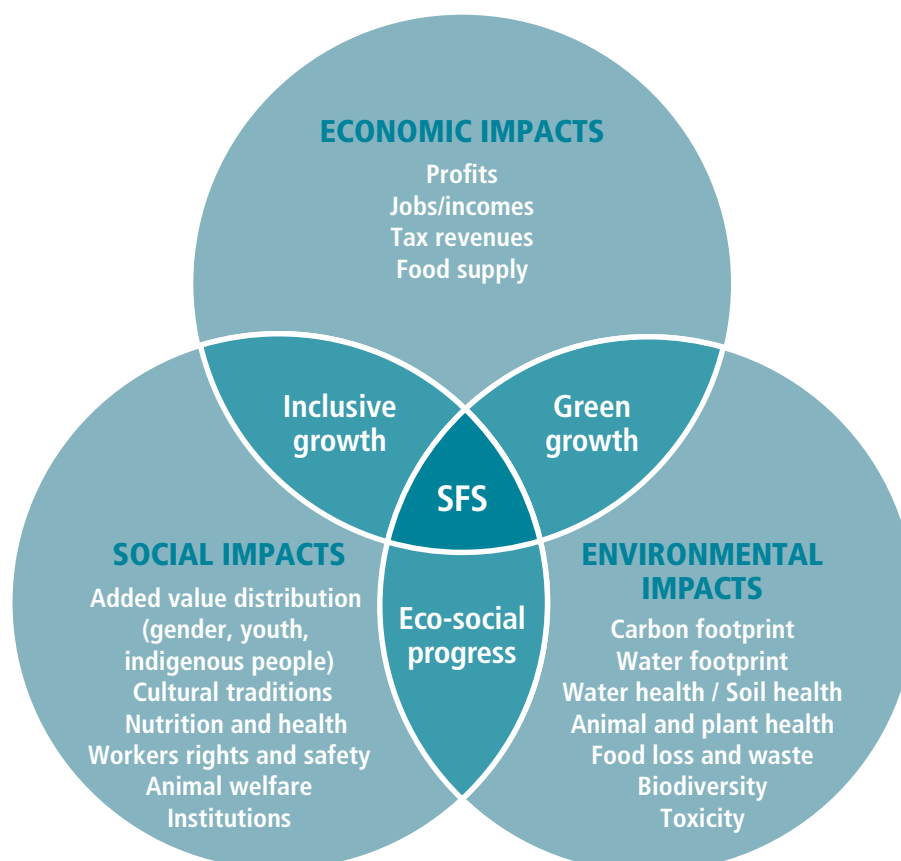
On the economic dimension, a food system is considered sustainable if the activities conducted by each food system actor or support service provider are commercially or fiscally viable. The activities should generate benefits, or economic value-added, for all categories of stakeholders: wages for workers, taxes for governments, profits for enterprises, and food supply improvements for consumers.

On the social dimension, a food system is considered sustainable when there is equity in the distribution of the economic value-added, taking into account vulnerable groups categorized by gender, age, race and so on. Of fundamental importance, food system activities need to contribute to the advancement of important socio-cultural outcomes, such as nutrition and health, traditions, labour conditions, and animal welfare.

On the environmental dimension, sustainability is determined by ensuring that the impacts of food system activities on the surrounding natural environment are neutral or positive, taking into consideration biodiversity, water, soil, animal and plant health, the carbon footprint, the water footprint, food loss and waste, and toxicity.

By way of illustration, any proposed measures to address a problem (e.g. animal diseases) or to take advantage of a new opportunity (e.g. a new green technology or profitable market), will have to be assessed against all other dimensions of sustainability to ensure there are no undesirable impacts. How would these measures impact the use of natural resources? Or would these measures affect poor and rich farmers differently, thus perhaps increasing the divide between them? Or would these measures have negative impacts on consumer health? This holistic vision allows us to use potential synergies and to reveal often hidden trade-offs, to ensure that while our targeted impact is positive, the net overall impact on the value added of the food system activities will also be positive. An immediate result of this is the need for new or improved impact metrics.

FIGURE 2 SUSTAINABILITY IN FOOD SYSTEMS



Source: Adapted from FAO, 2014.

THEORY OF CHANGE AND DEVELOPMENT PARADIGM

THEORY OF CHANGE: STRUCTURE-CONDUCT-PERFORMANCE

The theory of change behind sustainable food system development as presented here derives from the structure-conduct-performance (S-C-P) paradigm.

The structure of the food system is dynamic and driven by complex and varied trends such as urbanization, population growth, climate change, and forces such as technological change and innovation, policy change and so on. The structure generates incentives for actors and influences their capacities, which ultimately determine their conduct. Actors in the food system are also interdependent on each other and can impact each other's incentives and capacities to act.

The overall performance of the food system, measured in terms of sustainability, is the result of the intertwined conduct of all actors in the system. Firms, farms, consumers, for instance, all can have the power to influence food system performance and initiate change. Such performance, in turn, will generate positive and/or negative feedback that influences the conduct of actors and the structure of the system in an evolutionary process (behaviour change within dynamic food systems).

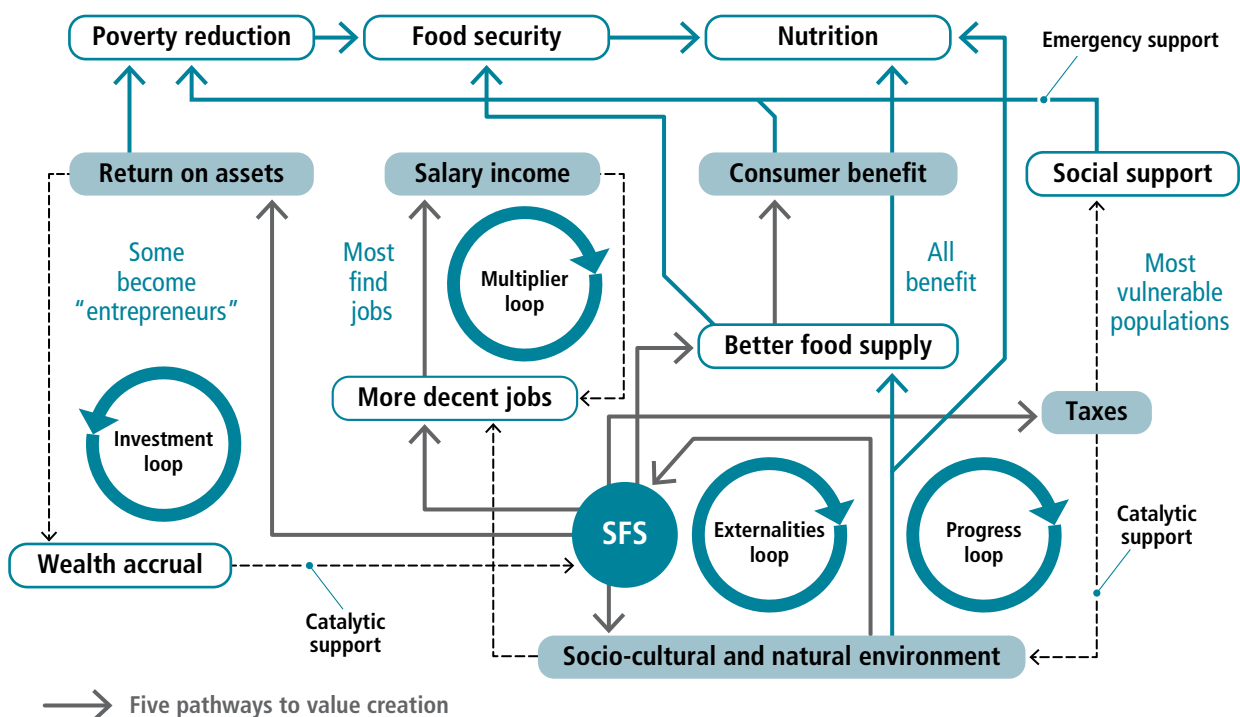
For a development organization such as FAO, the goal here is two-fold. First, to understand how the structure generates incentives for and influences capacities of actors, and orient them toward behaviour that leads to an observed system performance. Second, to facilitate the emergence of positive feedback loops (performance to conduct, or conduct to structure) that generate a self-sustained process of sustainability performance improvement.

THE DEVELOPMENT PARADIGM

Sustainable food systems (SFS), as engines of growth, create value-added that has five components (Figure 3):

1. salaries to workers;
2. a return on assets (profits) to entrepreneurs and asset owners;
3. tax revenues to the government;
4. benefits to consumers; and
5. impacts on the socio-cultural and natural environment.

FIGURE 3 THE FOOD SYSTEM DEVELOPMENT PARADIGM



Source: Adapted from FAO, 2014.

This value added sets in motion four feedback loops that relate to economic, social and environmental sustainability, and directly impact poverty, hunger and nutrition. The four feedback loops are: (1) an investment loop, driven by reinvested profits and savings; (2) a multiplier loop, driven by the spending of increased worker income; (3) a progress loop, driven by public expenditure on the socio-cultural and natural environments; and (4) an externalities loop, driven by economic, social and environmental impacts within the broader food system and on other systems. Each of these feedback loops can be positive or negative, but the more positive they are, the more sustainable the food system will be (and vice versa).

By facilitating, through catalytic support, positive feedback loops for both behaviour change and value creation, a transformative change of food systems is promoted that will help countries to achieve the Sustainable Development Goals. It will generate wealth that contributes to poverty reduction, while using natural resources responsibly and protecting the environment. Together with an improved food supply, it will ensure food security. Finally, with the right socio-cultural and natural environments, it will make more nutritious food products available, accessible and desired, thus contributing to nutrition security.

PRACTICAL IMPLICATIONS FOR FAO'S WORK

Taking a holistic view of the food system and adopting a food systems approach will have practical implications for development strategies and plans. In particular, there are three ways in which a food systems approach can contribute to FAO's work.

HOW TO MEASURE PERFORMANCE

A systems approach to measuring performance is about assessing the performance of the food system along all sustainability dimensions: economic, social and environmental. This holistic vision allows us to identify potential **synergies** and to reveal **trade-offs** between the three dimensions, so as to ensure that while our targeted impact is positive, the overall impact on the system will also be positive. Practically, this means combining expertise from various relevant areas and different organizations and establishing clear indicators to monitor the impacts on each dimension of sustainability.

HOW TO ANALYSE PERFORMANCE

A systems approach to understanding performance is about identifying the interlinked root causes of food system underperformance from a holistic perspective based on multi-disciplinary research. The identification of these root causes essentially implies a particularly broad and dynamic interpretation of the SCP paradigm. This paradigm calls for an in-depth understanding of the structure of the system; how this structure influences the conduct of the various stakeholders; and how this results in an overall performance that changes the system's structure over time. Three main steps are included:

- ▶ Analyse the **linkages** within the core system: linkages between actors across the five main stages of the product flow (production, aggregation, processing, distribution and consumption) and their support service providers, as well as the interactions between the core system and social and natural contexts they are embedded in, affected by and have impacts on;
- ▶ Analyse the **governance** mechanisms that underline the power relations among diverse stakeholders of the food system, determine the benefits they extract from conducting food system activities and thus drive their **behaviour**;
- ▶ Identify and analyse the **root causes** of underperformance (undesired behaviour), as well as the areas of greatest potential for improving system performance (**binding constraints, leverage points**), which may be located at some distance from the observed problem.

HOW TO IMPROVE PERFORMANCE

A systems approach to improving performance is based on the above holistic analysis and aims to:

- ▶ **Change behaviour** by targeting the structural elements that affect both the capacities and incentives of stakeholders, including by addressing stark differences in their level of organization, technology and economic power to foster more balanced relationships;
- ▶ Develop a joint vision and strategy for improving performance, and an **integrated** set of solutions that are supported by **multi-stakeholder** partnerships and can achieve improved results at **scale**; and
- ▶ **Facilitate**, rather than getting directly involved (e.g. through short-term publicly funded projects) positive feedback loops in the system that can generate a self-sustained process of performance improvement.

TABLE 1 HOW A FOOD SYSTEMS APPROACH CAN CONTRIBUTE TO FAO'S CORE ACTIVITY AREAS

Areas of activities	Contribution of taking a food systems approach
AREA 1. Putting data within reach to support the transition to sustainable food systems	<p>Vision and actions for food system changes must be firmly grounded on reliable data. FAO's activities in this area should focus on:</p> <ul style="list-style-type: none"> ▶ More systematic collection and analysis of data that covers various areas of the entire food system. ▶ Better compilation and comparison of data originating from different sectors to assess the performance of the food system, and to inform decision-making.
AREA 2. Promoting evidence-based policy making and policy alignment	<p>The transformation of the food system needs an enabling environment through country commitment and ownership. It has to be guided by sound policies. FAO's activities in this area should focus on:</p> <ul style="list-style-type: none"> ▶ Providing support to the design and analysis of policies that aim to tackle the structural causes of food system underperformance and generate behaviour change, particularly by focalizing technical, organizational, and economic support to address gaps amongst food system actors for more balanced relationships. ▶ Supporting active policy coordination across multiple sectors and public actors (e.g. ministries of agriculture, trade, health, environment, education, transport and infrastructure, etc). ▶ Strengthening the capacity of government bodies to work with businesses and non-state organizations.
AREA 3. Bolstering public-private collaboration in sustainable food systems development	<p>Food system changes must involve the efforts and interactions of diverse yet interdependent stakeholders. Partnership between them is vital. FAO's activities in this area should focus on:</p> <ul style="list-style-type: none"> ▶ Facilitating an adaptive process of system changes driven by market- led approaches, aligned with national strategies and combined with policy innovations. This process needs to be inclusive and engage firms, farms, consumers, governments, and civil society organizations, with particular attention paid to marginalized groups. ▶ Through multi-stakeholder initiatives, gathering stakeholders across sectoral and disciplinary boundaries to build an understanding of and collaboration on governance issues in the food system. ▶ Working in partnership with other organizations to learn, adapt, and synergize different approaches to work towards common food system objectives.
AREA 4. Facilitating local knowledge-building and knowledge-sharing	<p>Food system changes need to be built on and sustained by a combination of global and local knowledge, and the sharing of challenges and good practices. FAO's activities in this area should focus on:</p> <ul style="list-style-type: none"> ▶ Setting up local systems for knowledge generation and dissemination. Build clear and sustainable pathways to bring knowledge to the field by linking core actors with local and regional "knowledge providers" (e.g. extension services, research institutes, laboratories, knowledge networks). ▶ Building an international network of system thinkers and leaders from a wide range of sectors and backgrounds to facilitate an exchange of knowledge and offer technical expertise to countries.
AREA 5. Supporting countries in preventing and mitigating risks	<p>Food system changes need to take account of long-term pressures. In order to increase the resilience of a complex, dynamic food system, risks, threats and vulnerabilities across the system need to be well understood and analysed. FAO's activities in this area should focus on:</p> <ul style="list-style-type: none"> ▶ Assessing and understanding risks more systematically (economic, social and environmental - all interactive elements and linkages) and developing integrated solutions for risk prevention and mitigation.

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This brief was prepared by Hanh Nguyen (Value Chain Development Consultant of the Sustainable Markets, Agribusiness and Rural Transformations Team, FAO) based on the training course “Introduction to sustainable food systems and value chains” developed and piloted under FAO Strategic Programme 4 (SP4). It was executed by the Agricultural Development Economics Division (ESA) in broad consultation with other FAO Divisions and decentralized offices. Technical review was provided by David Neven, Senior Economist of the Strategic Programme 4 and Team Leader of the Sustainable Markets, Agribusiness and Rural Transformations Team, FAO.

TO KNOW MORE

Website – www.fao.org/sustainable-food-value-chain / www.fao.org/about/what-we-do/so4

Contact – sfvc@fao.org



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