The Food Systems
Decision-Support Toolbox

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POLICY OBJECTIVES

ACTORS

CHARACTERISTICS

BEHAVIOUR

RECOMMENDATIONS

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The Food System **Decision Support Toolbox**

WHAT IS
THE FSDS
TOOLBOX?

DOING A
FOOD SYSTEM
ANALYSIS

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FROM
ANALYSIS TO
ACTIONS

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What is the food system decision support toolbox?

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General introduction

Why this toolbox?

This toolbox has been developed to collate different tools and methods that can be used for food system analysis. It is specifically based on systems thinking for food system analysis, with the aim to formulate actionable recommendations that can bring about systemic change. It describes both the process of a food system analysis, as well as a set of tools that can be used at different stages.

The toolbox does not present a stepwise recipe for a food system analysis; it is rather a cookbook that aims to inspire anyone with an interest in food systems to get involved in food system analysis, regardless of whether you are a policy maker, practitioner, or researcher. It helps to make informed strategic decisions on the design of policies or interventions in the domains of food, agriculture and development. The food system analysis as described in this guide is thus understood as an ex-ante assessment to inform the policies, strategies, or programs that seek to contribute to systemic change in a food system.

For whom is this toolbox?

The toolbox intends to inspire a variety of users:
- **Policy makers** who may want to commission a food system analysis in order to inform new policy development, and foresight processes.
- **Researchers** who want to use a combination of research and participatory methods to better understand cause-effect relations in a food system.
- **NGOs** who want to develop a holistic intervention to improve food system outcomes (e.g. food & nutrition security), addressing specific bottlenecks.

From the very start you will need to be clear about who leads the analysis, and who will determine (or own) the recommendations at the end. We strongly advocate for the inclusion of local stakeholders from within the food system. The choice of 'who to invite to the table' during the entire process will influence the findings of the analysis, the recommendations for intervention, and the level of ownership or buy-in of local stakeholders. Therefore, we recommend engaging a wide range of stakeholders, to incorporate their tacit knowledge into the analysis and to co-create both a joint understanding of the food system and ownership of the recommendations (see stakeholder involvement). There is valuable wisdom to be collected from the voices that are often less heard.

How to use the toolbox?

This toolbox describes the process of doing a food system analysis, the quality principles we believe such an analysis should adhere to, the different components of the analysis, and tools that can be used for the analysis. Within the analytical process, we distinguish three components: system actors, system characteristics and system behaviour. Each component focuses on a different dimension of the system, but it is not necessary to do the analysis in this particular order. Rather, the different components can be done in parallel or iteratively, where different components can be repeated to dive deeper into specific issues or parts of the food system. For example, the first cycle could be a light-touch analysis to identify the key issues and root causes, followed by a second cycle to explore potential leverage points in more detail.

The toolbox is not exhaustive: many other tools are available that can be used in the analysis. We have organised a selected number of tools into three categories: awareness tools, exploration tools, and analytical tools (see Introduction for food system analysts for more detail). This allows the user to make a choice whether to conduct a 'light-touch' analysis, or an interdisciplinary research project, or anything in between. For a light-touch analysis, for example, you can organise a multi-stakeholder workshop and select a number of awareness tools to trigger discussion and collect insights into the food system. In addition, exploration tools can be used to dive into a few areas where you identified knowledge gaps or conflicting viewpoints among stakeholders. If a deeper understanding is desired, a combination of exploration and analytic tools can be used for a comprehensive food system study.

The three components in the analysis and the quality principles described in this toolbox are essential parts of a food system analysis. The choice of tools is yours – depending on context and availability of your resources.

Food system analysis: the process

POLICY OBJECTIVES   ACTORS   CHARACTERISTICS   BEHAVIOUR   RECOMMENDATIONS

Policy Objectives

The starting point of any analysis is the broader policy goal or question that will be addressed, including the level of intervention and/or target group. It is the answer to the question: 'Why this food system analysis?' The goal defines the direction and boundaries of the food system analysis.

Food System Actors

System actors entail every individual, group and organisation that is somehow involved in, or affected by, the food system. With their actions and interactions they shape, reshape or block the food system. Identifying the interests and influence of different actors, and the underlying power dynamics and structures, helps to inform your engagement strategies.

Food System Characteristics

A food system has many different elements, including drivers, activities and outcomes. To get insight, one needs to understand the trends of these components on the basis of key indicators, as well as synergies and trade-offs between them.

Food System Behaviour

The different elements within a food system do not act independently. As elements interact, systems reveal patterns of behaviour that determine the outcomes. Examining causal relationships make it easier to understand system behaviour, and to identify leverage points for system change.

Recommendations

This final stage explores the space for potential interventions directed at the leverage points. The findings of the food system analysis are combined to formulate actionable recommendations.
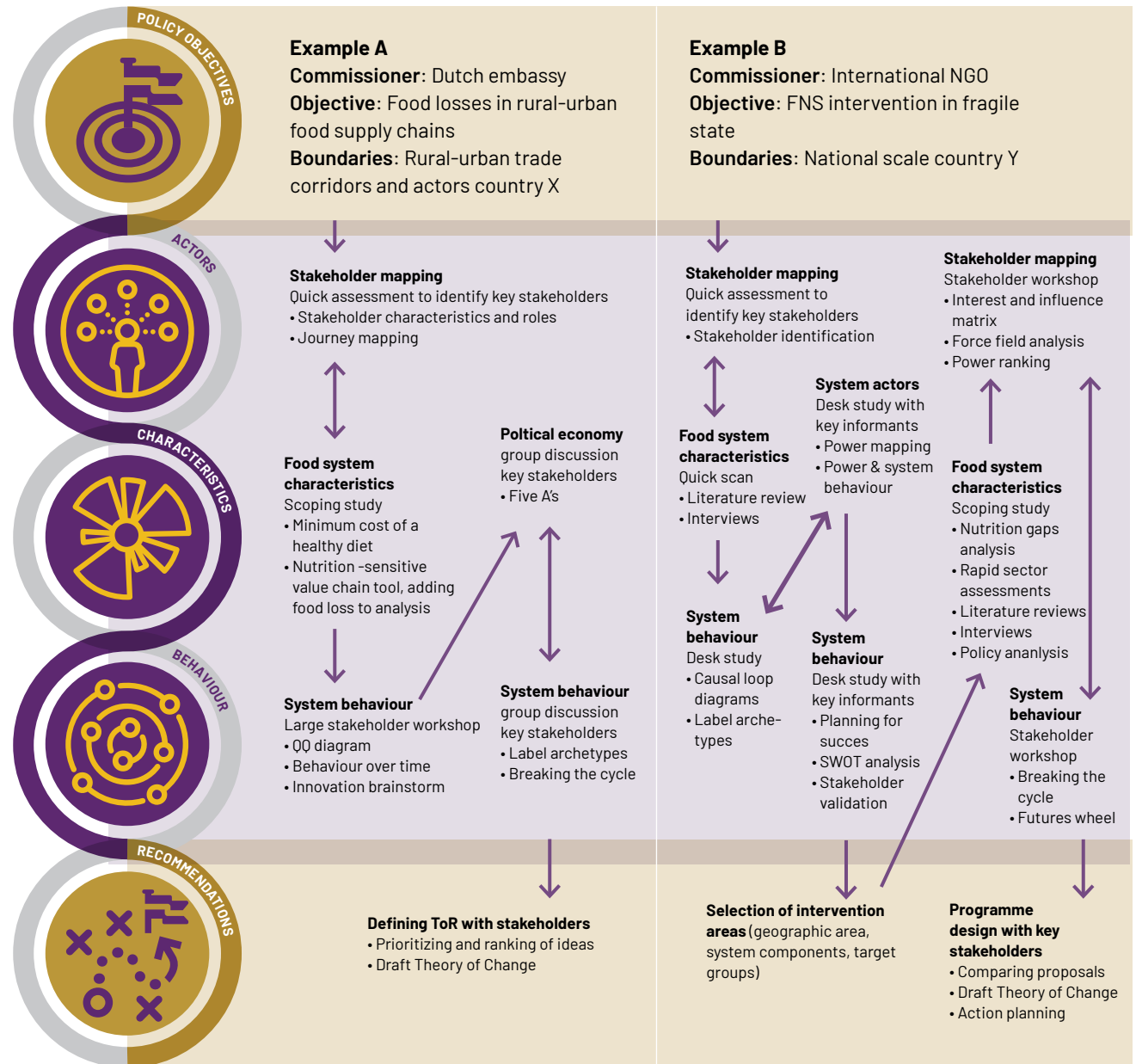
User stories

There are different ways to use this toolbox, depending on the purpose and the context of the food system analysis. Here are two user stories as examples of how to navigate this toolbox.

Example A: A Dutch embassy wishes to develop a new programme to address food losses in rural-urban food supply chains, with the aim to improve food & nutrition security and income generation in country X. Anecdotes of (post-harvest) food loss have triggered interest in this topic and the embassy tries to figure out which interventions could potentially have significant impact. Although the embassy staff has general knowledge of the agricultural sector in this country, there is a lack of insight into the rural-urban food supply chains and how these are influenced by dynamics in the broader food system. Therefore, the embassy wants to commission a food system analysis to get insight into potential intervention areas that could achieve multiple objectives (reduced food loss, youth employment, nutrition security, income generation).

Example B: An international NGO has been working on food and nutrition security and value chain development for many years. They are now planning to expand their activities into country Y, which is a fragile state. This is the first time that the NGO will work in a fragile state, and they realise that they will have to use new approaches and partnerships to make the intervention successful. In order to get a better understanding of the underlying causes of the food insecurity, the power dynamics and driving factors underlying the conflict, and potential stakeholders for partnerships, the NGO decides to carry out a food system analysis first.

POLICY OBJECTIVES

Example A
Commissioner: Dutch embassy
Objective: Food losses in rural-urban food supply chains
Boundaries: Rural-urban trade corridors and actors country X

Example B
Commissioner: International NGO
Objective: FNS intervention in fragile state
Boundaries: National scale country Y

ACTORS

Stakeholder mapping
Quick assessment to identify key stakeholders
• Stakeholder characteristics and roles
• Journey mapping

Stakeholder mapping
Quick assessment to identify key stakeholders
• Stakeholder identification

Stakeholder mapping
Stakeholder workshop
• Interest and influence matrix
• Force field analysis
• Power ranking

System actors
Desk study with key informants
• Power mapping
• Power & system behaviour

CHARACTERISTICS

Food system characteristics
Scoping study
• Minimum cost of a healthy diet
• Nutrition-sensitive value chain tool, adding food loss to analysis

Poltical economy
group discussion key stakeholders
• Five A's

Food system characteristics
Quick scan
• Literature review
• Interviews

Food system characteristics
Scoping study
• Nutrition gaps analysis
• Rapid sector assessments
• Literature reviews
• Interviews
• Policy ananlysis

BEHAVIOUR

System behaviour
Large stakeholder workshop
• QQ diagram
• Behaviour over time
• Innovation brainstorm

System behaviour
group discussion key stakeholders
• Label archetypes
• Breaking the cycle

System behaviour
Desk study
• Causal loop diagrams
• Label archetypes

System behaviour
Desk study with key informants
• Planning for succes
• SWOT analysis
• Stakeholder validation

System behaviour
Stakeholder workshop
• Breaking the cycle
• Futures wheel

RECOMMENDATIONS

Defining ToR with stakeholders
• Prioritizing and ranking of ideas
• Draft Theory of Change

Selection of intervention areas (geographic area, system components, target groups)

Programme design with key stakeholders
• Comparing proposals
• Draft Theory of Change
• Action planning

Introduction for policy makers

Whether you are working at a ministry, government institution, donor agency, investor, or an NGO, if you are active in the field of food, agriculture or development, chances are high that your work involves efforts to address challenges in food systems that result in undesirable outcomes, such as food insecurity, inequality, environmental degradation or unemployment. Understanding the multi-faceted challenges and opportunities within the food system is essential to be able to develop effective interventions. This toolbox provides you with building blocks to conduct a food system analysis that can be used to formulate recommendations for policy and programming.

A Food System approach is increasingly used as a framework to understand and shape strategic interventions and policies related to agriculture and food & nutrition security. Drawing from the UN Secretary General's Zero Hunger Challenge, a food system is defined as a system that 'embraces all elements (environment, people, inputs, processes, infrastructure, institutions, et cetera) and activities that relate to the production, processing, distribution, preparation, and consumption of food and the outputs of these activities, including socio-economic and environmental outcomes.' However, translating insights and aspirations on food systems into effective interventions remains a challenge. The objective of this toolbox is to build an approach for food system analysis that results in actionable recommendations that can contribute to systemic change. The policy maker is not expected to conduct the analysis by themselves but can commission such an analysis to a third party.

A good food system analysis should include at least the following elements:

- Understanding the trends of key indicators that represent desired outcomes, drivers and activities, such as food security, economic activities, environmental effects, or wellbeing.
- Insights into system processes that reveal interaction effects within the food system resulting in desired or undesired outcomes.
- Understanding the influence and interests of specific actors that shape the food system, or are affected by it. This includes insights into power dynamics or diversity in how different actors can engage (or not) and are affected, both positively and negatively.
- These insights allow the identification of leverage points for system change that can inform recommendations for strategy.

The above insights should result from a facilitated process of stakeholder involvement, where perspectives of multiple stakeholders are taken into account during the analysis and put into the context of wider trends. This requires experienced facilitators and analysts, who are able to analyse trends and processes at different levels and engage with different types of stakeholders.

Commissioning a food system analysis

Any policy maker who is considering commissioning a food system analysis should expect the following:

- The analysis gives up-to-date insights into the current status and trends of the food system under focus, including the areas of interest.
- The analysis takes a systems perspective, meaning it also looks how different drivers, factors, processes and actors influence each other.
- The analysis includes the motivations and influence of different actor groups, and who is included or excluded from the benefits.
- A variety of stakeholders are actively engaged in the analysis.
- The analysis has an applied perspective, producing actionable recommendations on how to best intervene in the food system, including whom to collaborate with to achieve the policy objectives.

The starting point of any analysis is the broader policy goal or food system objective that should be addressed, including the level of intervention and/or target group. This broader policy goal will define the boundaries of the food system analysis. Well-defined boundaries of the food system will allow a more in-depth analysis; alternatively, ill-defined boundaries will result in a shallow analysis.

Defining a food system objective

In order to get to actionable recommendations you will need to be explicit about what type of generic objectives you envisage, and for whom. Entering into a food system analysis without an ultimate purpose in mind can lead to meaningless breadth and vagueness. Though the objective should provide a focus for the food system analysis, it should still be sufficiently broad to be open to different strategies, policies or interventions to achieve that objective.

Food system outcomes

We make a distinction between three forms of food system outcomes in the food system analysis: socio-economic outcomes, food and nutrition security (FNS) outcomes and environmental outcomes.

Food and nutrition security outcomes: Food and nutrition security (FNS) is often the starting point for a food system analysis. Understanding the dynamics around FNS for different social groups will guide the further analysis. FNS is a result of the availability, access (including affordability), utilisation and stability of food. This includes for example consumption patterns, nutritional value of diets, food safety, market infrastructures, the production, storage and trade of food and the seasonal fluctuation of food availability. An objective related to FNS outcomes could be: improve healthy diets of [target group].

Socio-economic outcomes: A food system results in socio-economic outcomes such as health, employment and wealth, but also incomes and living conditions of specific target groups. It is evident that the agri-food sector is a major shaper of a country's economy and

societal wellbeing. A large share of households worldwide find employment in agriculture and food – ranging from subsistence farming to industrial food production. Furthermore, the way a food system behaves influences who benefits, and who loses out. This affects poverty levels and the level of equality between citizens. Given that we are aiming to transform food systems so that they work for the majority of people, it is essential to have a grasp of the socio-economic outcomes of a food system. An objective related to socio-economic outcomes could be: increasing the household incomes of [target group] in [geographical area].

Environmental outcomes: Activities of food systems often compete for common natural resources that are threatened by human activity. The role of agriculture and food consumption in damaging our planetary health is well recognised. Any transition towards sustainable food systems is not only about producing nutritious food and supporting livelihoods but also about dealing with environmental degradation and climate change. A food system analysis should look for pathways towards more regenerative and sustainable food system outcomes. An objective related to environmental outcomes could be: prevention of soil degradation and water pollution in [geographical area].

System boundaries

A food system is hardly ever bound to a specific geographical area. Furthermore, a food system is also embedded in, and impacted by, other human or natural systems so in reality it is impossible to draw a clear line where a food system starts and ends. Nevertheless, it is important to choose system boundaries (for example, based on geography, outcomes, and target groups) for the food system analysis to maintain focus. When choosing the system boundaries, the goal of the food system analysis should be leading, but available resources (finance, time) also need to be considered. During the analysis, you may want to revisit and adjust the boundaries if needed.

Target groups and diversity

Food system outcomes are never the same for different groups in a society. Hence, the objective may refer to a specific target group. If this is the case, it should become a focus point in the food system analysis. Even if there is no specific target group, it is still important to take into account social diversity as policies and interventions are never neutral; they have inherently different effects on different social groups.

Tools for defining a food system objective

Rich picture	**Needs assessment**	**Problem definition**
Visualise the desired future and challenges to realise this, including the relevant actors and factors affecting the issue. Link	Assess the needs of the target group to formulate the strategic objective.	Clarify which problem you are working on by asking five questions. It will help a group to focus ideas in the same direction.

Doing a food system analysis

Content

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    2. System characteristics
    3. System behaviour

Introduction for food system analysts

A toolbox to analyse and help shaping food system strategies

The goal of this toolbox is to do a thorough food system analysis that is useful for anyone who needs to make informed decisions and define their strategy within the context of a complex food system. This strategy can address a variety of food system outcomes, such as socio-economic outcomes, food and nutrition security outcomes and environmental outcomes. The analysis shows the current status of the food system and trends (system characteristics), the interplay between different parts of the food system and leverage points (system behaviour) and how actors, power relations and governance structures influence the food system (system actors). The analysis can help you define a strategy, policy or foresight process to make changes in a food system to achieve desirable outcomes.

Using the toolbox

The toolbox includes three categories of tools:

👁 **Awareness raising:** to increase awareness of some of the issues at play. Most of these tools can be used in a facilitated multi-stakeholder workshop setting. These tools require experience in workshop facilitation and prior understanding of the food system, but are low in costs.

⚙ **Exploration:** these tools dive a bit deeper into specific issues and require some dedicated resources for data collection and analysis. These tools are a mix of desk study and field research, which require experience in (qualitative) research and analysis. The fieldwork and analysis will require some dedicated funding.

📊 **Analytical:** these tools are mostly research methods that can be used for deep-dives and detailed analysis of specific issues as part of a funded research project on food systems. The tools are a mix of research methods and modelling techniques that require specific research skills and considerable investment in terms of time and funding.

The tools that are included in this toolbox have been tried and tested in different settings. We therefore refer to the relevant sources for more detailed descriptions of each tool.

With every tool we indicate the type of modality:

👥 **Workshop** with stakeholders or key informants
🎤 **Interviews** with key informants
🔍 **Research** done by researchers

This also helps to quickly indicate which tools can easily be combined, for example in one workshop or session. Engagement of stakeholders is key in all the tools, to make sure that the generated knowledge is co-created and action oriented.

The food system analysis demands interdisciplinary system expertise

As the term 'food system' implies, the analysis focuses on the entire system and the relationships between the different drivers and outcomes of the system. A food system analysis demands an interdisciplinary approach, which requires expertise on system thinking, participatory approaches as well as specific academic disciplines. Different skill sets are required, varying from

facilitating multi-stakeholder workshops to conducting economic, social or bio-physical research. A thorough analysis is best executed by an interdisciplinary team of analysts equipped with different, but relevant experiences, backgrounds and skills. Make sure to get a mix of international experts and local knowledge holders into the team.

You can tailor your food system analysis, depending on time and budget

A food system analysis can consume a considerable amount of time. However, there are different levels of analysis possible, depending on the objective, knowledge gaps and resources available. For each tool we give an indication of the time needed to execute it. The time indication refers to the active time required to use the tool, thus not including any time required for preparation or reporting. For some tools the time range is quite broad. Based on the goal of the study and the time and financial resources available, the analysts can choose on how elaborate they want to use the tool. If there is already sufficient knowledge on certain elements of the food system, some parts might be skipped or done marginally. There will be trade-offs to consider, such as the balance between academic rigour, the quality of stakeholder involvement/ownership, and the duration of the analysis.

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Three analytical components

The toolbox is divided into three analytical components: system characteristics, system behaviour and system actors. These three components combined will provide the insights to address the formulated objective and inform a policy design or intervention strategy. Depending on the existing knowledge on the food system and the issues to be addressed, some parts of the toolbox may be more relevant than others. Some iteration may also be necessary to address specific knowledge gaps.

1. System actors

How a food system operates depends largely on the actors who are involved. System actors entail every individual, group and organisation that is somehow involved in the food system. Through their actions and interactions with each other they shape and reshape the food system, or cause inactivity or stasis in the food system. For a good understanding of the food system, it is therefore key to understand who the actors are, how they act and interact, and why they do so. Hence, this component starts with defining the actors and their sphere of influence. A food system is rarely a level playing field; power dynamics shape the interactions between these different actors. We therefore recommend doing a political economy and governance analysis towards the end of the food system analysis. This provides an overview of the power dynamics in the food system: who benefits and who is excluded across different social axes of privilege/ marginalisation, including insight into one's own position.

2. System characteristics

This component aims to create an overview of the issues to be addressed and the current status of the various elements of the food system. A food system analysis seeks to understand the problem as defined in the objective; in other words, exploring the dynamics of the socio-economic outcomes, food and nutrition security outcomes and the environmental outcomes.

In addition to understanding the food system outcomes, this component maps the various elements of the food system: the activities (e.g. value chain), the underlying drivers and the institutional and environmental context. The mapping includes the assessment of key indicators, as well as understanding (historical) trends, synergies and trade-offs of specific activities and indicators.

3. System behaviour

Where system characteristics look at the status and trends for the various elements of the food system, system behaviour addresses the interactions between the elements. For example, the effects of climate change on farming practices, or the influence of policies on local trade. Analysing system behaviour is crucial for understanding the food system and how systemic changes comes about; that is how a change in one part of the system affects the other parts.

This component specifically looks into causal relationships between different elements of the food system. Identification of system archetypes (common patterns of system behaviour) makes it possible to understand system behaviour better, and to identify leverage points for system change. Although we recommend using system archetypes in the food system analysis, it is not a necessity. However, understanding the causal relationships within the system is necessary to identify leverage points. These are places in the food system where targeted interventions can lead to system change and thus a change in the food system outcomes.

Quality principles

There are three quality principles to keep in mind in every step of the food system analysis: **system thinking, stakeholder involvement** and **attention for equity & inclusivity.** In the next chapters, the meaning and implications of these quality principles are discussed. In the descriptions of the tools, there are guidelines to take the quality principles into account in the analysis.

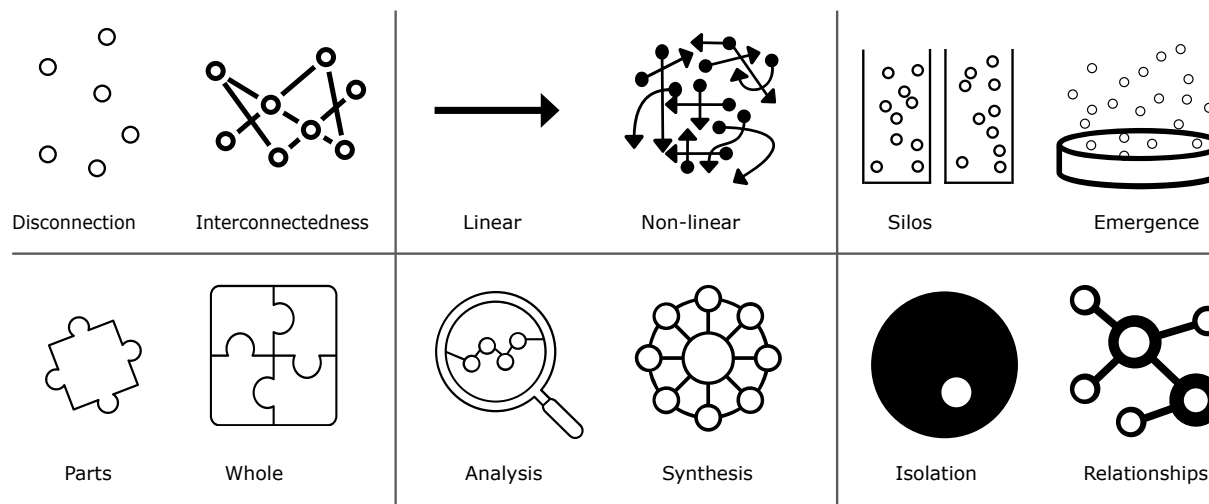# Quality principle A: System thinking

A food system is a dynamic interplay between many elements – it is not a static machine which produces outcomes based on certain inputs. We call the type of change we would like to see in food systems, systemic change. 'Systemic' means 'in relation to the whole system', which is different from the word 'systematic'. So instead of breaking a food system down into small elements for analysis, we look at the whole of it, the relationships between elements, and how it behaves. This calls for a different way of looking, or the use of different mental tools such as the ones illustrated below. A system analysis also seeks to understand parts of the system that cannot easily be observed or measured. We also see a system as complex, where cause-effect relationships only become apparent when taking action (called 'emergence').

Learning with multiple stakeholders from within the system is a prerequisite to better understand the system (see Posthumus et al., 2018a for more details on the conceptual framework).

A system intervention aims to shift the status quo of a problem arena towards a more desirable state, which may require intervention in non-obvious parts of the system. It also acknowledges that there is likely to be resistance to change within the system that needs to be addressed, among particular social groups or within current institutional structures. Although transformation of food systems is often talked about, it is not possible to dismantle an existing food system and redesign it from scratch. System interventions therefore look to nudge food systems into a desired direction away from the status quo. This is done by targeting leverage points that can shift the system towards a more desirable state that is more sustainable in terms of human and planetary health. A leverage point is understood as a place in a complex system where a small shift in one factor or process can generate large-scale impact in the food system (see e.g. Meadows, 1999).

Tools of a systems thinker (adapted from Leyla Acaroglu/Disruptive Design)

| Disconnection | Interconnectedness | Linear | Non-linear | Silos | Emergence |
| Parts | Whole | Analysis | Synthesis | Isolation | Relationships |

Your pocket guide to system thinking

1. Focus inside the boundaries of your system; avoid getting drawn into the web of the entire cosmos.
2. Look for patterns in the way a system has behaved in the past.
3. Study the relationships between different elements in your system.
4. Aim to understand the system, don't aim to fix it; this is how the solutions emerge.
5. Don't pull the system into a static solution but gently nudge it into the desired direction.
6. Embrace ambiguity.
7. Be flexible with your ideas, thoughts and process; allow them to evolve.
8. Zoom in and out repeatedly between micro and macro workings of a system and its elements
9. There is no one solution that can fix a system; seek to understand how each solution impacts the system, including negative unintended effects, relative to another.

From: Rockefeller 2019, p31

Quality principle B: Stakeholder involvement

Why is it important to involve stakeholders?

When analysing a food system, it can be difficult to decide on whom to engage. There are many different and opposing opinions among different stakeholders on food system performance. Yet, it is essential to include this variety of voices in your analysis, for two reasons:
a) it provides more perspectives on the food system to consider, increasing the chances for new innovations;
b) it invites stakeholders to join the conversation about food system change to deliver better outcomes for all and create an action perspective at the same time.

Stakes and stakeholders: who is a stakeholder?

Everybody who has a stake (an interest or a concern) in the food system, is a stakeholder. In other words, any group or individual who can affect, or is affected by the food system. For your analysis it is important to recognise their motives, assets, concerns and agendas. However, it is impractical to include everyone. The step 'Define actors and sphere of influence' provides several ways to analyse and prioritise stakeholders to take part in your analysis.

Make sure you have representation from all major stakeholder groups: government, private sector, civil society (e.g. farmer organisations, community-based organisations, NGOs) and knowledge institutes. Also, try to identify stakeholder groups beyond the usual suspects, to include voices that are normally not heard at this stage (e.g. women groups). You can add groups or clusters that operate at different levels, depending on the context or scale of your analysis. Across these 'groups', ensure that you strive to have a cross section of different social

categories (e.g. gender, age, income level).
Be aware that not all stakeholders are also 'problem holders' – one stakeholder may have defined the problem, which is not necessarily acknowledged by the others. Also, be conscious of your own biases when choosing the stakeholders.

Organising your stakeholders: workshops, focus groups & interviews

Not every stakeholder has time or interest to take part in an analytical process. This does not mean you should not involve them. Generally, it is recommended to organise a stakeholder workshop in order to exchange perspectives and understand where people agree or disagree. This may not work for everybody, though. Think about high-level decision makers who cannot spend a day in a workshop (tip: inform them prior to the workshop, interview them if possible, and report back to them afterwards) or about community members who do not feel comfortable in a workshop setting (tip: help them to tell their story on video or online, and ask permission to use it during the workshop). If a workshop is not feasible or desirable, use focus group discussions or semi-structured interviews to collect stakeholder perspectives on the food system. Try to form a small multi-stakeholder validation team which comments on the data analysis, and enriches it.

The goal is not to involve everyone all the time, but rather to create an analysis which takes the different stakeholder perspectives into account, incorporates different types of knowledge, and facilitates opportunities to create more understanding and connections between stakeholders. A food system analysis can thus also enable

stakeholders to initiate actions to collectively shape food systems that deliver better outcomes.

Be aware of power dynamics, including your own position

Be aware that stakeholders have stakes and their relations are not neutral, which influences their (re) actions. The timing and location of the interaction is important, as it may exclude/include different types of stakeholders from attending (e.g. gender-based mobility constraints related to timing of day). Think also about the set-up, local customs and mode of facilitation to allow all voices to be heard. There are helpful guides on multi-stakeholder processes available that give tools to deal with power dynamics in workshop settings (e.g. The MSP Guide). It is important to use a neutral, highly skilled and trusted facilitator, to navigate complex power relations in a workshop. The section 'Analyse political economy & governance' provides several tools to analyse the power relations in the food system.

Quality principle C: Equity & inclusiveness

Within food systems, processes work differently for different people

Across various social markers (such as gender, age, education, profession, social status, disability or any minority groups) there are differences in opportunities and challenges for different social groups. Not everyone has the same access to resources or can benefit equally from food system outcomes. Food system inequities also play out differently depending on where people are in their lifecycle. This diversity within food systems for different social groups is often overlooked. Including equity and inclusiveness principles in every step of the food system analysis is key for a good quality analysis. Thinking around equality and empowerment has much to offer to a food system analysis. First, it can provide clarity on root causes of inequality in food system outcomes for different social groups at different levels. Second, it provides insights into how power affects processes contributing towards social exclusion and marginalisation, which act as structural bottlenecks for equity (Newton, 2020).

Start with identifying the relevant target group

Food system dynamics play out differently depending on who you are, your access to key resources, the decisions you are able to make and how social and gender norms affect the work you can do, or your ability to benefit from interventions. Therefore, it is key to identify the most relevant social groups for the formulated objectives. Gender and age are often important factors, but also think of other intersecting social markers such as religion, sexuality, social class, race, migrants, income, etc. For food systems, it is also relevant to distinguish where in

the food supply chain actors are operating (whether input suppliers, small-scale farmers, commercial producers, traders, retailers, regulators, or consumers) and how much power they hold.

Working backwards: look beyond the average

Often studies calculate the average. For example, the average nutritional value of a population's diet. However, averages mask differences in society. Disaggregating food system outcomes by different social markers will identify who needs what kind of support. This entails looking at individuals and groups who are both socio-culturally disadvantaged and nutritionally disadvantaged due to different drivers of malnutrition.

During the food system analysis, ask regularly 'how is this different depending on who you are, according to your gender, age, socio-economic status, religion, geographical location, etc ?

Understanding differences

When identifying who are the winners (or included) and losers (or excluded) in the food system, understanding the 'why' is vital to identifying inclusive strategies to address inequities. Some guiding questions to assist this include:

- Who has access to which resources?
- How do institutional structures and norms shape differences in access to key resources required to engage in food system activities (e.g. land, capital, equipment)?
- Who has decision making power and on what level?
- How does this play out differently for different actors?
- Why do we see those differences and how does this affect the food system characteristics and its behaviour?
- How do institutions and gender norms drive inequity within the food system? Who is reached or involved? Who benefits?

Tools for including equity & inclusiveness in the food system analysis

Food security walk

This tool raises awareness on inequality mechanisms in the food system. Based on character descriptions, participants respond to statements which helps them to become aware of how food system outcomes vary between different social groups.

Unpacking gender assumptions

This tool provides clarity on gender assumptions underlying a Theory of Change, which are often invisible but very influencing. It addresses the risks of ignoring gender to achieve inclusive food system outcomes.

Reach, benefit or empower

Not every intervention or strategy that targets disadvantaged groups has the same intended outcome. This tool helps to understand the difference between reaching, benefiting and empowering social groups.

Toolbox 1: System actors

How a food system operates depends for a great deal on the actors who are involved. System actors entail every individual, group and organisation that is somehow involved in the food system. Within their interactions they shape, reshape and adjust the food system. For a good understanding of the food system, it is therefore key to understand who the actors are, how they act and interact, and why they do so. This includes both the actors directly involved in activities related to the food supply chain, as well as supporting actors who provide supporting services within the food system (Figure 1). Hence, this component starts with defining the actors and their sphere of influence.

For an even deeper understanding, we recommend also doing a political economy and governance analysis. This provides an overview of the power dynamics and governance arrangements in the food system: who benefits and who is excluded across different social axes of privilege/marginalisation, including insight into one's own position. This analysis on power and governance is done towards the end of the overall analysis.

An analysis of the system actors is preferably done through-out the analysis: at the start to decide on whom to involve in the analysis, throughout the analysis to understand differences in benefits, influence and interest between stakeholders in different parts of the food system, and at the end to understand how to collaborate with whom in order to activate leverage points. This will ultimately inform your food system strategy.

This Toolbox component has two parts:

a. Define actors and sphere of influence
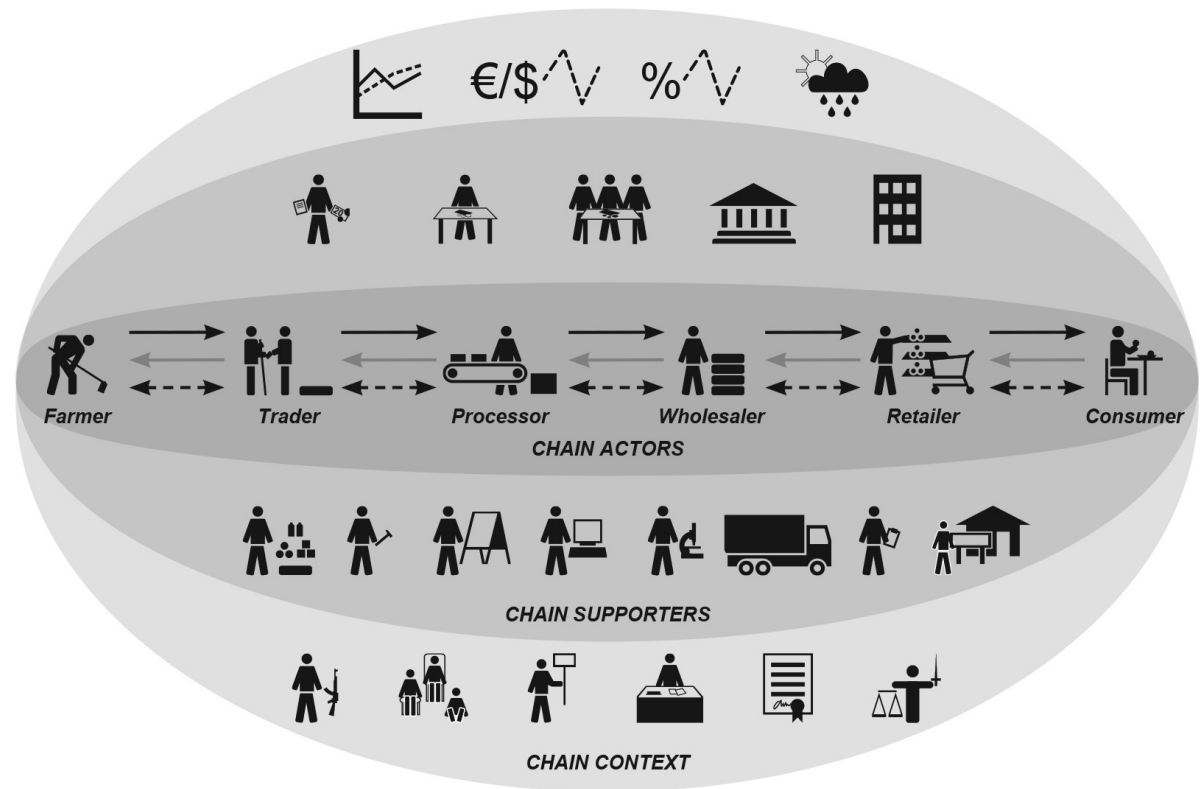**b.** Analyse political economy & governance

Figure 1. Food supply chain actors (KIT/IIRR, 2010)

Toolbox 1a: Define actors and sphere of influence

Introduction

These tools create an understanding of the roles different actors play in the food system, their objectives and their sphere of influence. System dynamics are the result of the interests and influences of actors, which translate into their actions and their interactions. A stakeholder analysis provides insight into the interests, mandates, relationships and power levels of different actors. Understanding the stakeholders' arena, and who can activate leverage points, can inform strategies for engagement with different actors in order to achieve the formulated objective.

Short description on tools

The tools will help to gain a detailed and structured knowledge on the different actors/stakeholders and their spheres of influence. You can identify the varying degrees of importance of individual stakeholders/groups of stakeholders as well as how influential these are and what their contribution might be.

Creating a social network will provide you with a visual overview of how the actors are connected. Combining this with a visual representation of the objectives of the stakeholders in the form of radar charts, shows a rich picture of the actors in the food system. The outcomes of these exercises are a stepping stone for the analysis on political economy and governance.

Quality principles

Try to include a wide range of actors in this step. Their role could be to give information, or be actively involved in the analysis. Think of formal and informal stakeholders; conservative and transformative actors; actors with different levels and forms of influence; actors with different backgrounds; and actors with different roles in the food supply chain, society, community and households. A key consideration is whose voices are included and excluded. For further information, see our chapters on stakeholder involvement and equity and inclusiveness. Remember that not everybody needs to be involved all the time or needs to agree with everything. Rather aim for a balance of inclusion and efficiency. Always ask yourself: 'What is the added value of including this actor, at this moment?'.

👁 **Awareness tools**			🔗 **Exploration tools**			📊 **Analytical tools**		
Stakeholder identification	**Stakeholder characteristics & roles**	**Journey mapping**	**Importance & influence matrix**	**Force field analysis**	**Immersion through shadowing**	**Social network analysis**	**Objectives spiderweb chart**	**Food System governance arrangements framework**
Fast visual overview of the most relevant stakeholders for the issue at hand, and their relationships. Make sure to include a wide range of stakeholders as explained in the quality principles.	This tool defines roles of stakeholders in the food system. In combination with the 'importance and influence matrix,' the outcomes enable a stakeholder specific approach and strategy.	Visualisation of the process that different types of actors (in particular your target group) go through to achieve their goals.	This tool captures the degree of influence and level of importance that each stakeholder attaches to the relevant issues or possible objectives.	In a small group, map the stakeholders in support of, or working against, a policy goal or objective. The forces are scored according to their magnitude	Immerse yourself in the lives of people working in the food system by spending a day shadowing them and asking them how they make decisions.	Create a social map of actors to get insight into the contacts of stakeholders, to whom knowledge and resources are transferred and who holds a broker position. Data is obtained through surveys.	Define the objectives by stakeholders in the food system and place them in a chart. For each stakeholder, create a chart and score. Provides visual overview of objectives in the food system	To diagnose strengths and weaknesses of food governance arrangements, this framework explores 5 principles: system-based problem framing, boundary-spanning structures, adaptability, inclusiveness, transformative capacity.
👥🎤 40-60 min	👥 1 hour	👥🔍 1-2 hours	👥🔍 60-90 min	👥🔍 1-2 hours	🎤 1 day per actor	👥🔍🎤 5-10 days	🔍 0.5-2 days	🔍 0.5-2 days

Toolbox 1b: Analyse political economy & governance

Introduction

This step gives insight into the sources of power that influence the food system, and is meant for the latter part of the analysis. It builds on the previous package on actors and sphere of influence. Plus, it addresses the relation between political economy, governance structures and the system characteristics and system behaviour. In many food system interventions, the position of dominant players and paradigms tend to be reinforced, resulting in a preservation of the status quo or in some cases even a widening of the gap between existing inequalities. Therefore, developing a good understanding of the dynamics of power, politics and agency in food systems is crucial to tackle problems adequately. At the end of this step you have an overview of the power dynamics in the food system, who benefits and who's excluded across different social axes of privilege/marginalisation, including insight into one's own position. This will result in an overview of which stakeholders could play a role in influencing the identified leverage points.

Short description on tools

The objective of the tools is to understand which forms of power are involved and how the political economy and governance structures interfere with the food system. We recommend to start with the tools that raise awareness on different forms of power within the food system and who benefits from the current status quo. As a next step we recommend analysing the governmental and political economy that are linked to the food system, including the local (food) policy frameworks. In the last part of the analysis you analyse how power is distributed over the different actors and institutions within the food system and how they influence the system behaviour through formal and informal 'rules of the game'.

Quality principles

In this analysis it is key to be sensitive to power dynamics and stakes of the stakeholders that you invite in workshops and interviews. Nobody is neutral. That also includes your position as a researcher or commissioner of the food system analysis. For more information, read the chapters on stakeholder involvement and equity and inclusiveness.

👁 **Awareness tools**			🔗 **Exploration tools**			📊 **Analytical tools**		
Forms of power	**Power ranking**	**Governance indicators**	**Stakeholders power in food systems**	**Political economy assessment**	**Five A's: policy implications**	**Netmapping**	**Power & system behaviour**	**Future scenarios**
This tool helps participants consider what forms of power are being used in the food system. How do actors attempt to influence the system? Are actors aiming to keep the status quo or aiming for change?	This tool makes participants realise that every person has different statuses and privileges which can be situational, social, and personal. These attributes give the actor a certain level of power.	This global dataset shows a set of six national governance indicators over time (since 1996) related to dimensions such as accountability, government effectiveness, law and regulation	This tool gives a deeper understanding of the role of stakeholders in the food system. It visualises the relative importance and influence of each stakeholder as well as their place within the food system	This qualitative method explores the political commitment and opportunities to advance agri-food policies. It combines stakeholder analysis with metrics of political commitment and reform.	After a political economy assessment, this tool helps to identify the policy implications: should we aim for Altering, Adapting, Avoiding, Awaiting, or Abandoning practices/ incentives?	This tool combines social network analysis and power mapping of the stakeholders and how they influence outcomes. Shows where synergies and conflicts between stakeholders are in the network.	Interviews regarding the following questions: • How do actors and governance structures influence feedback loops? • Which actors can influence the identified leverage points? • What are their interests?	With this tool you combine predictable and unpredictable changes in the food system and power dynamics to sketch possible future outcomes.
👥 45 min	👥 1 hour	🔍 1 hour	👥🎤 1-3 days	👥🎤 1-3 days	👥🔍 0.5-2 days	👥🎤 30-120 min	👥🎤 1-3 days	🔍 1-5 days

Toolbox 2: System characteristics

This analytical component creates an overview of the food system, including the system outcomes, activities and underlying drivers. A food system analysis starts with exploring food system outcomes. You will want to gain insight into what the food system actually delivers. Some examples of outcomes are healthy diets, environmental pollution, and fair wages for agricultural labourers. You don't need to analyse all the outcomes. Let your food system objective (Part 1) determine the focus of this analytical step.

In addition, the states and trends of the various elements of the food system are being mapped. The mapping includes the assessment of key indicators, as well as understanding (historical) trends, synergies and trade-offs of different food system parts. And because food systems are connected to many other systems, they are riddled with trade-offs, making it difficult to transition to more sustainable systems. The food system framework of van Berkum et al. (2018) can be used as a checklist for topics to be addressed (Figure 2). This will draw the attention to the vulnerabilities of the food system, and identify the most limiting factors to achieving the desired food system outcomes.

Depending on data availability and knowledge gaps, this analytical component may consist of a light document review and use of expert knowledge or more comprehensive approaches such as scoping studies and surveys to gather the essential data.

This analytical component has two parts:

a. Analysing food system outcomes

b. Mapping food system drivers and activities

Figure 2. Food system framework of van Berkum et al. (2018)

SOCIO-ECONOMIC DRIVERS
- Markets
- Policies
- Science & technology
- Social organisations
- Individual factors

FOOD SYSTEM ACTIVITIES
- Enabling environment
- Food environment

FOOD SUPPLY SYSTEM
- Agricultural production
- Food storage, transport & trade
- Food processing & transformation
- Food retail & provisioning
- Food consumption

- Business services
- Consumer characteristics

ENVIRONMENTAL DRIVERS
- Minerals
- Climate
- Water
- Bio-diversity
- Fossil fuels
- Land, soils

FOOD SYSTEM OUTCOMES
- Socio-economic outcomes

FOOD SECURITY
- Food utilisation
- Food access
- Food availability

- Environmental outcomes

Toolbox 2a: Analysing food system outcomes

Introduction

Food systems produce three types of outcomes: food-nutrition outcomes, socio-economic outcomes and environmental outcomes. Though food and nutrition is the primary outcome of a food system, the related socio-economic and environmental outcomes are recognised as being equally important.

Short description on tools

For each of the three outcomes, we have included three tools that can get you started depending on whether you are creating awareness with a group, or are exploring the topic further, or are doing a deep analytical dive.
If you have the opportunity to discuss in a multi-stakeholder workshop, it is best to start with an awareness tool first. Much of the exploration and deeper analysis can be done in a smaller circle of experts.

Quality principles

It is key for the analysis to understand the differences in outcomes for the relevant social groups. So for example, how the local diet differs between men and women and between youth and elderly and other social markers. Is this difference due to consumer preferences, to access to food items or intra-household dynamics? For the desk research such as the nutrition gap analysis, it is important to look beyond the average, and disaggregate the outcomes by different social groups.

👁 **Awareness tools**			🔗 **Exploration tools**			📊 **Analytical tools**		
Food-nutrition	**Socio-economic**	**Environmental**	**Food-nutrition**	**Socio-economic**	**Environmental**	**Food-nutrition**	**Socio-economic**	**Environmental**
What we eat	Wealth ranking	Transect walk	Minimum cost of a healthy diet	Rapid sector assessment	Participatory land use mapping	Nutrition gap analysis	Doughnut analysis	
Draw a plate and divide it according to typical ingredients / food groups that are consumed in local diets, and where these come from.	Participatory tool to identify wealth classes and their attributes within communities.	Organise a guided walk through a landscape to jointly make sense of how agriculture, nature and economic activities coexist and/ or compete. |0.5 day	Calculation method in which you combine market prices and nutritional values of local crops. Shows the costs of a healthy diet and good value food products.	This assessment helps to zoom into performance of a sector, using a Sector Transformation model. Combines survey and focus group discussions. This example is on impact Covid-19 on agriculture.	Identify how land use is distributed and how this has changed over time. Shows local perspectives on natural resources in the landscape, and where vulnerabilities are.	Based on the food availability and health data you can analyse which elements lack in diets and for different target groups. A good source is the DHS programme.	Use Kate Raworth's 'doughnut' model to find the sweet spot for food systems to support healthy livelihoods without trespassing planetary boundaries. See also Good Life Index. This can be applied to countries, landscapes, cities, and so on.	
👥 1 hour	👥 2 hours	👥 0.5-2 days	🔍 1-3 days	👥 🔨 8 days	👥 0.5-2 days	🔍 2-10 days	🔍 👥 1-5 days	

Toolbox 2b: Mapping food system drivers and activities

Introduction

You will need to dive into the different activities which take place in a food system, and get clear about what is driving these activities (these are the orange, blue and green parts of the food system model). The focus is really about the trends you can identify, using key indicators. Food system drivers and activities mapping can therefore be perceived as the basis of the analysis. Remember that a mapping is always a momentary snapshot, while in reality food system elements are dynamic.

Short description on tools

The tools in this step are more generic by nature, but are essential to understand of the drivers, and trends within food systems. To give focus to the analysis of the system trends, try to focus on those aspects most related to the formulated objective. However, make sure that the analysis includes aspects of all the drivers and outcomes to generate a system overview.

We advise to start with interviews, literature review, general data collection and triangulation on those sources to generate a first overview. The level of effort required depends on the prior knowledge of the food system of interest. Be aware that much secondary data is freely available. To deepen the analysis, we recommend some analytical tools to understand how some trends form synergies and trade-offs and how trends could develop in the future.

Quality principles

It is important to avoid bias in the data that you collect. Therefore make sure that the key informants and the literature represent all the relevant target groups. The informal economy tends to make up a large part of the food system in emerging economies, and the analysis should thus include the informal markets, activities and trade flows.

A similar point of attention is needed for the data collection. Make sure that the analysis goes deeper than calculating the average. Instead, include the relevant targets groups in the analysis and analyse the differences between them. For further elaboration, see our chapter on equity and inclusiveness.

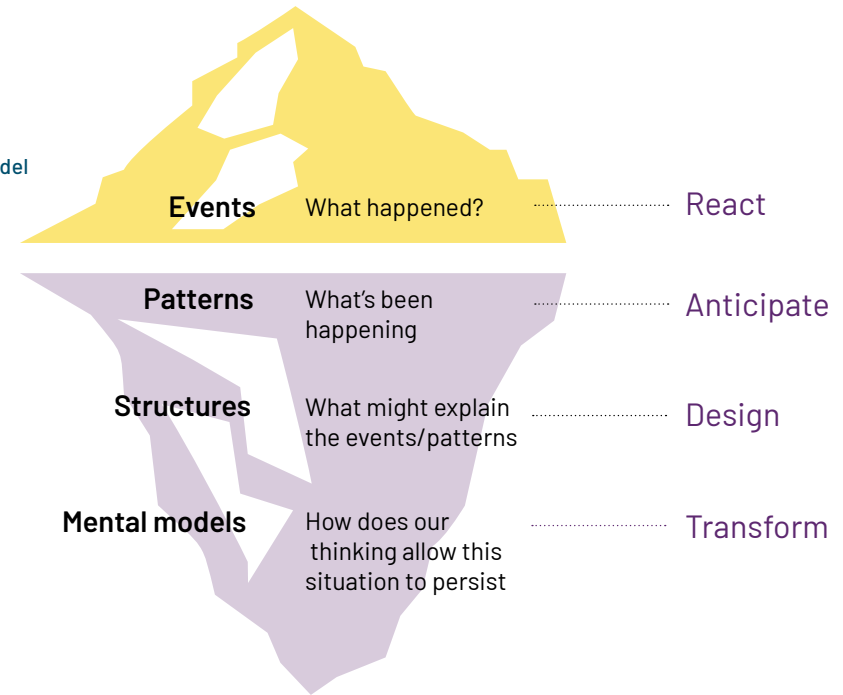| 👁 Awareness tools			🦠 Exploration tools			📊 Analytical tools		
Interviews	**Interactive map**	**Secondary data**	**Nutrition-sensitive value chain**	**Integrated Biodiversity Assessment Tool**	**Literature review**	**Synergies & trade-offs**	**Future scenarios**	**Policy analysis**
Interviews to get understanding of what key informants perceive as key system trends, drivers and activities of the food system.	Using Google Earth (online, or large print) in stakeholder workshop or interviews. Ask food system actors to identify their role and other actors' roles in activities from production to consumption. Add data to map (example Kenya/Bolivia).	Collect secondary data regarding the food system. Such as GDP, export data, agriculture, nutrition and environmental data and business regulations. Good sources are the World Bank (data, business) and the Food Systems Dashboard.	This tool identifies nutrition-sensitive investments in the value chain. We recommend the 3rd step in the guide of IFAD to complement other tools in this box.	Helps to check biodiversity status of a specific location within the food system boundaries. First level of access is free for everyone.	A literature review on what key authors describe as the main system drivers and trends relating to the food system.	Map for important trends in the food system how they interact. Which ones can strengthen each other and which ones form trade-offs? Example synthesis for inspiration.	This tool combines predictable and unpredictable changes in the food system to sketch possible future outcomes. "Good examples and resources available at Foresight4Food	Analyse local, national and international policies that effect the food system. This can entail governmental policies, but also of other influential organisations. Here is a practical guide.
🎙 1-14 days	🔎 0.5–5 days	🔎 0.5–5 days	🎙 🔎 2-3 weeks	🔎 0.5 day	🔎 0.5–5 days	🔎 1-5 days	🔎 > 30 days	🎙 🔎 3-10 days

Toolbox 3: System behaviour

System behaviour addresses the interactions between the elements of the food system, whereas system characteristics looks at the status and trends for the various elements of the food system. For example, how does climate change influence farming practices? And how do governmental policies influence local trade infrastructures? Analysing system behaviour is crucial for understanding the food system and designing effective strategies for intervention. It shows how a change in one part of the system affects the other parts.

This component has three parts. The first part is identifying system causalities. This provides a visual diagram of causal relationships between different elements of the food system. Second, one can label the various causal relationships as system archetypes. This helps to understand common behavioural patterns that occur repeatedly in the food system. This makes it possible to identify leverage points for systemic change. Although we recommend using system archetypes in the food system analysis, it is not a necessity. Lastly, leverage points for system change should be identified. These are places in the causal relationships where actions can lead to a change in system behaviour and subsequently to valuable impact.

In systems thinking, a system is often depicted as an iceberg where only a small part (the events and symptoms) is visible for an observer, but these visible parts are the result of what is happening underneath the surface: the patterns, structures and paradigms or mental models that determine system behaviour (see Figure 3). The thinking on leverage points argues that the 'deeper' into the system you go with your intervention points, the more leverage you can create to achieve systemic change (see the box on intervention points by Meadows).

Figure 3. The iceberg model

Events	What happened?	React
Patterns	What's been happening	Anticipate
Structures	What might explain the events/patterns	Design
Mental models	How does our thinking allow this situation to persist	Transform

Leverage points for systemic change – from least to most effective intervention points (Meadows, 1999):

1. Change whatever numbers you can measure: constants, parameters, numbers (subsidies, taxes, standards)	**Events & symptoms**
2. Change the way stocks and flows are connected: material flows and nodes of material intersection.	**Patterns**
3. Adjust the lengths of delay relative to the rate of system change.	
4. Allow thing to adjust to goals faster: regulating negative feedback loops.	**System structure**
5. Allow thing to grow faster: driving positive feedback loops.	
6. Improve the information flows.	
7. Change the rules of the system (incentives, punishments, constraints).	
8. Allow diversity for self-organization (e.g. address the distribution of power)	
9. Change the goals of the system.	**Mental models**
10. Change the mind-set or paradigm out of which the system arises.	

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Toolbox 3: Identify system causalities

Introduction

Causal mapping provides insight into root causes that shape the food system dynamics. Causal maps depict how a change in one factor affects a change in another factor in a similar (positive) or opposite (negative) direction. The causal maps also include feedback loops between different factors that may reinforce or restrain specific processes within a system.

Identifying system causalities is key step to analyse how different drivers and activities can influence each other and subsequently the food system outcomes. Make sure that you build on the insights of the previous step (Mapping of food system drivers and activities).

Short description on tools

In a workshop setting, we recommend doing a problem tree exercise with relevant stakeholders as a start, to add local perspectives on causes and effects in the local food system. If stakeholders have difficulty to map a problem tree, one can start with creating a mind map or QQ diagram to brainstorm about issues related to the relevant food system outcome. Many of these tools can also be used in on-line workshops by combining video calls with, for example, Mural templates.To deepen the analysis, other tools can be used, such as the creation of Causal Loop Diagrams. Based on the problem tree, system analysts can further deepen the causal linkages and the influence of feedback loops on the system behaviour as a whole. To conduct data collection from respondents in a system-sensitive manner software such as Sensemaker can be used. This analysis

reveals the non-linear processes that determine food system behaviour and outcomes, and provides a stepping stone to the identification of the system archetypes.

Quality principles

Causal relations in a food system can play out differently for different social groups. Therefore different problem trees could be constructed for different target groups. To do this effectively, make sure that the participants in the workshop include representatives of the groups. Separate sessions for different social groups are also an option.A similar point of attention is needed for the data collection. Make sure that the analysis goes deeper than calculating the average. Instead, include the relevant targets groups in the analysis and analyse the differences between them. For further elaboration, see our chapter on equity and inclusiveness.

👁 **Awareness tools**			🔗 **Exploration tools**			📈 **Analytical tools**		
Mind map	**QQ diagram**	**Affinity Diagram**	**Problem tree**	**Behaviour over time**	**Graphical function diagram**	**Causal loop diagram**	**Agent-based modelling**	**Sensemaker**
Brainstorm session, in which you create a visual representation of related ideas and information that exist in the group on the food system.	This brainstorm exercise asks participants to distinguish between 'hard' (quantitative) and 'soft' (qualitative) variables which have an impact on a particular issue. Helps participants to gain a system view.	Brainstorm session, where participants write own ideas on cards which are later clustered by the group into major themes and issues.	This tool is often used for project planning. It provides a structure that maps the root causes and effects of a particular issue.	Shows how behaviour of variables interrelates. It answers questions as: if this happens to one variable, what will happen to the others?	Captures how two variables affect each other. This relationship is plotted in a graph. Also helps understanding non-linear relationships.	This analysis reveals the non-linear processes that determine food system behaviour and outcomes, and provides a stepping stone to the identification of the system archetypes.	Simulation modelling technique that maps the effects of autonomous decision making on complex behaviour patterns in a food system.	Cognitive Edge software for data collection and analysis, capturing narratives of people in their contexts and enabling pattern recognition and outlier spotting.
30-60 min	60-120 min	30-60 min	60-90 min	60-120 min	2-5 hours	2-5 hours	>30 days	>30 days

Toolbox 3: Label system archetypes

Introduction

This step identifies common system behavioural patterns that occur repeatedly in the food system. By uncovering these patterns, it becomes possible to understand system behaviour better and quickly identify leverage points for system change. When we see that system behaviour consists of patterns that recur over time and place, we can better signal and anticipate problems and accommodate them. In this step we draw on eight common patterns, which are called **system archetypes** (Kim 1994).

Short description on tools

There are no 'off-the shelf' tools available to develop or identify system archetypes. The field of system dynamics recognises a number of archetypical system behaviours of which we select eight that are relevant for food systems. Recognition of system archetypes builds strongly upon the causal loop diagrams which are made in the previous step, identifying system causalities. For each set of causal loops, this step identifies the archetypes that determine recurring patterns in the food system.

As each archetype has its own dynamic in the specific situation, the next step is to zoom in on the situation, with the lens provided by the archetype. This will generate input for understanding why current problems are occurring and how these patterns of system behaviour can be altered. As much of this requires interpretations by researchers, we recommend a workshop with stakeholders and experts to validate this analysis. This analysis will assist the identification of

leverage points that can achieve transformative change in the food system. The field of system dynamics recognises a number of archetypical system behaviours of which four examples are illustrated here. Posthumus et al. (2018b) explain eight different archetypes in food systems in more detail.

Quality principles

Causal loop diagrams and system archetypes do not always distinguish differences in how various social groups are affected. Hence, it is important to include stakeholders or key informants in the workshops who are a representative or have sufficient knowledge on how the different dynamics affect different social groups. For further information, see our chapters on stakeholder involvement and equity and inclusiveness.
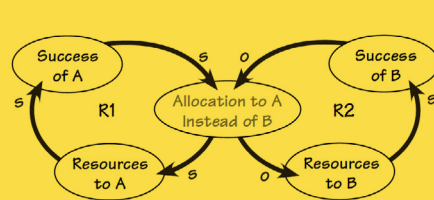
Fixes that fail
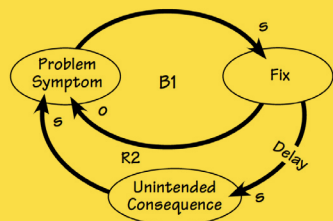
- Short term fix for long term problem
- Quick fix only enlarges problem
- Over time, no solution is reached

Example: Inorganic fertilizer
Advantages for short-term soil fertility, but no investment in integrated soil fertility management to regenerate soils. Increased input dependency in the long term.
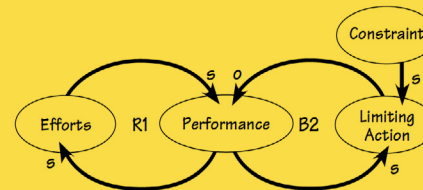
Succes to the successfull

- One group has been given more resources
- More likely to succeed
- Investment attracts investment

Example: Business competition
Agri-business start-ups that win more grants initially, are more likely to succeed than other businesses
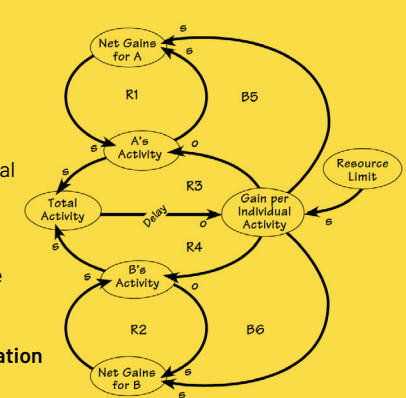
Limits to succes

- Increase performance
- Later, system encounters limit
- Performace erodes/declines

Example: Nutrition
Increased nutrition diversity has positive effects until a certain satisfaction point

Tragedy of the commons

- Individual beneficial behaviour
- Commons do not benefit
- Degradation of the commons

Example: Deforestation
Farmers use forest services, in case of too much pressure forests will be degrading.

Toolbox 3: Identify leverage points

Introduction

Once the systemic problems have been defined, leverage points are identified to change problematic system behaviour. A leverage point is understood as a place in a system where a shift in one factor can result in catalytic effects or systemic changes in the food system. Leverage points can include the improvement of infor¬mation flows, strengthening or weakening of particular feedback loops, or introducing new incentives to influence actor behaviour.

Short description on tools

Based on the causal loop mechanisms and system archetypes, this analysis starts with identifying what should change to create a (more) positive outcome. When possible solutions are drafted, they are examined on how they would influence the rest of the food system and used to analyse if and how a goal can be achieved. To deepen the analysis we recommend using Bayesian modelling. This model helps predict how the perceived changes affect other aspects of the food system.

It is recommended to rank the leverage points according to their relevance and potential to achieve the desired food system outcomes, preferably together with the key stakeholders. The exploration tools can be used for this. Also consider which stakeholders or actors have

an influence on, or are immediately affected by, these leverage points. These insights will inform the type of partnerships or incentives needed to activate the identified leverage points. The next section on system actors provides more information.

Quality principles

Note that the effects of leverage points can be different for different social groups. The choice of leverage points can differ depending on the formulated objectives at the start of the analysis. For example, the leverage points to make the food system more inclusive can be different from leverage points to increase productivity or profit.

👁 **Awareness tools**			🔗 **Exploration tools**			📊 **Analytical tools**		
Breaking the cycle Based on the dynamics of the archetypes, find ways to alter the cycles for a (more) positive outcome. What should change in the dynamics to make it positive or less negative?	**Innovation brainstorm** Brainstorm exercise building upon 'breaking the cycle.' Participants answer the question: how can we make this change happen? Give room for both existing solutions and new creative ideas.	**Futures wheel** Visual tool to brain-storm on direct and indirect consequences of a proposed change.	**Planning for success** Mapping the effects of a changing feedback loop on the rest of the food system. Take into account the differ-ences in pace in which impact can be felt and the limits of growth. Gives direct input for policy design.	**SWOT analysis** This assessment tool lists strengths, weaknesses, opportu-nities, and threats of a project, partnership, or product. It helps to distinguish between factors that can and can't be influenced.	**Stakeholder validation** This tool is especially important when stake-holders are only partly involved in the previous tools of this step. Ask stakeholders: what res-onates with you, what surprises you, what's missing. Focus on your analysis of the different leverage points in the food system.	**Bayesian modelling** Model the effect of changing dynamics as you planned them, are likely to play out using Bayesian modelling techniques.	**Fuzzy cognitive mapping** Modelling technique that maps the causal linkages and the expected effects based on expert interviews. The model calculates how a change in one variable affects the entire system.	**SUSFANS** A modelling toolbox for forward-looking description of be-haviour of key actors in response to each other, allowing an assessment of potential inter-ventions for healthy sustainable European diets.
👥🔍 2-5 hours	👥 1-2 hours	👥 60-90 min	🔍 1-3 days	👥🔍 60-90 min	👥🖊 1-10 days	🔍 10-30 days	🖊🔍 10-30 days	🔍 10-30 days

From analysis to actions

Content

▶ Deciding on entry points for intervention
▶ Engaging stakeholders to identify pathways for transformation
▶ Putting food system analysis into action

Deciding on entry points for intervention

After analysing the three dimensions of the food system (system actors, system characteristics, and system behaviour), choices can be made on where to intervene in the system. Below we give some questions and pointers to guide this stage.

Identify pockets of resistance to change

- Are there persistent feedback loops or archetypes that need to be changed? One can distinguish means for transformation or incremental change:
  - System transformation: remove or add feedback loops in the system structure
  - Incremental change: slow down or accelerate specific feedback loops
- Are there powerful stakeholders or institutions that prevent change?
  - How can these be addressed?
- Based on the above, what are potential leverage points for change?
- Who are important stakeholders you could partner with?

Identify short-, medium- and long-term issues to address

Thinking about appropriate actions you could take while paying attention to synergies and trade-offs that the different actions may hold over time:

- What are the possibilities to react on urgent problems at short term?
- What medium-term challenges can be anticipated?
- What long-term challenges require a revised design for system structures or transformation of our mental models?

Find synergies with the outcomes and own portfolio of activities, interventions or policies

- Which portfolio components should be discontinued?
- Which portfolio components should be changed or improved?
- Which portfolio components should be multiplied?
- Which portfolio components should be added?

Be aware of 'lock-ins' at this stage

Lock-ins are conditions that keep the system in its current state and inhibit system transformation. IPES (2016) identified the following lock-ins that can create resistance to drastic change of industrialised food systems:

Path dependency. Current food systems tend to reinforce themselves.

Export orientation. Agricultural policies and trade agreement prioritize agri-food commodities for export.

Expectation of cheap food. Processors and retailers rely on cheap and flexible supply of uniform commodities. Compartmentalized thinking. Institutions (policy, research, business) have been compartmentalised, based on model of industrialized agriculture.

Short-term thinking. Short-term solutions dominate because of political electoral cycles and commercial interests.

'Feed the world' narratives. Focus on total food production neglects social equity, power imbalances, or local food availability and access.

Measures of success. Performance is predominantly measured by crop yields and productivity instead of indicators such as resilience or externalities.

Concentration of power. Small number of multinationals dominate input supply and food processing industry and retail.

Engaging stakeholders to identify pathways for transformation

"It is really hard to use foresight data to envisage pathways of change. After all, the future is unknown to all of us. Over the last decade however, we have learned much more about agrifood transitions and how they work – why some innovations may go to scale while others never enter the mainstream."

In this toolbox we elaborately discuss the importance of engaging a variety of stakeholders in every part of the process (see Quality principle B). The engagement of stakeholders is also of importance in the stage of identifying pathways for transformation. This will not only inform the discussions regarding uncertain futures, it also creates agency.

One approach to engage stakeholders in this stage is the Three Horizons approach (Sharpe et al. 2016). This approach provides a framework for structured and guided dialogue with stakeholders. The dialogue will trigger a lot of discussion and disagreements and it will highlight knowledge gaps about the future. The main aim is however, to identify potential actions that will take a step along the pathway of change.

The framework works with three horizons in time.

- **Horizon one (H1)** represents the way things are done now (business as usual). The starting point for discussion is the acknowledgement that this horizon is losing its fit with emerging conditions (e.g. climate change, societal or technological changes) or desired outcomes.
- **Horizon three (H3)** is the long-term vision or horizon that we aim to achieve in order to deal with the opportunities and/or challenges of the emerging conditions.
- **Horizon two (H2)** is the turbulent domain of transition in between the first and third horizons. This is where current structures are being challenged or disrupted and innovations emerge.

Using the insights obtained from the food system analysis, and in particular the leverage points for system change that you identified, you can discuss the different horizons to identify potential pathways for transformation.

The Three Horizons dialogue can be facilitated following several steps:

1. Examine present concerns (H1): discuss how current ways of doing things is losing its fit with emerging conditions.
2. Explore future aspirations (H3): examine aspirations and visions, and what aspects of H1 need to be replaced.
3. Explore inspirational practice in the present: look for concrete examples where new ways of doing things are already visible in the margins ('pockets of the future in the present').
4. Identify innovations (H2): look for innovations that respond to the failings of H1 and the possibilities of H3.
5. Determine essential features to maintain: identify elements of the old system (H1) that need to be retained in the future (H3).

One way to explore this further, is the Multi-Level Perspective (MLP) framework (Geels and Schot, 2007). This explains how transitions manifest through interaction between three analytical levels in societal systems: the landscape, the regime(s) and the niche(s).

H3 long-term vision

Looking for innovations that can accelerate a Horizon 3 future

H2

H1 business as usual

Desired food system outcomes

Present

Time

27
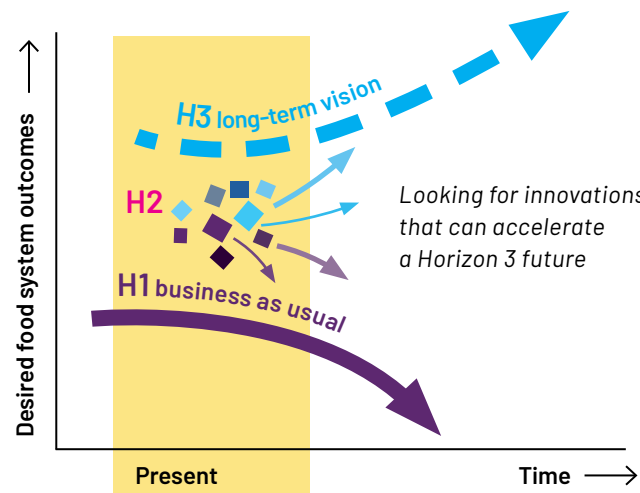
Putting a food system analysis into action

Choosing the best options for action

The food system analysis should result in a better understanding of the drivers and stakeholders influencing the entire food system. After the identification of leverage points for systemic change, choices will still need to be made which leverage points can be turned into actionable recommendations for strategies or interventions.

This final stage of the process explores the space for potential interventions directed at these leverage points. This space is determined by the capacities of the intervening party (e.g. the policy maker or NGO), the anticipated effects of the interventions on different stakeholders, and the intervention space of other actors.

Inspired by the human centred design approach, one can use the following 3 questions to focus your recommendations: What do people desire? What is financially viable? What is technically and organisationally feasible?

Possible criteria for making these choices:

- Relevance, level of impact and sustainability of the systemic change for different social groups.
- Synergies and trade-offs of different choices for different social groups.
- Strengths, expertise and resources of the intervening party, but also mandate and legitimacy to initiate change.
- Cost-effectiveness of interventions.
- The added value of the strategy in relation to existing initiatives, interventions or policies influencing the food system
- Potential for. creating synergies with other existing initiatives or partners.
- Balance between supporting and opposing forces (stakeholders) of your strategy, and your ability to influence these forces.
- Extent to which assumptions and risks underlying the strategy are reasonable, acceptable or manageable.

Several tools are available to help with prioritisation and choices

Prioritising & ranking This tool will help you to select the most promising ideas or options when many have been generated. In a group you discuss the options and vote for the best ideas.

Delphi For complex questions, invite an expert panel. Collate and summarise their answers and share. Ask the same question to the panel again and see if there is an emerging consensus.

Comparing proposals This tool is a simple matrix for weighing proposals from different perspectives. It captures alternative proposals developed by the group, and analyses the corresponding synergies and trade-offs. A multi-criteria analysis can be more elaborate (note that many methods exist), comparing different proposals against a set of multiple criteria.

Policy for whom? What types of socio-economic outcomes are we trying to shift in the food system and for whom? Explore the desired gender outcomes of the interventions (reach, benefit, empower, transform).

Force field analysis This tool assesses the strengths of various supportive and restraining forces influencing a desired change. It can inform decisions on which partnerships or coalitions to form in order to achieve change.

Draft a Theory of Change Define what the strategy will look like, what activities and resources are needed, with whom to partner, and how this strategy is expected to lead to change. Include in the Theory of Change the impact on different social groups and the underlying assumptions and risks.

In the entire process, consult with stakeholders in order to validate your change logic. There are a number of ways of getting feedback including citizen juries, field testing, and feed-back surveys. Special attention is needed to ensure different profiles of individuals are consulted and that the modality of consultation facilitates the inclusion of all voices.

Source overview

Articles and reports

Brouwer, H., and J. Woodhill; with M. Hemmati, K. Verhoosel, S. van Vugt. 2016. The MSP Guide, How to design and facilitate multi-stakeholder partnerships, Wageningen: Wageningen University and Research, CDI, and Rugby, UK: Practical Action Publishing. www.mspguide.org

Danielsen, K., F.F. Wong, D. McLachlin, S. Sarapura. 2018. Typologies of Change: Gender Integration in Agriculture and Food Security Research. Amsterdam: KIT Royal Tropical Institute

Dekeyser, K., F. Rampa, C. D'Alessandro, P. Bizotto Molina. 2020. The food systems approach in practice: our guide for sustainable transformation. Discussion paper 278. European Centre for Development Policy Management, Maastricht

Geels, F., Schot, J., 2007. Typology of transition pathways in socio-technical systems. Research Policy.

IPES. 2016. From uniformity to diversity: a paradigm shift from industrial agriculture to diversified agroecological systems. International Panel of Experts on Sustainable Food systems. www.ipes-food. org

Kim, D.H. 1994. Systems archetypes II: using systems archetypes to take effective action. Pegasus Communications Inc

KIT and IIRR. 2010. Value chain finance: Beyond microfinance for rural entrepreneurs. Royal Tropical Institute, Amsterdam; and International Institute of Rural Reconstruction, Nairobi. Meadows, D. 1999. Leverage Points: Places to Intervene in a System. The Sustainability Institute, 2-19.

Medium. 2020. Disruptive design. https://medium.com/disruptive-design/archive. Last accessed on 30/09/2020

Newton, J. 2020. Gender, nutrition and food system approaches. In: C.E. Sachs, L. Jensen, P. Castellanos, K. Sexsmith (Eds.) Routledge Handbook of Gender and Agriculture. Routledge, London

Omidyar Group (2017) Systems Practice Workbook. https://docs.kumu.io/content/Workbook-012617.pdf

Pegasus communication Inc. 2020. The Systems Thinker. https://thesystemsthinker.com. Leverage Networks Inc. Last accessed on 30/09/2020

Posthumus, H., B. de Steenhuijsen Piters, J. Dengerink, S. Vellema. 2018a. Food systems: from concept to practice and vice versa. Wageningen University & Research, KIT Royal Tropical Institute

Posthumus, H., B. de Steenhuijsen Piters, J. Dengerink, S. Vellema. 2018b. Archetypes: common systemic behaviours in food systems. Wageningen University & Research, KIT Royal Tropical Institute

Sharpe, B., A. Hodgson, G. Leicester, A. Lyon, I. Fazey. 2016. Three horizons: a pathways practice for transformation. Ecology and Society 21(2): 47

Termeer, C.J.A.M, S. Drimie, J. Ingram, L. Pereira, M.J. Whittingham. 2018. A diagnostic framework for food system governance arrangements: The case of South Africa. Wageningen: NJAS Wageningen Journal of Life Sciences. Vol 84, p 85-93.

The Rockefeller Foundation. 2019. Food System Vision Prize Envisioning: Regenerative and Nourishing Food Futures for 2050 – Toolkit.

Van Berkum, S., J. Dengerink, R. Ruben. 2018. The food system approach: sustainable solutions for a sufficient supply of healthy food. Wageningen Economic Research, Memorandum 2018-064

Databases and online tools

Demographic and Health Surveys (DHS). https://dhsprogram.com/methodology/Survey-Types/DHS.cfm

Good Life Index. https://goodlife.leeds.ac.uk/

Kate Raworth's 'doughnut' model. www.kateraworth.com/doughnut/

Mural. www.mural.co/templates

The Food Systems Dashboard. https://foodsystemsdashboard.org/

The World Bank: Country data. https://data.worldbank.org/country

The World Bank: Doing business. www.doingbusiness.org/en/doingbusiness

Tool sources

Affinity Diagram
www.burgehugheswalsh.co.uk/Uploaded/1/Documents/Affinity-Diagram-Tool-Draft-v2.pdf

Agent-based modelling
www.pnas.org/content/99/suppl_3/7280

Behaviour over time
https://thesystemsthinker.com/a-palette-of-systems-thinking-tools/

Breaking the cycle
https://thesystemsthinker.com/wp-content/uploads/2016/03/Systems-Archetypes-I-TRSA01_pk.pdf

Causal loop diagram
https://thesystemsthinker.com/causal-loop-construction-the-basics/

Comparing proposals
www.mspguide.org/tool/comparing-proposals

Delphi
www.mspguide.org/tool/delphi

Doughnut analysis
www.c40knowledgehub.org/s/article/Creating-City-Portraits-A-methodological-guide-from-the-Thriving-Cities-Initiative?language=en_US

Five A's: policy implications
https://ecdpm.org/publications/doing-regional-development-differently/

Food security walk
www.mspguide.org/tool/food-security-walk

Food system governance arrangements framework www.sciencedirect.com/science/article/pii/S157352141730012X

Force field analysis
www.odi.org/sites/odi.org.uk/files/odi-assets/events-documents/2808.pdf & www.mspguide.org/tool/force-field-analysis

Forms of power
www.mspguide.org/tool/forms-power

Future scenarios
www3.weforum.org/docs/IP/2016/NVA/WEF_FSA_FutureofGlobalFoodSystems.pdf & http://www.mspguide.org/tool/scenario-planning

Futures wheel
www.mindtools.com/pages/article/futures-wheel.htm

Fuzzy cognitive mapping
www.mentalmodeler.org/

Governance indicators
https://info.worldbank.org/governance/wgi/Home/Reports

Graphical function diagram
https://thesystemsthinker.com/graphical-functions-seeing-the-full-story/

Immersion through shadowing
www.designkit.org/methods/immersion

Innovation brainstorm
https://thesystemsthinker.com/wp-content/uploads/2016/03/Systems-Archetypes-I-TRSA01_pk.pdf

Integrated Biodiversity Assessment Tool
www.ibat-alliance.org/

Interactive map
www.researchgate.net/publication/333895085_Mapping_Food_Systems_A_Participatory_Research_Tool_Tested_in_Kenya_and_Bolivia

Interest & influence matrix
www.mspguide.org/tool/stakeholder-analysis-importanceinfluence-matrix

Interviews
www.mspguide.org/tool/semi-structured-interviews

Journey mapping
https://qualaroo.com/customer-journey-map-template/

Mind map
www.groupmap.com/map-templates/group-mind-mapping/

Minimum cost of a healthy diet
www.motherchildnutrition.org/malnutrition/pdf/mcn-stc-minimum-cost-of-a-healthy-diet.pdf

Needs assessment
www.fao.org/3/w5830e07.htm

Nutrition gap analysis
www.wfp.org/publications/2017-fill-nutrient-gap

Nutrition-sensitive value chain
www.ifad.org/en/web/knowledge/publication/asset/40805038

Objectives spiderweb chart
www.fusioncharts.com/resources/chart-primers/radar-chart

Participatory land use mapping
www.ifad.org/en/web/knowledge/publication/asset/39399099

Planning for success
https://thesystemsthinker.com/wp-content/uploads/2016/03/Systems-Archetypes-III-TRSA03_pk.pdf

Policy Analysis
www.ncchpp.ca/60/Analyzing_Public_Policies.ccnpps

Policy for whom?
www.ifpri.org/blog/reach-benefit-or-empower-clarifying-gender-strategies-development-projects

Political economy assessment
http://documents.worldbank.org/curated/en/327051468337182275/pdf/769210WP-0Polit00Box374391B00PUBLIC0.pdf

Power analysis
www.powercube.net/wp-content/uploads/2009/11/quick_guide_to_power_analysis_external_final.pdf

Power mapping
www.mspguide.org/tool/netmapping

Power ranking
www.mspguide.org/tool/power-ranking

Prioritising & ranking
www.mspguide.org/tool/prioritizing-and-ranking

Problem definition
www.mspguide.org/tool/problem-definition-worksheet

Problem tree
www.mspguide.org/tool/problem-tree

QQ diagram
https://thesystemsthinker.com/a-palette-of-systems-thinking-tools/

Rapid sector assessment
www.wur.nl/en/Research-Results/Research-Institutes/centre-for-development-innovation/Our-Value-Propositions/Guiding-Sector-Transformation/The-effects-of-COVID-19-on-food-systems-rapid-assessments.htm

Reach, benefit or empower
www.ifpri.org/blog/reach-benefit-or-empower-clarifying-gender-strategies-development-projects

Rich picture
www.mspguide.org/tool/rich-picture

Sensemaker
https://sensemaker.cognitive-edge.com/

Social network analysis
https://towardsdatascience.com/how-to-get-started-with-social-network-analysis-6d527685d374

Stakeholder Identification
www.mspguide.org/tool/stakeholder-identification

Stakeholder characteristics & roles
www.mspguide.org/tool/stakeholder-characteristics-and-roles-matrix

Stakeholder power in food systems

SWOT analysis
www.mspguide.org/tool/swot-analysis

Synergies & trade-offs
www.frontiersin.org/articles/10.3389/fenvs.2018.00112/full & https://drift.eur.nl/publications/food-and-agriculture-systems-foresight-study/

Theory of Change
www.mspguide.org/tool/make-visual-theory-change

Transect walk
https://catcomm.org/transect-walk/

Wealth ranking
www.padev.nl/other_output/PADev_guidebook_2013.pdf

Colophon

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