Background Documents

In Preparation of the

Regional Forum on Accelerating Food Systems Transformation in the Arab Region

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Background Document 6

Economic and Social Commission for Western Asia

Guidelines to Accelerate the Transformation of Food Systems in the Arab Region - draft

Guidelines to Accelerate the Transformation of Food Systems in the Arab region

I. Introduction

The Arab region faces significant challenges in food security due to a combination of factors, including conflicts, limited natural resources, economic slowdowns, and climatic variability. These challenges are further exacerbated by inefficient food systems characterized by low productivity, inadequate supply chains, and trade policies that hinder effective food distribution. These inefficiencies contribute to higher costs of doing business, ultimately leading to increased food commodity prices and reduced incomes for those relying on the food systems for their livelihoods.

Understanding and transforming regional food systems are critical steps towards achieving food security and ending hunger in the Arab region. Food systems not only ensure the delivery of food in sufficient quantity and quality but also play a pivotal role in sustaining livelihoods and impacting human and environmental/ecosystem health. Therefore, it was essential to comprehensively assess the functioning of Arab food systems to enable policymakers and development planners to target and address the weakest links. For instance, UN agencies such as the UN Economic and Social Commission for Western Asia (ESCWA) and the Food and Agriculture Organization Regional Office for the Near East (FAORNE) have been working on identifying vulnerabilities and promoting resilience in food systems in the Arab region. ESCWA's food security monitoring framework (2019) and the food system assessment tool (2023) provided comprehensive approaches to monitoring food security and food systems in Arab countries (ESCWA, 2019, 2023).

The 2021 UN Food Systems Summit brought together a diverse array of global participants to devise strategies and document pathways for creating more sustainable and equitable food systems. This collaborative effort, led by national convenors, captured the insightful dialogues among key stakeholders. Building on this foundation, the 2023 UNFSS+2 marked a pivotal juncture in ensuring the effectiveness of the "National Pathways for Food Systems Transformation" documents (referred to as "Pathways documents" or "Pathways reports"). The event convened global leaders, policymakers, and stakeholders from various sectors to discuss the complexities of food systems transformation, examining both challenges and opportunities. Moreover, the 2023 UNFSS+2 served as a crucial platform to garner the necessary resources and support to actualize these Pathways. By aligning global aspirations with national strategies for food systems transformation, the UNFSS+2 aimed to foster a collective commitment towards achieving a resilient, equitable, and sustainable global food system. This endeavor is integral to advancing the objectives outlined in the 2030 Agenda for Sustainable Development.

Several countries in the Arab region have initiated processes to transform their food systems towards greater sustainability, resilience, and equity. However, a critical gap exists in the strategy, tools and skills necessary for its successful implementation. The Economic and Social Commission for Western Asia (ESCWA) aims to address this gap by developing comprehensive guidelines to equip countries with the essential tools and information needed to accelerate food systems

transformation. These guidelines will focus on three key areas: strategic planning, innovative frameworks, and collaboration.

II. Objective of the Guidelines

These guidelines aim to enhance three key areas namely, strategic planning and policy reforms, the adoption of innovative frameworks, and regional collaboration in the Arab region. These areas are grounded in a robust theoretical foundation and practical support. The guidelines presented in this document will bridge the critical gap in the tools and skills necessary for successful implementation of the food systems transformation, enabling stakeholders, especially national conveners, to better navigate and implement strategies to achieve sustainable and equitable food systems.

An overview[1] of the key areas is outlined below, including action items; advantages and disadvantages; and examples. These key areas include strategic planning methods and policy reforms, innovative frameworks, and approaches to regional collaboration and partnership.

Strategic Planning and Policy Reforms for transforming food systems:

- Identifying the food system's outstanding issues, set the desired short- and long-term goals and expected outcomes
- Developing a theory of change
- Identifying and selecting the appropriate key performance indicators (KPIs) to guide efforts.
- Designing monitoring and evaluation frameworks
- Setting Time Frames

Adoption of Innovative Frameworks to support food system transformation

- Integrate innovative approaches: Doughnut Economy for social and ecological transformation.
- Apply True Cost Accounting: Assess the hidden environmental, health, and social costs associated with different pathways using true cost accounting methodologies.
- Adopt Circular Economy and circularity frameworks to inform policy.

Regional Collaboration

- Facilitate Knowledge Sharing: Encourage shared best practices, peer-to-peer learning, and collaborative problem-solving.

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[1] *The key areas are not exhaustive nor intended to be. Some objectives and approaches are complementary, while others are substitutes. Some have broad applicability, while others are narrowly focused. The choice of key areas and action items for any given context will depend on a range of considerations, including the intended use of the guidelines, the primary stakeholders interested in the outcomes, the urgency of the information, and the cost.*

- Promote Regional Exchange: Advance regional progress through collaborative efforts and exchanges.

III. Key Areas

1. Strategic planning

A. Defining desired short- and long-term goals and expected outcomes

First and foremost, it is crucial to clearly understand the specific goals of food system transformation within each unique context. This involves determining the relative importance of various outcomes, including food security, nutrition, environmental factors (such as biodiversity and climate resilience), economic and social aspects (such as livelihoods and socio-cultural context), and overall resilience in a given setting. Many of these goals already exist at the country level. For example, numerous countries have outlined goals in their respective strategic documents, such as ministry and stakeholder action plans (e.g. National Food Security Strategy of Jordan). The challenge remains to understand and group these goals under the umbrella of food system transformation and consider the appropriate scale to effectively continue the implementation strategy.

Step 1: Identify and Analyze the Outcomes of the Food System

There is an increasing need for governments to develop a long-term vision rather than focusing solely on short-term policy results. A long-term perspective is essential to provide sustainable, healthy, and nutritious food to a growing population while considering the planet's carrying capacity. Emphasizing outcomes ensures that Arab policymakers and stakeholders are dedicated to achieving genuine improvements for their societies. Therefore, this step begins by considering the outcomes of food systems as a starting point.

Example: Begin by identifying the specific issue or diminishing outcome within the food system. Conduct a thorough analysis of the issue, considering its nature, position within the food system components, extent, underlying causes, short-term effects, long-term impacts, and socio-political context. For instance, suppose your country A is facing severe food insecurity. One of the critical problems is "food availability" caused by water scarcity and inefficient agricultural practices. This problem necessitates a comprehensive analysis of the contributing factors, such as water management policies, irrigation infrastructure, and farming techniques. At this stage, it is crucial to identify the strengths and weaknesses of the country's food supply chain and its driving factors. This involves a review of all existing strategies within ministries related to the food system, including Agriculture, Food Safety, Economy, Energy, Social, Environmental, and Labor. Understanding these complex details and existing frameworks, goals can be developed to address water scarcity, improve agricultural practices, and ultimately enhance food availability and security.

Step 2: Define the Goal

Decide on an ultimate goal[2] that describes the desired impact on the food system. This goal should reflect the outcomes you aim to achieve, rather than just immediate objectives.

Example Goal:

- **Ensure that food systems' supply chains are adaptable to food safety concerns.** For instance, the Ministry of Economy in Country A should guarantee that all products traded domestically or internationally meet rigorous food safety standards in collaboration with the Ministry of Health and concerned stakeholders. This involves leveraging comprehensive monitoring and regulatory frameworks to ensure compliance with safety protocols at every stage of the supply chain, from production and processing to distribution and retail.

Step 3: Set Long-Term Goals

Identify specific long-term goals that will guide your policy interventions. These goals should align with the overall vision and address various components of the food system.

Examples of Long-Term Goals:

- **Sustainability:** Promote agricultural practices that protect natural resources, reduce greenhouse gas emissions, and enhance biodiversity. For instance, encourage the adoption of environment-friendly farming techniques and the use of renewable energy sources in agriculture (Al-Jayyousi, 2003).

- **Resilience:** Develop food systems that can withstand and recover from disruptions, whether from climate change, economic shocks, or political instability. This could include implementing advanced irrigation systems, establishing food reserves, and creating trade policies that support rapid recovery from crises (Ansah et al., 2019).

- **Equity:** Ensure fair access to resources and opportunities within the food system, particularly for marginalized groups such as women, smallholder farmers, and rural communities. Policies might include providing subsidies for small-scale farmers, ensuring land rights for women, and supporting rural development programs (Ambikapathi et al., 2022).

Step 4: Ensure Policy Coherence

Ensuring that policies related to the food system are aligned and coherent is a critical aspect of the transformation process. Policy coherence involves assessing whether goals, both at national and regional levels, support or hinder the desired outcomes. For instance, examining whether

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[2] The selected goal can be an existing goal at a certain responsible ministry.

agricultural policies prioritize food availability (including exports) at the expense of biodiversity, for example, in food systems (such as those in Morocco and South Tunisia (Molle and Tanouti, 2017; Rodríguez-Caballero et al., 2017)). Aligning policies to support sustainable practices across various sectors ensures a cohesive approach to achieving food system transformation. We point to different traditions of 'systems thinking' that each emphasize particular types of interventions for achieving system change, and argue that food systems are best looked at as complex multi-dimensional systems. This implies that we need to move beyond rational engineering approaches to system change, and look for approaches that anticipate and accommodate inherent social tensions and struggles in processes of changing food system dynamics and outcomes.

B.   Theory of Change and Transformation for Food Systems Transformation in the Arab Region

Theories of change and transformation are essential for developing effective strategies and interventions. These theories provide a framework for identifying the necessary steps to achieve desired outcomes and for understanding the underlying factors that influence behaviors and environmental conditions. In the context of food system transformation, this involves a structured approach to planning and implementing changes that promote sustainability, resilience, and equity.

The stakeholder can identify appropriate theories by:

1. **Brainstorming and Matching:** Matching ideas from the brainstorming process to theoretical constructs.
2. **Applying Established Theories:** Applying frequently used theories to guide the identification of determinants and the selection of methods to influence these determinants.

Selected established theories:

1. Theory of Transformation (ToT)

1. **Purpose**: Guide large-scale, systemic change.

2. **Scope**: Broader and more ambitious, transforming entire systems or sectors.

3. **Structure**: Complex, dynamic framework acknowledging non-linear change.

4. **Focus**: Create conditions for systemic change, addressing power dynamics, cultural norms, and structures.

5. **Application**: Used for profound changes in areas like climate change and systemic inequalities.

Template and Example on ToT:

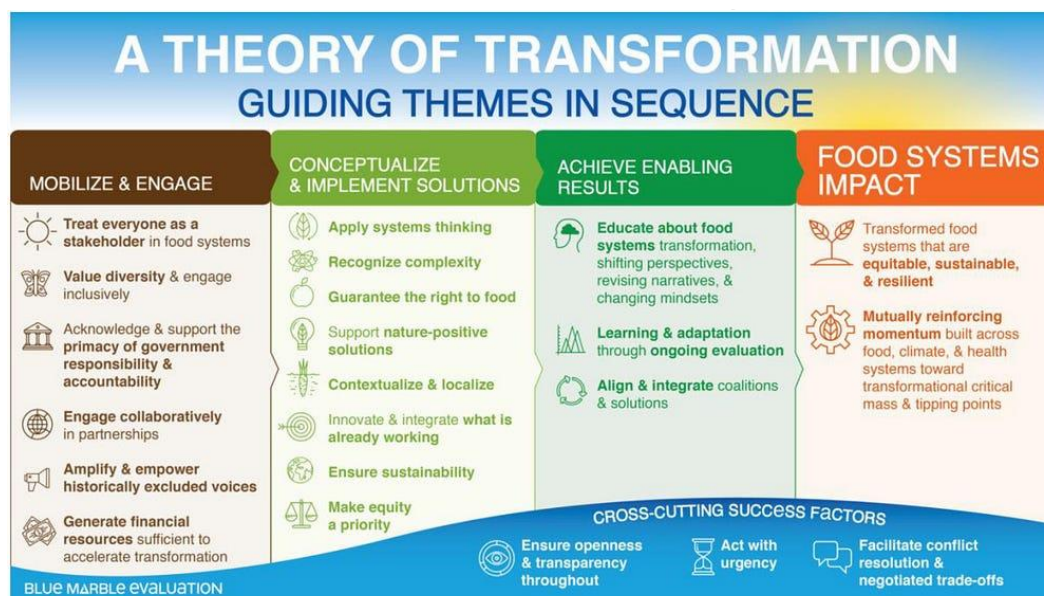| Vision	Transform the food system to be sustainable and equitable.
Priority Areas	Long term goals: Sustainability, resilience, equity.
Strategic Objectives	E.g., reduce greenhouse gases in agriculture by 50% in 10 years.
Key Actions	Promote agroecological practices, support climate-resilient infrastructure

Figure 1: UN Coordination Hub - Theory of Transformation Themes (Quinn Patton et al, 2019)

Theory of Change (ToC)

1. **Purpose**: Outline steps for achieving specific goals, detailing causal pathways and assumptions.

2. **Scope**: Focus on specific projects, programs, or policies.

3. **Structure**: Include inputs, activities, outputs, outcomes, and impacts.

4. **Focus**: Emphasize logical, evidence-based steps.

5. **Application**: Used across various sectors for planning and evaluating programs.

Template and Example on ToC

Goal	Increase smallholder farmers' income by 30% in 5 years.
Inputs	Financial resources, training programs.

Activities	Implementing sustainable farming practices, providing market access.
Outputs	Number of farmers trained, amount of produce sold.
Outcomes	Increased productivity, higher income
Impacts	Improved livelihoods, reduced poverty.

Example: Theory of change for transforming food systems under climate change

A theory of change for transforming food systems under climate change, based on Campbell et al. (2018), outlines transformative actions in eight key areas: strong farmer organizations, climate-informed advisories, digital agriculture, climate-resilient practices, prioritization and pathways of change, credit and insurance, expanded private sector activity, and enabling policies. These priorities have been central to the global initiative "Transforming Food Systems Under a Changing Climate," influencing various reports and literature. Practitioners are using this theory to develop context-specific approaches, as seen in the Global Commission on Adaptation and the Green Climate Fund projects. This framework was adopted by the advisory committee of the 5th Global Science Conference on Climate-Smart Agriculture, resulting in six refined themes that envision a coordinated transformation effort across these interlinked elements (Figure1).
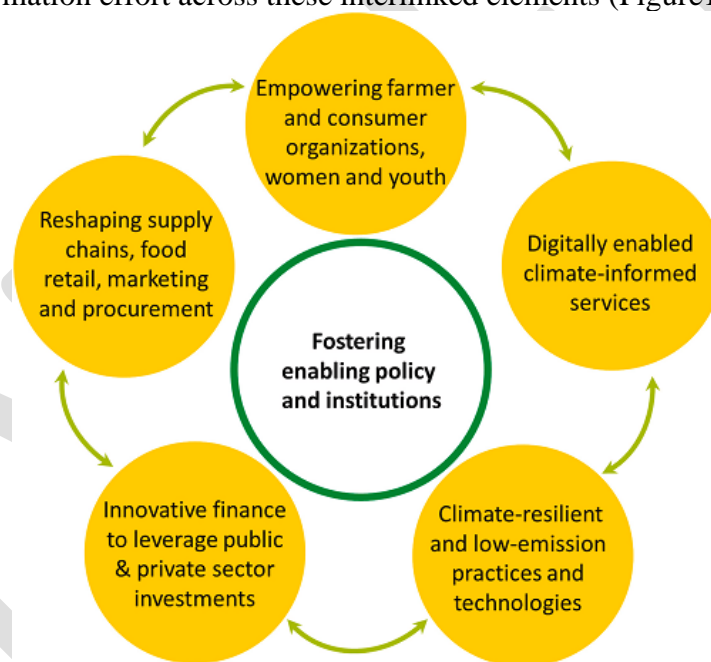
Figure 2: Theory of change for transforming food systems under climate change, based on (Campbell et al., 2018).

(Check Annex 2 for another example as part of the CGIAR 2022–24 prospectus)

Connection between the two theories: The ToT provides the overall framework for change, outlining major priority areas. Specific programs and priorities are detailed through ToC, mapping out how to progress from specific actions to final goals.

C. Methodology for Selecting KPIs Aligned with SDG Goals and Food Systems Framework

**1. Review existing Vision and Goals of food systems.**

- o **For instance, identify relevant SDGs**.
    - SDG 2: Zero Hunger
    - SDG 3: Good Health and Well-being
    - SDG 6: Clean Water and Sanitation
    - SDG 8: Decent Work and Economic Growth
    - SDG 12: Responsible Consumption and Production
    - SDG 13: Climate Action
    - SDG 15: Life on Land

2. Select Clear Food Systems' Goals and Indicators

- Choose a defined short, medium, and long-term goals.
  For instance, it might include reducing food insecurity, improving nutritional outcomes, increasing agricultural productivity, and ensuring sustainable water use.
- Trim down the number of indicators to a manageable set

3. Adopt a Food System Framework

- **Framework selection:**

  - The suggested comprehensive design framework to ensure that the selection of indicators is based our approach on two well-regarded frameworks: the High-Level Panel of Experts report on Food System and Nutrition (HLPE, 2017) and the one adpoted by the Food Systems Dashboard by Fanzo et al. (2020). The resulting generic framework, illustrated in Figure 2, identifies five key components of food systems: (i) drivers; (ii) food system supply, actors, and activities; (iii) food environment; (iv) consumer choices and subsequent diets; and (v) food system outcomes, which include four distinct types: environmental, food security and health, economic, and social outcomes. These components are further detailed in figure 2.
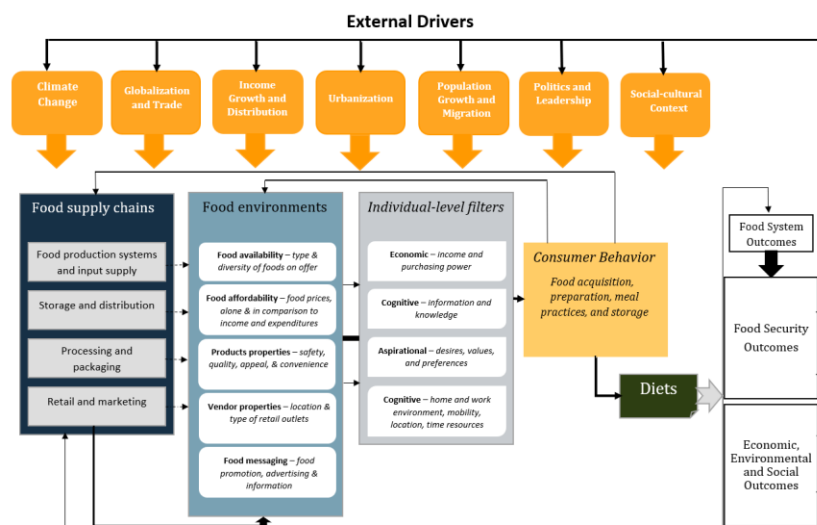
معدل ومترجم من (Fanzo et al., 2020)

N.B. Viewing food systems as complex, multi-dimensional entities means moving beyond rational engineering approaches. Instead, one should adopt strategies that anticipate and accommodate inherent social tensions and struggles in changing food system dynamics and outcomes.

4. Identifying Key Performance Indicators (KPIs)

Key Performance Indicators

What are they?

Performance indicators are measures used to evaluate inputs, processes, outputs, outcomes, and impacts of development projects, programs, or strategies. Supported by comprehensive data collection, which may involve formal surveys, along with thorough analysis and reporting, these indicators allow policy makers/technical experts to monitor progress, demonstrate results, and implement corrective actions to enhance service delivery. Engaging key stakeholders in defining these indicators is crucial, as it fosters better understanding and usage for management decision-making.

What can we use them for?

- **Setting Performance Targets:** Establish and measure progress towards achieving targets.

- **Early Problem Identification:** Serve as an early warning system to identify issues and enable corrective actions.

- **Evaluation Triggers:** Determine when an in-depth evaluation or review is necessary.

Advantages

- **Progress Measurement:** Provides an effective means to measure progress towards objectives.

- **Benchmarking:** Enables comparisons across different organizational units, districts, and over time.

Disadvantages

- **Poorly Defined Indicators:** Ineffective as measures of success.

- **Excessive Indicators:** Defining too many indicators or those without accessible data sources can render the system costly, impractical, and underutilized.

- **Indicator Trade-offs:** Balancing the selection of optimal indicators with those measurable using existing data.

  KPIs are based on the actions, outputs, outcomes, and goals set within the ToT and ToC frameworks.

  SMART Principles: Ensure KPIs are Specific, Measurable, Achievable, Realistic, and Timely (Table 1).

  - **Recommended KPI Example:** Increase the proportion of agricultural area under productive and sustainable agriculture by X%.

  - **Not recommended KPI Example:** Make farming better.

Table 1: S.M.A.R.T. KPIs in Food Systems (Leonard and Watts, 2022).

A S.M.A.R.T. indicators defined by its five key aspects or elements. Without addressing all these aspects, you might be setting goals but not effectively creating a plan for success. Here's a brief overview of the five elements of S.M.A.R.T. goals in the context of food systems:	
Specific	have a clearly understood desired outcome. In food systems, this might be reducing food waste or increasing the proportion of locally sourced agricultural products. The indicator should be clearly articulated so that everyone involved understands the objective. Define what will be accomplished and the actions needed to select the indicator.
Measurable	involve quantifiable aspect to track progress. For instance, aiming to reduce food waste by 20% in the next year. Define the data that will be used to measure the indicator and establish a method for collecting this data.
Achievable	While ambitious indicators are beneficial, they should be broken down into smaller, manageable steps. If an indicator seems out of reach, consider first enhancing resources or capabilities. For example, before aiming to achieve zero waste, you might set a goal to implement a legal waste audit.

Relevant	should align with the broader goals of the food system transformation. Ensure that the indicator contribute meaningfully to the overall goals. For instance, increasing the nutritional value of school meals is relevant if it directly supports public health goals.
Time-Bound	should have a clear deadline. For example, achieving a 15% increase in the use of organic produce within the next two years. This allows for evaluation of success or failure and helps in setting new goals. A deadline ensures there's a timeframe within which progress is measured and goals are achieved.

Example: The pathway document of Lebanon outlines a pathway for sustainable development in Lebanon from 2022 to 2030, aligning with SDGs, expert recommendations, and National Development Strategies. Key Performance Indicators (KPIs) were established with milestones for 2025 and targets for 2030, recalibrated to reflect SDG achievements up to 2022 and the remaining time until 2030. For example, to increase agricultural productivity, indicators such as a 20% increase by 2027 and 30% by 2030 are set. Data sources include the Lebanon National Agriculture Strategy (NAS) 2020-2025, Lebanon's National Communication to the UNFCCC, and input from UN agencies like FAO and WFP. This approach ensures that selected KPIs are relevant, measurable, and aligned with both national and international development goals.

- Ensure comprehensive coverage of the food system, and involve stakeholders in validating the final list of indicators.

D. Designing Monitoring and Evaluation Frameworks

Monitoring is the internal collection and analysis of information about a project or program.

Evaluation is the periodic retrospective assessment of a completed project or program and is often conducted by external independent evaluators.

What is an Impact Evaluation?
Impact valuation is the systematic identification of the effects – positive or negative, intended or not – on individual households, institutions, and the environment caused by a given development activity such as an action plan, program or project. Impact evaluation helps us better understand the extent to which activities reach the poor and the magnitude of their effects on food system. Impact evaluations can range from large scale sample surveys in which project populations and control groups are compared before and after, and possibly at several points during program intervention; to small-scale rapid assessment and participatory appraisals where estimates of impact are obtained from combining group interviews, key informants, case studies and available secondary data.

What can we use it for?
- Measuring outcomes and impacts of an activity or action and distinguishing these from the influence of other, external factors.
- Helping to clarify whether costs for an activity are justified.
- Informing decisions on whether to expand, modify or eliminate projects, programs or policies.
- Drawing lessons for improving the design and management of future activities.
- Comparing the effectiveness of alternative interventions.
- Strengthening accountability for results.

Advantages:
- Provides estimates of the magnitude of outcomes and impacts for different components, areas or over time.
- Provides answers to some of the most central development questions – to what extent are we making a difference? What are the results on the ground? How can we do better?
- Systematic analysis and rigor can give managers and policy-makers added confidence in decision-making.

Disadvantages:
- Some approaches are very expensive and time-consuming, although faster and more economical approaches are also used.
- Reduced utility when decision-makers need information quickly.

(World Bank, 2004)

E. Setting Time Frames

- Establish achievable timeframes for measuring and reporting progress on KPIs: this can take several days to several months, depending on extent of participatory process used to define indicators and program complexity. Implementing performance monitoring systems may take 6–12 months.

Next Steps:

To ensure these indicators are effectively employed in setting and executing the implementation, the following questions should be considered:

- What are your monitoring objectives?
- Are there quantified targets to be reached?
- Who is responsible for collecting and recording the data?
- How often will data collection and recording take place?
- Is periodic progress reporting necessary?
- Who will analyze and evaluate the reported progress?

Additionally, for reassessing the indicators, consider the following questions:

- How often should the indicators be reassessed?
- How frequently are the results evaluated?
- Is there a need to identify gaps?
- What new issues need to be addressed?

2. Innovative frameworks for sustainable food systems transformation

Food systems must transform to mitigate their impacts on human health and the environment, while enhancing their social performance and resilience against increasing disturbances from geopolitical instability and climate change (FAO et al., 2021). However, food systems are complex, involving multiple actors and producing multifaceted societal and environmental outcomes. Consequently, it is often challenging to determine the most effective intervention points to address specific issues and enhance the overall sustainability of these systems (Zhou et al., 2022; Béné et al., 2019). The Arab region faces significant challenges in achieving its desired outcomes and goals due to conflicts, limited natural resources, economic slowdowns, and climatic variability. Despite efforts, Arab countries are not making enough progress towards achieving Sustainable Development Goal (SDG) targets related to food security and nutrition. Innovative frameworks such as the True Cost Accounting, Doughnut Economics, and Circular Economy offer comprehensive approaches to address these challenges and ensure inclusive, resilient, and sustainable food systems.

True Cost Accounting (TCA)

The cost of operating food systems in Arab countries continues to surge, often including hidden costs that remain unaccounted for. True Cost Accounting (TCA) has emerged as a crucial tool for policymakers to assess these hidden costs and benefits, facilitating informed decisions that mitigate negative impacts and maximize benefits. The FAO's "The State of Food and Agriculture (SOFA) 2024" introduces TCA, highlighting over $500 billion in hidden costs within the Arab region, underscoring the need for comprehensive measures to address economic, environmental, and social injustices. This framework ensures that all costs associated with food system components, are accounted for, promoting more sustainable and equitable food systems (FAO et al., 2021; WFP-VAM, 2020)

The Arab region's food systems are hindered by scarce water and land resources, climate change, and socio-economic disparities. For example, 56% of farmland relies on erratic rainfall, pushing farmers to extract excessive groundwater, exacerbating water scarcity and environmental degradation (UNESCWA, 2022). The region heavily relies on grain imports, with wheat accounting for 50% of consumed calories (UNESCWA, 2022). Income growth disparities and land ownership inequalities further perpetuate social and economic disparities, particularly affecting rural and migrant workers (World Bank, 2021).

Doughnut Economics

Doughnut Economics balances essential human needs with planetary boundaries, visualizing a space where food systems can operate sustainably. ESCWA was a pioneer in tracking food security incorporating elements of doughnut economics in its visualization approach, specifically through the use of doughnut charts. ESCWA's framework focuses primarily on food security and its four dimensions, the use of doughnut charts to present indicators and assess performance aligns with the visual and conceptual method of doughnut economics. This approach helps in easily identifying areas of good and poor performance and supports a holistic understanding of food security in the context of sustainable development. Applying Doughnut Economics to food systems emphasizes meeting basic human needs within ecological limits, promoting sustainable practices like urban agriculture and local food systems to enhance food security and reduce environmental impact.

Circular Economy

Last but not least, the circular economy focuses on minimizing extraction of natural resources, reduce waste and maximizing resource use. In the Arab region, existing vulnerabilities are compounded by the pandemic and wars, significantly hindering Arab food systems' capacity to respond effectively to systemic shocks. For example, about 6% of food is lost along the supply chain, and between 76 and 132 kg per capita per year are wasted at the household level (FAOSTAT, 2020; UNEP, 2021). Scarce water and land resources, already stressed by degradation and overconsumption, are further strained by climate change. Circular economy practices, such as composting, biogas production, and water recycling in agriculture, can reduce waste and create additional value from food by-products, addressing food insecurity by ensuring more efficient resource use and reducing dependency on external inputs. Promoting environmental protection within food supply chains and adopting climate change adaptation strategies are key to ensuring the sustainability of food systems. In Saudi Arabia, 88% of water resources are dedicated to the agricultural sector, which contributes only 2% to the GDP, highlighting inefficiencies in water use. The Arab region also faces significant challenges with food loss and waste, with per capita waste sometimes exceeding 210 kg annually, impacting food security, the environment, and economies. ESCWA supports Arab states in transforming their food systems towards sustainability through various initiatives, including wastewater management, sustainable agriculture, and reducing food loss and waste, as evidenced by studies conducted in Morocco. The circular economy (CE) model for food systems involves rethinking and redesigning food production to mimic natural regenerative processes, fostering new business models that enhance resource sharing and local system resilience. This approach aims to break the unsustainable cycle of using harmful fertilizers by introducing practices like rotational schemes and agroforestry, which improve soil quality, water retention, and carbon sequestration, thus ensuring sustainable and resilient food systems.

A. Doughnut Economy for social and ecological transformation
- o Overview of the doughnut economy concept (social foundation and ecological ceiling)
- o How food systems can contribute to achieving the doughnut model
- o Examples of policy changes and business practices approach (Annex 1)

Overview of the Doughnut Economy Concept

- Since the publication of Kate Raworth's seminal works, "A Safe and Just Space for Humanity: Can We Live within the Doughnut?" (Raworth, 2012) and "Doughnut Economics: Seven Ways to Think Like a 21st-Century Economist" (Raworth, 2017), the doughnut model has become a pivotal framework in economic and sustainability analyses. Its simplicity and holistic vision have led to its adoption across various scales, from international to local levels (Fang, 2022).
- The doughnut framework comprises two rings (Figure 3): the inner ring represents the basic social foundation, based on the social priorities outlined in the Sustainable Development Goals (United Nations, 2015), ensuring that no one falls short on life's essentials. The outer ring represents the ecological ceiling, grounded in the planetary boundaries framework (Steffen et al., 2015). The space between these two boundaries signifies an ecologically safe and socially just zone where societies should strive to exist (Raworth, 2017), offering an alternative to the traditional GDP growth-oriented economic model.
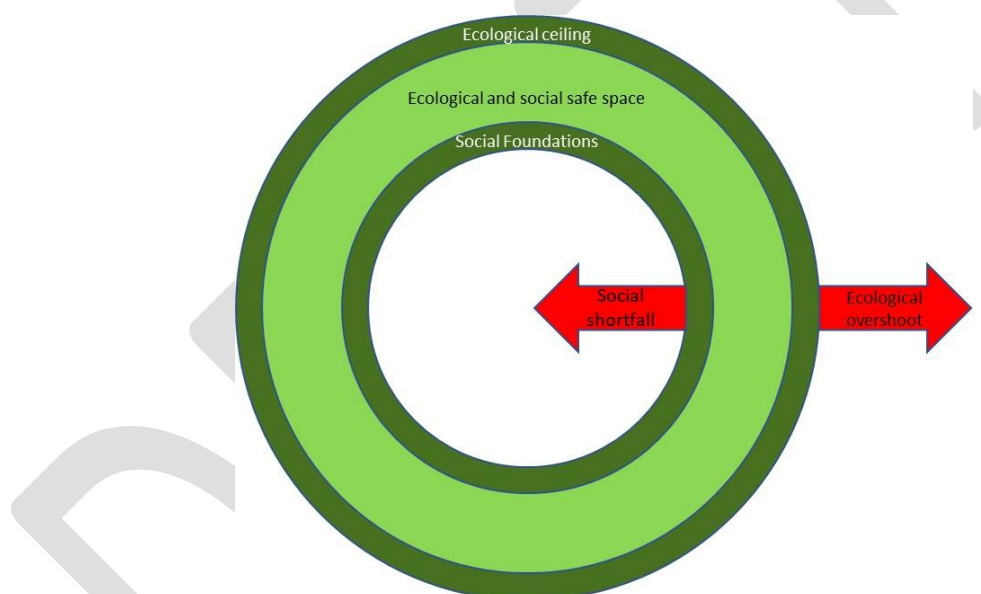
Figure 3: The Doughnut Framework (Ortega et al., 2024)

- **How Food Systems Can Contribute to Achieving the Doughnut Model**

The food system is a complex socio-ecological system (Allen and Prosperi, 2016). The doughnut economic model can be integrated into this system by using ecological and social indicators to create a balanced framework that ensures both environmental sustainability and social equity. This allows stakeholders to collaboratively address and navigate the trade-offs and synergies between economic activities and ecological health. A natural

starting point for applying the doughnut approach within food systems transformation is the food supply chain, particularly the agriculture sector.

- **Examples of policy changes and business practices (Annex 1: detailed recent example)**

Historical studies on ecosystem-based agriculture management (Matson et al., 1997; Costanza et al., 1998; Pikitch et al., 2004; Hobbs et al., 2014) have explored the dynamics of crops and livestock, entire ecosystems, trophic relationships, energy flows, environmental factors, and human impacts (Botsford et al., 1997; Cury et al., 2008). Developing human-related indicators (Hornborg et al., 2019) and integrating them into a comprehensive framework that is understandable to a diverse range of stakeholders is essential.

B. True Cost Accounting (TCA)

- o Understanding the real costs of food systems (environmental, social, and health costs).
- o Integrating TCA for policy prioritization and financial decision-making (Example of Lebanon's experience; Annex 4)

Understanding the Real Costs of the functioning of Food Systems (Environmental, Social, and Health Costs)

The True Cost Accounting (TCA) approach has emerged as a crucial tool for comprehending the multifaceted dynamics of food systems (FAO, 2023; et al., 2023). It provides a comprehensive framework to identify the often-hidden challenges within these systems. The initial results from SOFA 2023 highlight the significant hidden costs associated with food production and consumption, which are increasingly pronounced despite the 2.3 percent annual growth in agricultural productivity (FAO, 2023).

Environmental Costs:

Agriculture significantly contributes to global greenhouse gas emissions, freshwater withdrawals, and water pollution, leading to severe environmental degradation. TCA helps quantify these impacts, providing a clearer picture of the true environmental costs of food systems (SOFA, 2023).

Health Costs:

Hidden health costs, not reflected in food prices, impose substantial economic burdens. Unhealthy dietary habits are linked to significant health expenditures, amounting to 9 trillion 2020 PPP dollars in 2020 due to obesity and noncommunicable diseases (NCDs). Addressing these costs is crucial for advancing public health and ensuring the economic sustainability of food systems (SOFA, 2023).

Social Costs:

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Over 600 million people lived in extreme poverty in 2019, with a significant proportion relying on agricultural livelihoods (Hasell et al., 2022). Issues such as child and forced labor within food systems highlight the social complexities and hidden social costs. Conversely, food systems also offer hidden benefits, including biodiversity preservation and sustaining rural livelihoods for over 1 billion people (Zhang et al., 2018).

Steps for the Application of the True Cost Accounting:

1. **Identifying Hidden Costs and Benefits:**
   - **Environmental:** Quantify the environmental impacts of food systems via scientific evidence and the calculating costs.
   - **Health:** Assess the health-related costs of dietary patterns to prioritize public health interventions and promote healthier food choices.
   - **Social:** Recognize the social dimensions of food systems, including labor conditions and poverty alleviation, to foster equitable development.

2. **Navigating Trade-offs:** Policymakers must understand the web of stakeholders and trade-offs. For instance, reducing environmental impacts may inadvertently affect economic outcomes or social equity. A nuanced approach is necessary to balance these factors effectively.

3. **Policy Formulation:**
   - **Cross-Sectoral Coordination:** Promote alignment between agriculture, environment, health, and social policies to address the comprehensive impacts of food systems.
   - **Inclusive Decision-Making:** Engage diverse stakeholders, including marginalized groups, to ensure that policies are representative and equitable.

   Application in the Arab Region: TCA is particularly relevant for policymakers in the Arab region to assess hidden costs and benefits, enabling informed decisions that mitigate negative impacts and maximize benefits. By rigorously applying TCA, policymakers can navigate trade-offs and develop more sustainable and equitable food systems (Annex 3).

C. Circular economy
   - Circularity
   - Reduction of waste flows (Annex 1)

What is it?

The Circular Economy (CE) is a sustainability framework that emphasizes the importance of closing resource loops to minimize waste and environmental impact (Korhonen et al., 2018; Genovese & Pansera, 2021). It involves measures of inputs, processes, outputs, outcomes, and impacts for development projects, programs, or strategies. By promoting the reuse, recycling, and regeneration of resources, CE aims to create a more sustainable and efficient economic system.

What can we use it for?

- **Resource Efficiency:** Improve the efficiency of resource use by promoting recycling, reusing, and reducing waste.
- **Sustainability Goals:** Achieve sustainability targets by reducing environmental impacts and enhancing resource productivity.
- **Economic Resilience:** Increase economic resilience by reducing dependency on finite resources and mitigating supply chain risks.
- **Innovation:** Foster innovation in business models, products, and processes to support sustainable practices.

Example from the United Arab Emirates (UAE):
The UAE has launched several initiatives to promote the Circular Economy as part of its broader sustainability goals. One notable example is the **"UAE Circular Economy Policy,"** which aims to promote sustainable consumption and production patterns. This policy focuses on various sectors, including manufacturing, food systems, and construction, to reduce waste and increase resource efficiency.

- **Sustainable Agriculture:** In the UAE, projects such as vertical farming and the use of advanced hydroponic systems exemplify CE principles. These initiatives aim to reduce water usage and increase crop yields, addressing food security while minimizing environmental impact.
- **Recycling Programs:** The UAE has implemented extensive recycling programs to manage waste more effectively. For instance, Dubai Municipality's "My City, My Environment" program encourages residents to segregate waste at the source, promoting higher recycling rates and reducing landfill use.
- **Renewable Energy:** The UAE's investment in renewable energy sources, such as the Mohammed bin Rashid Al Maktoum Solar Park, aligns with CE principles by promoting the use of sustainable and renewable resources.

IV. Collaboration

A. Regional collaboration to strengthen food system networks
   o Success stories from the region and globally.

B. Lesson learned from effective collaboration
   o Peer-to-Peer learning good practices
      - In-person workshops and field visits
   o Remote collaboration tools
   o Regional platforms

A.   Regional collaboration to strengthen food system networks

The Arab region, with its unique socio-cultural, economic, and environmental mosaic, offers significant opportunities for regional cooperation in transforming food systems. Collaborative

efforts can enhance sustainability, food security, health, and socio-economic development. The historical ties and shared challenges among Arab countries create a unique context for meaningful cooperation in food system transformation. This section outlines opportunities for regional cooperation, organized into three collaborative levels: regional collaboration and food system conveners, community of practice, and stakeholders that attended the food system dialogues as of 2021.

Collaboration Overview

Numerous collaborative platforms exist to promote effective collaboration among various food systems stakeholders, recognizing their critical roles from production to consumption in policy planning, implementation, and evaluation. Regional collaboration encompasses multi-stakeholder collaboration mechanisms that can minimize trade-offs, overcome polarization, and address traditional power dynamics (OECD, 2001).

- **Historical Ties:** The historical ties and shared challenges among Arab countries create a unique context for meaningful collaboration in food system transformation.
- **Three Collaborative Levels:**
  o Regional collaboration and food system conveners
  o Community of practice
  o Stakeholders attending food system dialogues as of 2021

o **Existing regional collaboration and food system conveners**

UN Food Systems Coordination Hub: Webinars Regional Touchpoints

Between November 14-16, 2023, the UN Food Systems Coordination Hub organized five regional touchpoints to introduce the Food Systems and Climate Action Convergence Initiative to National Convenors. These touchpoints aimed to highlight the connections between food systems transformation and climate action, aligning with the 2030 Agenda and the Paris Agreement. The sessions featured over 200 participants, including representatives from the UAE COP28 Presidency, who underscored the importance of integrating food systems into climate plans by 2025 through the Emirates Declaration on Sustainable Agriculture, Resilient Food Systems, and Climate Action (UN Coordination Hub, 2023).

Key discussions focused on the unsustainable nature of current food systems and their contributions to greenhouse gas emissions, biodiversity loss, and freshwater consumption. The initiative aims to align food and climate agendas, foster dialogues, and update national pathways, Nationally Determined Contributions (NDCs), and National Adaptation Plans (NAPs). Participants highlighted the importance of existing national coordination mechanisms, the integration of food systems into climate policies, and the need for technical assistance, capacity-building, and stakeholder engagement to support the convergence of food systems transformation and climate action (UN Coordination Hub, 2023)..

Community of Practice

A Community of Practice (CoP) is defined by the World Bank Group (WBG) as a gathering of individuals who are driven by the desire to transcend organizational boundaries, connect with each other, and collectively build actionable knowledge through coordination and collaboration.

In the realm of food systems transformation, CoPs are organized groups of individuals who share a common interest in enhancing and revolutionizing food systems. They collaborate regularly to exchange information, learn together, improve their skills, and advance the overall knowledge in the field of food systems.

Why are Communities of Practice Important for Food Systems Transformation?

CoPs are crucial in food systems transformation due to the complexity and adaptive challenges inherent in this field. These challenges cannot be addressed by any single person or organization in isolation. CoPs emerge from the recognition that collective effort and shared expertise are needed to find innovative solutions.

CoPs in food systems connect people in meaningful ways, facilitating the sharing of knowledge and experiences within the domain. This collaborative approach strengthens individual capabilities and achieves a greater collective impact on transforming food systems.

How Do Communities of Practice Deliver Value in Food Systems Transformation?

CoPs can deliver significant value in transforming food systems by focusing on specific areas. Here are some examples:

- **Practitioner Support:** This common focus area involves practitioners asking specific questions, seeking references, providing materials, and receiving feedback from other community members. For instance, practitioners might share best practices for sustainable agriculture or innovative water management techniques.
- **Business Support:** CoPs can support organizational operations by recruiting technical experts for food system projects, providing up-to-date knowledge, and ensuring quality standards. For example, they might help in identifying the best practices for food supply chain management or sustainable farming technologies.
- **Learning:** Learning-focused CoPs enable members to share knowledge, expertise, and experiences or collaboratively create knowledge repositories related to food systems. This could involve workshops on new agricultural practices or seminars on food security strategies.
- **Innovation:** CoPs focused on innovation work collaboratively to develop new approaches and solutions to challenges in food systems. This might include, for instance, pioneering new farming techniques or developing sustainable food packaging solutions.

Coordination mechanism: These CoPs facilitate information exchange among members from different organizations working on similar food system projects or serving the same communities. They help avoid duplication of efforts and promote efficiency through resource sharing and integration. For example, they might coordinate efforts between various NGOs and government bodies to enhance food distribution networks

Regional and Global Collaboration

The FAO's latest publication emphasizes the urgent need for transformative change in sustainable food systems to achieve the Sustainable Development Goals (SDGs) by 2030, focusing on the collaboration at the level of the Mediterranean region. The report explores the unique socio-economic and political context of the Mediterranean, identifying barriers and proposing policy recommendations to enhance food systems transformation. It leverages insights from the UN Food Systems Summits and categorizes countries based on their food systems and economic development status (Zurayk et al., 2024).

Green and Circular Economy Examples

1. **Shared Research and Development Focused on Green Economy:**

   o **Example:** The PRIMA (Partnership for Research and Innovation in the Mediterranean Area) initiative funds projects that address water scarcity, sustainable agriculture, and food production. By encouraging cross-border research partnerships, PRIMA exemplifies how countries can pool resources and expertise to address common challenges.

2. **Collective Food Waste Reduction:**

   o **Example:** The Mediterranean Action Plan (MAP), under the Barcelona Convention, has components addressing pollution reduction. Member states can jointly address food waste as an environmental pollutant, share waste reduction technologies, and set common standards. Algeria's experience described in chapter 4.2.2. can be mobilized for this purpose.

3. **Shared Eco-labeling and Certification:**

   o **Example:** Based on models like the EU Ecolabel, Mediterranean countries can develop a regional eco-label for sustainably produced food products, ensuring uniform standards and facilitating cross-border trade of certified products. However, care should be taken not to disadvantage small producers with heavily regulated systems.

4. **Joint Training and Capacity Building:**

   o **Example:** Organizations like CIHEAM (International Centre for Advanced Mediterranean Agronomic Studies) provide training and education in sustainable agriculture. Such institutions can be leveraged to train professionals from different countries on green and circular economy principles. The Erasmus+ Program can also be utilized for this purpose.

5. **Collaborative Urban Farming Initiatives:**

- o **Example:** The FAO's Urban Food Agenda emphasizes urban agriculture. Cities from various Mediterranean countries can form a network, sharing models of urban farming, community gardens, and rooftop farming techniques.

6. **Shared Platforms for Traditional Knowledge in Food and Farming:**

   - o **Example:** A digital platform can be developed where traditional farming and food preparation techniques, which inherently promote sustainability, are documented and shared among countries, contributing to healthy diets from sustainable food systems.

Blue and Circular Economy Examples

1. **Sustainable Fisheries and Aquaculture:**

   - o **Example:** The GFCM (General Fisheries Commission for the Mediterranean) works collaboratively to ensure sustainable fisheries. By integrating circular principles, such as waste reduction and resource optimization, member countries can jointly address overfishing, promote sustainable aquaculture, and share best practices.

2. **Integrated Coastal Zone Management:**

   - o **Example:** The Mediterranean Action Plan (MAP) under the Barcelona Convention emphasizes integrated management of coastal zones. By aligning with circular principles, member states can collaborate on regenerative tourism, coastal agriculture, and waste management to bolster local food systems.

3. **Collaborative Research on Marine Biotechnology:**

   - o **Example:** The BlueMed Initiative focuses on research and innovation for blue jobs and growth in the Mediterranean area. Collaborative research on marine biotechnology can lead to the discovery of new sustainable food sources and processes that benefit the entire region.

4. **Regional Platforms for Blue Economy Stakeholders:**

   - o **Example:** The Union for the Mediterranean (UfM) promotes regional dialogues on various sectors, including the blue economy. Through such platforms, stakeholders can exchange knowledge on sustainable fishing, aquaculture, and marine conservation, fostering a unified approach to food system transformation.

5. **Resource Recovery from Seafood Processing:**

   - o **Example:** Using circular principles, waste from seafood processing can be turned into valuable products. The Blue Biotechnology Master program, run by several Mediterranean universities, is training the next generation on how to harness marine resources efficiently, including waste valorization.

6. **Joint Monitoring and Surveillance:**

   o **Example:** Ensuring the sustainability of marine resources requires robust monitoring. Regional programs like the Mediterranean Marine Protected Areas Network (MedPAN) can be expanded to monitor fishing activities, ensuring compliance with sustainable and circular practices.

B. Lesson learned from effective collaboration

o Peer-to-Peer learning good practices

Understanding Stakeholder Contexts:

Food systems stakeholders operate within diverse driving contexts and environments, including:

- **Institutional Regulations:** Legal and policy frameworks governing food systems.
- **Tenure Rights:** Land ownership and usage rights.
- **Physical Environment:** Geographic and climatic conditions affecting food production.
- **Education and Training:** Access to knowledge and skill development.
- **Gender Equity:** Ensuring equal opportunities and rights for all genders.
- **Food Prices:** Economic factors influencing affordability and access.
- **Cultural Aspects and Beliefs:** Traditions and values shaping food practices (UNEP, 2016).

Stakeholders also work according to their specific expertise and mandates (TEEB, 2015). The Food Systems Summit Dialogues have attracted a diverse range of stakeholders, reflecting the multifaceted nature of food systems and the need for inclusive engagement. Participants include youth activists, indigenous leaders, smallholder farmers, scientists, CEOs, policymakers, and representatives from various sectors. These Dialogues facilitate collaboration among diverse actors to identify solutions and create sustainable, equitable food systems.

Key Lessons for Stakeholders:

- **Promote Multi-Stakeholder Collaboration:**
   o Establish platforms for regular dialogue and interaction among food systems actors.
   o Ensure representation from all stages of the food system, from production to consumption.
- **Understand Contexts and Challenges:**
   o Engage with stakeholders to learn about their specific environments and challenges.
   o Recognize the unique contributions and perspectives of each actor.
- **Set Coordinated Actions:**
   o Develop joint strategies and action plans that align with stakeholders' contexts and expertise.

- o Foster synergy between different sectors to enhance the effectiveness of interventions.
- **Ensure Inclusiveness:**
  - o Make sure that all voices, especially those of marginalized and underrepresented groups, are heard.
  - o Ensure that advice and strategies are representative and relevant to all stakeholders (OECD, 2017).

Peer-to-peer communication workshops

The Delphi technique is an example: "a method of structuring a group communication process so that the process is effective in allowing a group of individuals as a whole to deal with a complex problem" (Hugé et al., 2010).

The Delphi survey method begins with an initial questionnaire addressed to a group of experts or participants. This process initiates a series of discussion rounds among group members, facilitated through controlled feedback organized by a facilitator. Here is how the methodology typically unfolds:

1. **Initial Questionnaire:** The facilitator prepares and distributes a questionnaire to the selected experts.

2. **First Round Feedback:** After completing the initial questionnaire, each expert receives common feedback on the group responses. The facilitator also indicates each participant's position within the panel.

3. **Subsequent Rounds:** Equipped with the feedback, participants complete the survey again, either confirming or amending their initial responses. In each round, participants evaluate the opinions and suggestions from the previous round.

4. **Iteration:** This iterative process continues until a consensus is achieved or nearly achieved, typically within two to four rounds. Additional rounds can lead to a significant drop in participation.

By the end of this process, the group should reach a well-rounded consensus on the topic at hand, benefiting from the collective insights and expertise of all participants (Allen and Prosperi, 2016).

Remote Collaboration Tools and Regional Platforms

Numerous collaborative platforms exist to promote effective collaboration among various food systems stakeholders, recognizing their critical roles from production to consumption in policy planning, implementation, and evaluation. Regional collaboration encompasses multi-stakeholder mechanisms that minimize trade-offs, overcome polarization, and address traditional power dynamics (OECD, 2001). Examples include:

1. **FAO's Regional Initiatives:** Bringing together governments, civil society, and the private sector to address food security and agricultural development through joint planning and policy implementation.

2. **The PRIMA Initiative:** Funding academic projects to address water scarcity, sustainable agriculture, and food production, fostering cross-border research partnerships.

3. **CIHEAM:** Providing training and education in sustainable agriculture, facilitating knowledge exchange and capacity building among professionals from different countries.

4. **ESCWA Initiatives:** ESCWA supports Arab states in transforming their food systems towards sustainability through separate initiatives like wastewater management, sustainable agriculture, and reducing food loss and waste. ESCWA's collaborative approach includes organizing regional dialogues, workshops, and capacity-building programs that bring together diverse stakeholders, including civil society, private sector representatives, and policymakers. The latest initiative concerning the food system is the food system assessment tool.

Concluding Remarks

The Arab region continues to face significant challenges in food security due to conflicts, limited natural resources, economic slowdowns, and climatic variability. These challenges are compounded by inefficient food systems characterized by low productivity and inadequate supply chains, leading to higher costs and reduced incomes for those dependent on these systems. Achieving food security and sustainable development necessitates a transformation and reform of regional food systems.

This guide outlines a holistic approach to transforming food systems in the Arab region by addressing critical challenges through strategic planning and policy reforms. Key steps include identifying outstanding issues, setting short- and long-term goals, developing a theory of change, selecting appropriate KPIs, designing monitoring and evaluation frameworks, and setting time frames. Innovative frameworks integral to this transformation include True Cost Accounting (TCA), which assesses hidden costs and benefits to facilitate informed policymaking; the Doughnut Economy, which balances social and ecological needs; and Circular Economy principles, which minimize waste. The cost of operating food systems in Arab countries continues to surge, often including unaccounted hidden costs. TCA has emerged as a crucial tool for policymakers, helping to mitigate negative impacts and maximize benefits. Concurrently, Doughnut Economics helps balance essential human needs with planetary boundaries, visualizing a space where food systems can operate sustainably. The circular economy model involves rethinking and redesigning food production to mimic natural regenerative processes, fostering new business models that enhance resource sharing and local system resilience.

Effective collaboration in food systems highlights the importance of understanding stakeholder contexts, promoting multi-stakeholder collaboration, setting coordinated actions, and ensuring inclusiveness. Key lessons include establishing platforms for dialogue, recognizing diverse contributions, developing joint strategies, and ensuring representation of marginalized groups. The Delphi technique is a valuable method for peer-to-peer communication, facilitating consensus through iterative feedback. Regional collaboration is crucial, fostering knowledge sharing and leveraging platforms like FAO's Regional Initiatives, ESCWA, and CIHEAM 's initiatives. For example, ESCWA's food security monitoring framework (2019) and food system assessment tool (2023) have been instrumental in promoting resilience in Arab food systems. Additionally, the 2021 UN Food Systems Summit and the 2023 UNFSS+2 have provided valuable insights and strategies for creating more sustainable and equitable pathway s for transforming food systems globally and regionally.

In conclusion, a cohesive strategy involving strategic planning, innovative frameworks, and regional collaboration is essential for transforming food systems in the Arab region. This approach ensures policy coherence, inclusivity, and robust monitoring mechanisms, aligning with the Sustainable Development Goals and promoting sustainability and resilience for all.

Annex 1
CGIAR Action Area Theory of Change: Systems Transformation

https://storage.googleapis.com/cgiarorg/2021/06/CGIAR-Action-Area-Theory-of-Change_Systems-Transformation.pdf

Challenges

- High environmental footprint of agriculture: Including greenhouse gas emissions, loss of biodiversity, and damage to land and water systems.
- Agri-food systems as major employers: They are key to addressing poverty, food insecurity, and inequity.
- Policy improvements: Needed for investment, food, land, water security, and resilience to climate and environmental challenges.
- Poor quality diets: They are a root cause of malnutrition and premature adult deaths.
- Gender and social inequalities: Deeply entwined with global agri-food systems.
- Food, land, and water systems' transformation: Stakeholders lack the necessary resources for managing complex trade-offs.

Demand Partners

- Ministries of Agriculture, Environment, Water, Meteorology, Planning, Health, and Finance.
- Farmers/Women associations.
- Development agencies.
- River basin authorities.
- Water and energy utilities.
- Conservation agencies.

Initiatives (2022)

- Transformational agroecology: Across food, land, and water systems.
- Rethinking food markets and value chains: For inclusion and sustainability.
- National policies and strategies: For inclusive and sustainable agri-food systems.
- SHiFT: Sustainable healthy diets through food systems transformation.
- Harnessing equity for resilience in the food environment.
- Harnessing digital technologies: For decision-making in food, land, and water systems.

Innovation and Scaling Partners

- National and international universities and research centers.
- International environmental groups.
- Government development agencies.
- Ministries of Agriculture, Water, Planning, and Finance.
- SME incubators.

- Impact investors.
- Small holder farmers.
- Food wholesalers.
- Water and energy utilities.
- River basin authorities.
- Seed companies.

Outcomes (2024)

- Knowledge from science-based assessments: Demand and scaling partners use it to implement agroecological options that are commercially viable, environmentally sound, and socially inclusive.
- Carbon sequestration: Increased in agri-food systems and green resilience financing.
- Water use: More deliberate and efficient, reflecting national and regional equity.
- Transformation of agri-food systems: At national and subnational levels with policies supporting human health, nutrition, environment, and inclusivity.
- Smallholder farmers and value chain actors: Adapt to climate change and manage food safety risks.
- National policies and strategies: They are evidence-informed, inclusive, and support sustainable agri-food systems.

Demand and Scaling Partners (2024)

- Ministries of Environment, Health, Planning, Finance, Agriculture, Water, and Energy.
- UNCCD/CC agencies.
- Smallholder farmers.
- Water and energy utilities.
- Environmental agencies.

Impact (2030)

- Nutrition, health, and food security: Improved, with increased availability, affordability, and consumption of safe and nutritious food.
- Poverty reduction, livelihoods, and employment: Improved, with increased income and employment opportunities.
- Gender equality, youth, and social inclusion: Enhanced, with increased agency and opportunities for women, youth, and marginalized groups.
- Environmental health and biodiversity: Improved, with restored land, soil, and water systems.
- Climate adaptation: Enhanced, with resilient food, land, and water systems that can manage climate risks and shocks.

Annex 2

Published Example of Applying Doughnut Economics to the Fisheries Sector:

The approach was applied to the fisheries sector, focusing on purse-seiners[3] in the northwestern Mediterranean Sea. This study demonstrated the approach's effectiveness in supporting the transition of fisheries toward a sustainable blue economy (Ortega et al., 2024).

Benefits of the Doughnut Approach:
The doughnut perspective provides a comprehensive, flexible, and holistic framework that integrates multiple values, making it easy to understand and incorporate into a cohesive narrative of transitioning to a "safe and just space for humanity." This approach is particularly valuable in expanding marine economic activities, as it can extend to other blue economy sectors. It helps avoid the conflictual narrative of environment versus economy and the isolated consideration of social, environmental, and economic perspectives often found in marine political discussions. The doughnut approach facilitates dialogue among diverse stakeholders, including decision-makers, managers, media, researchers, and NGOs.

Advantages for Stakeholders:
Using an "out of the fisheries box" framework, fisheries experts can participate in broader discussions about socioeconomic and ecological changes needed to achieve the Sustainable Development Goals within the blue economy context. Conversely, non-fisheries experts gain a better understanding of fisheries issues.

Limitations:
The doughnut approach does not show linkages and dependencies between indicators, requiring additional tools to evaluate trade-offs between management scenarios. Technical challenges include translating ecological and social indicators into the "basic needs and ecological ceilings" framework and establishing reference values for comparison. Historical data series can sometimes hide shifting baseline tendencies, so fixed reference values are preferable. Further testing in different contexts and reflecting on the interaction between various fleet segments and other blue economy activities are crucial for an ecosystem-based fisheries management approach.

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[3] a large wall of netting deployed around an entire area or school of fish

Figure 4: Doughnut Framework Assessment Ortega et al., 2024
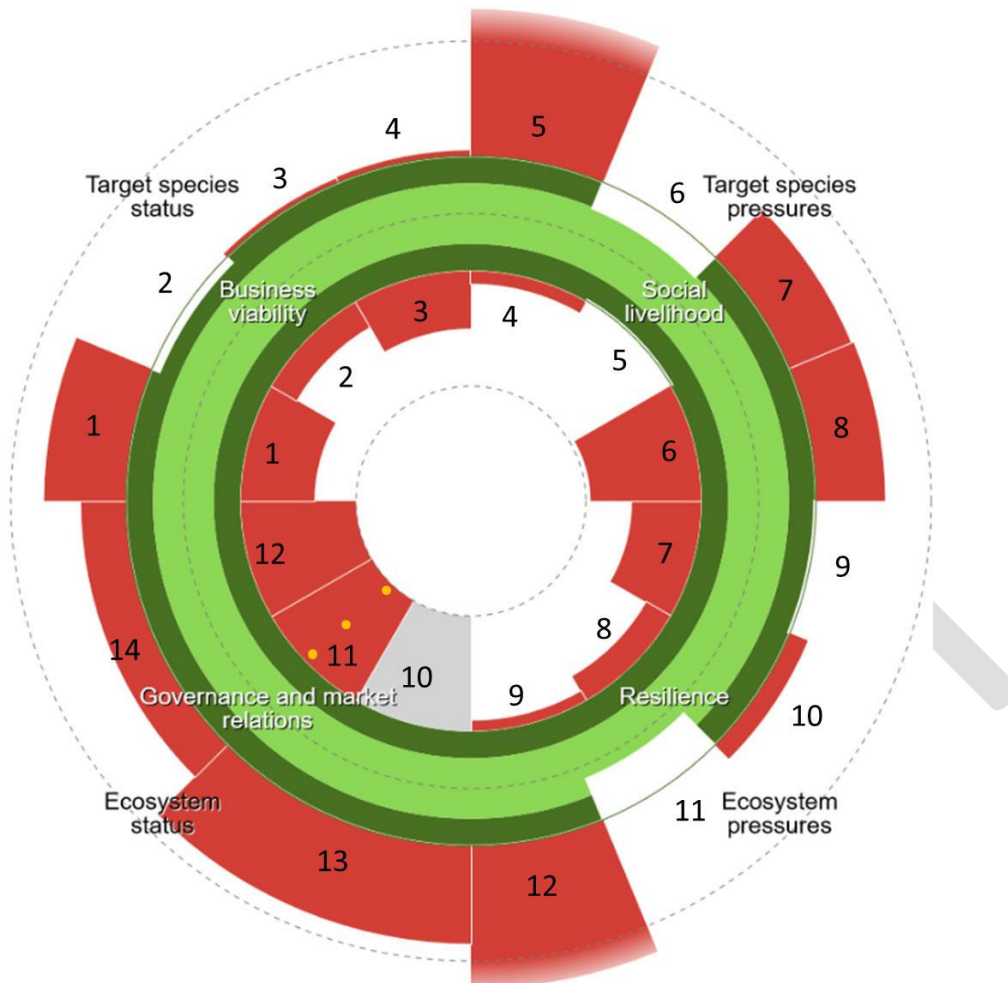
Social Foundation

BUSINESS VIABILITY
1. Return on Equity -ROE: 0.36
2. Return on Assets - ROA: 0.75
3. Profit margin: 0.50

SOCIAL LIVELIHOOD
4. Number of purse-seiners fishers: 0.89
5. Fishers wage: 1.04
6. Gender disparity: 0.04

RESILIENCE
7. Education: 0.40
8. Fishers age structure: 0.76
9. Age of vessels: 0.91

TRANSITION
10. Buyers concentration: Not available
11. Representation of purse-seiners members in regional fishers sectoral representative bodies: regional dependent
12. Representation of non-EU fishers in sectoral executive committees: 0

Ecological ceilings

TARGET SPECIES STATUS
1. Sardine biomass: 1.71
2. Anchovy biomass: 0.73
3. Sardine mean size at first maturity: 1.04
4. Anchovy mean size at first maturity: 1.05

TARGET SPECIES PRESSURES
5. Sardine fishing mortality: 2.28
6. Anchovy fishing mortality: 0.51
7. Microplastic presence in sardine: 1.58
8. Microplastic presence in anchovy: 1.60

ECOSYSTEM PRESSURES
9. Out of optimal spawning sea surface temperature for sardine: 0.97
10. Out of optimal sea surface temperatures for anchovy: 1.17
11. Fuel intensity: 0.23
12. Fish consumption: 2.24

ECOSYSTEM STATUS
13. Overexploited commercial stocks: 1.85
14. Top predators at risk: 1.39

Overview of the results:

- The doughnut assessment provides a comprehensive view of Spanish purse-seiners' activity in the northwestern Mediterranean Sea.
- Results indicate the current situation is far from being ecologically safe or socially just.
- The doughnut portrait aligns with the decline of purse-seine vessels by 20% in the past decade and supports the urgency of the "Spanish Mediterranean purse seiners sustainability management plan."

Business Perspective:
- Most purse-seiner activities are less profitable than other small and medium businesses in the region (Indicator S1: 64%).
- 25% of the analyzed fleet operated with negative profitability in 2021, posing midterm viability concerns.
- The sector appears unstable, with some subsegments facing significant difficulties if no changes occur.

Species and Ecosystem Indicators:
- Negative trends observed in the main commercial species (European anchovy and sardine) and their ecosystems.
- Declines in biomass, abundance, growth patterns, age structure, and body condition due to fishing pressure, environmental changes, and food availability.
- Anchovy stocks are in better condition and sustainably exploited, while sardine stocks have low biomass and high overfishing levels.
- Climate change may reduce anchovy distributions by the end of the 21st century.

Ecosystem Pressures:
- Negative trends in sea surface temperature changes, reduced optimal spawning days for anchovies, and plastics in the guts of small pelagic fish.

Global Implications:
- Spanish per capita fish consumption is much higher than the world average.
- Spain's self-sufficiency rate was 49% in 2020, indicating reliance on imports.
- Mediterranean purse-seiners have better fuel efficiency compared to other Spanish Mediterranean fleets, especially bottom trawlers.

Social Dimension:
- High buyer concentration with five buyers in Catalonia and Valencia accounting for over 50% of all purse-seiner captures in 2021.
- Lack of historical data on buyer concentration for trend analysis.
- Varied representation of purse-seiners in regional fishermen's representative bodies: proportional in Catalonia, none in Valencia and Murcia.

Annex 3

Total Hidden Costs in Arab Countries (**million USD**): Environmental, Social, and Health Dimensions as provided by the SOFA 2023 - For each country and dimension, the percentages represent the proportion of the respective value relative to the total costs (FAO 2023)

COUNTRY	TOTAL HIDDEN COSTS	ENVIRONMENTAL				SOCIAL		HEALTH
		CLIMATE	BLUE WATER WITHDRAWAL	LAND	NITROGEN	AGIFOOD WORKER POVERTY	BURDEN OF DISEASE (UNDERNOURISHMENT)	BURDEN OF DISEASE (DIETARY PATTERNS)
Protracted crisis								
Libya	12026	649	280	-	298	234	43	10521
		5.4%	2.3%		2.5%	1.9%	0%	
			10.2%				2.3%	87.5%
Iraq	67095	2402	1029	97	3777	123	793	58874
		3.6%	1.5%	0.1%	5.6%	0.2%	1.2%	
			10.9%				1.4%	87.7%
Mauritania	2598	708	2	136	223	241	63	1224
		27.3%	0.1%	5.2%	8.6%	9.3%	2.4%	
			41.1%				11.7%	47.1%
Palestine	2356	21	21	-	129	12	23	2151
		0.9%	0.9%		5.5%	0.5%	1.0%	
			7.3%				1.5%	91.3%
Sudan	20712	6248	84	89	1533	6670	265	5823
		30.2%	0.4%	0.4%	7.4%	32.2%	1.3%	
			38.4%				33.5%	28.1%
Syrian Arab Republic	5330	768	167	93	193	428	61	3620
		14.4%	3.1%	1.7%	3.6%	8.0%	1.1%	
			22.9%				9.2%	67.9%
Yemen	9291	753	178	119	327	3090	672	4153
		8.1%	1.9%	1.3%	3.5%	33.3%	7.2%	
			14.8%				40.5%	44.7%
Informal and Expanding								
Egypt	98130	4964	2122	-	4403	1587	244	84811
		5.1%	2.2%		4.5%	1.6%	0.2%	
			11.7%				1.9%	86.4%
Morocco	39400	2225	332	146	7857	793	105	27942
		5.6%	0.8%	0.4%	19.9%	2.0%	0.3%	

		26.8%				2.3%		70.9%
Emerging and Diversifying								
Algeria	32272	2763	427	219	3321	120		25423
		8.6%	1.3%	0.7%	10.3%	0.4%	0.0%	
		20.9%				0.4%		78.8%
Lebanon	4508	270	38	10	161	1	36	3993
		6.0%	0.8%	0.2%	3.6%	0.02%	0.8%	
		10.6%				0.8%		88.6%
Tunisia	11299	776	97	20	2407	27	18	7954
		6.9%	0.9%	0.2%	21.3%	0.2%	0.2%	
		29.2%				0.4%		70.4%
Modernizing and Formalizing								
Jordan	12663	422	21	-	233	2	183	11801
		3.3%	0.2%		1.8%	0.0%	1.4%	
		5.3%				1.5%		93.2%
Kuwait	12322	438	85	-	637		30	11132
		3.6%	0.7%		5.2%		0.2%	
		9.4%				0.2%		90.3%
Oman	11418	794	288	-	282	37	123	9893
		7.0%	2.5%		2.5%	0.3%	1.1%	
		11.9%				1.4%		86.6%
UAE	38188	1580	552	-	326	-	-	35731
		4.1%	1.4%		0.9%			
		6.4%				0.0%		93.6%
Qatar	6455	909	2	-	152	-	-	5392
		14.1%	0.0%		2.4%			
		16.5%				0.0%		83.5%
Saudi Arabia	132004	5126	442	18	1696	-	219	124504
		3.9%	0.3%	0.0%	1.3%		0.2%	
		5.5%				0.2%		94.3%
Total costs	**518,067**							

Annex 4

Examples of the outcomes of the systematic review on food system TCA in Lebanon

Reference	Methods	Relevant Indicators	Findings
Water Scarcity			
Skaf et al. (2019)	Evaluated environmental and socio-economic indicators. Utilized Life Cycle Assessment (LCA) methodology. Analyzed environmental impacts of food diets.	Agricultural land occupation Crop loss Freshwater Eutrophication Human toxicity Water depletion	Quantified environmental costs and impacts. Assessed contributions to selected impact categories.
Khalil et al. (2020)	Utilized food consumption data from a national survey. Assessed environmental footprints and economic costs of traditional food consumption.	Water use GHG emissions Dietary patterns	Compared environmental footprints and costs between dietary patterns.
Hoteit et al. (2021)	Utilized a mobile application called the Nutrition Assessment System (NAS). Conducted a trial across Lebanese governorates. Examined food insecurity prevalence and coping strategies.	Malnutrition prevalence	Highlighted high prevalence of food insecurity. Noted household coping strategies and economic challenges.
Mortada et al., (2018)	Creation of an optimization model for optimal resource allocation. Integration of nutritional, socio-economic Integration of nutritional, socio-economic constraints spanning water-stressed to land-stressed extremes	Water use Agricultural land occupation Crop yield Dietary patterns	Maximization of composite water-food security status, Demonstration of model sensitivity to adopted water and food security definitions.
Land Degradation			

Harik et al. (2023)	Utilization of behavioral mental model with Cellular Automata Markov Chain (CA-MC) model expanded through multi-criteria decision analyses (MCDA).	LCLU changes Cropland area changes	LCLU predictions through the combination of social behavior and mechanistic processes
Mhanna et al. (2023)	Integration of remote sensing products, and quasi-experimental statistical analysis to study land use and land cover (LULC)	LCLU changes Cropland area changes	Significant change in cropland areas Tracking of refugee settlements unveiling distinct LULC patterns.
Al Sayah et al. (2019)	multitemporal satellite images to track detailed LCLU change	LCLU changes, surface runoff Land Degradation	LULC changes and CN increases. Land Degradation

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