

EXPLORING THE VALUE OF CRITICAL SYSTEMS THINKING IN FOOD SYSTEMS INTERVENTIONS: THE CASE OF RAISE-FS

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Abstract

The concept of *food systems* has become a buzzword, whose interpretive flexibility often leads to confusion and enables co-option by powerful agribusiness actors, reinforcing dominant agro-industrial practices. Some food systems scholars have pointed to the need for deeper engagement with systems traditions, noting that barriers to collaboration may stem from conflicting understandings of *systems*, typically grounded in hard or soft systems paradigms. Despite its origins in addressing such paradigm divides, Critical Systems Thinking (CST) remains largely absent from efforts to transform food systems. Aside from engagement by Gerald Midgley and Bob Williams in the grey literature, CST has yet to inform food systems research or practice. This study seeks to explore its potential contribution to more inclusive and reflexive framings of food systems and related interventions. Drawing primarily on Midgley's systemic intervention, I develop a food systems intervention framework that emphasizes boundary critique and strategies to address marginalization as tools to expose hidden assumptions, power asymmetries, and exclusions, and to enhance inclusion throughout interventions. This framework is applied to analyze the Resilient Agriculture for Inclusive and Sustainable Ethiopian Food Systems (RAISE-FS) program. Through desk review, interviews, surveys, and participant observation, I investigate how program-affiliated actors from Ethiopian research and innovation (R&I) systems navigate contested framings of food systems, and whether features associated with CST are reflected in the program designs or in actor capacities. Findings reveal that program designs addressing marginalized gender and nutrition issues helped broaden R&I actors' concerns, facilitated alignment with program goals, and contributed to coordinated action. However, boundary critique was largely absent, potentially limiting these interventionists' ability to respond to complex challenges and contribute to systemic change over the long term. I therefore argue that achieving *systemic* food systems transformation may require parallel shifts in R&I systems through cultivating critical systems thinking skills among interventionists.

Keywords

Boundary critique, critical systems thinking, food systems intervention, marginalization, systemic intervention

1 | Introduction

Over the past few decades, various narratives have highlighted critical failures in food systems, such as their inability to adequately feed the global population, provide healthy diets, ensure equitable benefits, and mitigate their role as a significant driver of global environmental change (Béné et al., 2019). These interrelated challenges have contributed to the rising prominence of the *food systems* concept, which increasingly guides research priorities and interdisciplinary discourse in both academic and policy contexts. A review of 410 scholarly publications on food system transitions and transformations from 1994 to 2022 found that 90% were published between 2015 and 2022, reflecting the growing influence of the agroecology movement, transition theories, and increasing calls for interdisciplinary systems approaches to address externalities and promote inclusive governance (Juri et al., 2024). This surge in academic interest is echoed in the policy sphere, most notably by the United Nations Food Systems Summit (UNFSS) launched in 2021, signaling a global commitment to transforming food systems.

Exploring the Value of Critical Systems Thinking in Food Systems Interventions: the Case of RAISE-FS

Despite its widespread use, the meaning of *food systems* and the nature of their required transformation have become increasingly diffuse and contested (Brock, 2023; Juri et al., 2024). Scholars describe the term as a fuzzword: seemingly inclusive yet strategically ambiguous, allowing actors to mask conflicting interests (Leach et al., 2020). The framing of food systems is inherently political. Its ambiguity has been criticized for enabling co-option by powerful agrifood corporations, allowing them to gain political advantage, reinforce unsustainable practices, and shape governance agendas (Recine et al., 2021; Canfield et al., 2021; Béné, 2022). At the same time, there is no consensus on what *food systems transformation* entails, though most academic research describes it as a shift away from the globalized industrial model toward more sustainable and equitable alternatives (Canfield et al., 2021; Brock, 2023; Juri et al., 2024). Beneath these competing interpretations lies a deeper conceptual divide rooted in systems thinking itself. While framing food as a system offers analytical clarity and integrative potential, it also reveals tensions between hard and soft systems paradigms. These differences were evident at the 2021 UN Food Systems Summit (UNFSS), where the Scientific Group's mechanistic, hard-systems approach broadened the scope of intervention but failed to address structural inequities, challenges more effectively engaged through soft systems thinking, thereby fueling controversy and fragmentation at the Summit (Brock, 2023).

The conceptual ambiguity surrounding *food systems* also has implications in the field of Research and Innovation (R&I). Ericksen (2008) is often credited with pioneering a *food systems approach*, proposing an analytical framework that identifies key components across scales and their intended and unintended outcomes, including food security, socio-economic dynamics, and environmental impacts. Her aim was to offer a common frame of reference to support cross-disciplinary collaboration, integrated policymaking, and coordinated action in complex contexts (Ericksen et al., 2010). Since then, various organizations have developed their own food systems frameworks, each with distinct mandates and focus areas (Brouwer et al., 2020; Dengerink & Brouwer, 2020). Yet, although food systems framings increasingly shape R&I interventions and funding priorities, it remains unclear whether initiatives under this label can truly align diverse actors or inform strategies that meaningfully influence policy (SCAR, 2019).

One persistent challenge in research-driven food systems interventions is defining system boundaries, a critical step that significantly shapes intervention design, resource allocation, and policy outcomes (van Berkum, 2021). In this context, Critical Systems Thinking (CST) has appeared sporadically in the food systems literature as a way to reflect on boundary judgments and the underlying values that shape how a food system is framed in the first place. For example, Williams and Blue Marble Evaluation Team (2021) incorporated CST elements when reviewing dialogues leading up to the UN Food Systems Summit. More systematically, Helfgott and Midgley (2020) applied boundary critique, the core principle of CST, in their review of UK food systems projects and dialogues. They demonstrated how CST helped surface biases and blind spots, and how tensions between competing frames were regarded by participating researchers as opportunities for learning rather than obstacles. When addressed through dialogue, these tensions even often led to greater trust, stronger mutual understanding, and new insights.

This paper hence responds to the lack of empirical evidence that R&I initiatives operating under the banner of *food systems* actually foster coordinated action, while also building on preliminary examples suggesting that CST can offer valuable insights into these dynamics. While CST is seldom explicitly applied in real-world interventions, its core concerns may nonetheless emerge implicitly through practice, including boundary judgments, patterns of inclusion and exclusion, and underlying value conflicts. A case study approach was adopted, using the Resilient Agriculture for Inclusive and Sustainable Ethiopian Food Systems (RAISE-FS) program as the empirical case. CST was applied as a heuristic lens to examine how food systems framing can enable or constrain coordinated action by R&I actors in a real-life intervention. Specifically, the study explored whether and how features relevant to CST emerged and influenced these processes. The central research question guiding the study is:

How do the ways R&I actors engage with the RAISE-FS program's food systems framing influence the development of coordinated action, and what is the potential role of Critical Systems Thinking in this process?

Exploring the Value of Critical Systems Thinking in Food Systems Interventions: the Case of RAISE-FS

The paper first develops an analytical framework grounded in CST to support this inquiry. It then outlines the research design with an introduction to the empirical case. Next, it presents the results, analyzing how food systems framing shaped coordination within RAISE-FS and exploring the potential role of CST. Finally, the paper discusses the implications of these findings and concludes with recommendations for future research and practice.

2 | A food Systems Intervention Framework Grounded in CST

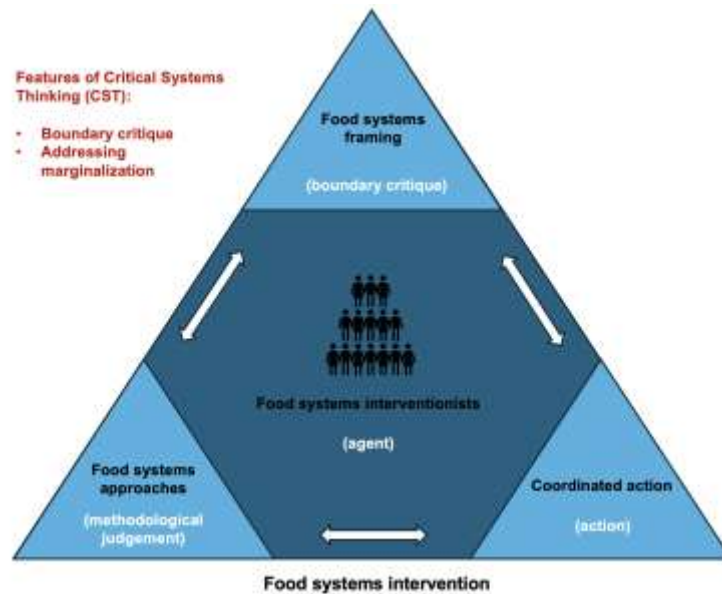
Food systems approaches adopted in research and practice have been strongly shaped by systems science, particularly the traditions of hard and soft systems thinking (Posthumus et al., 2018). Hard systems approaches tend to treat elements such as farming systems or value chains as objectively existing structures that can be modeled and optimized. Problems are seen as arising within these systems and are analyzed using approaches like system dynamics (Forrester, 1961), which emphasize feedback loops, interconnections, and systemic structures to identify leverage points for change (Meadows, 1999). In contrast, soft systems thinking views systems as socially constructed—defined by how different actors perceive and frame problems. Boundaries are not fixed but negotiated, with an emphasis on learning across perspectives. Participatory tools like the rich picture (Checkland & Scholes, 1990) are used to support stakeholder engagement, collaborative reflection, and joint problem-solving in food systems interventions. These contrasting traditions reflect a broader evolution in systems thinking—from an ontological view of systems as out there in the world, to an epistemological view that sees systems as shaped through knowledge and values (Ison, 2017). While both paradigms coexist, their assumptions can lead to tensions, especially in food systems contexts where diverse actors must negotiate boundaries, goals, and priorities.

Critical Systems Thinking (CST), often described as the third wave of systems science, emerged to address tensions between hard and soft systems traditions (Cabrera et al., 2023). It embraces methodological pluralism and emphasizes *boundary critique* — critical reflection on who defines system boundaries, who is affected, and whose perspectives are excluded (Ulrich, 1983). This makes CST particularly relevant to food systems interventions, where framing shapes coordination, legitimacy, and outcomes. As argued in the introduction, food systems framing is not neutral. This paper therefore treats framing not as background context but as a constitutive element of interventions that requires critical attention, especially when collaboration among diverse actors is central. In this regard, Midgley’s Systemic Intervention (2000) is highly relevant. He defines *intervention* as “purposeful action by an agent to create change” (Midgley, 2000, p. 1), where the agent may be an individual or a group, even without internal agreement. In food systems, this highlights how Research and Innovation (R&I) actors often operate with divergent framings or priorities, complicating collective action.

To address such challenges, Midgley emphasizes the importance of boundary critique and argues that interventions only become truly *systemic* when they explicitly reflect on value-laden assumptions and judgments about what is included or excluded. He further defines *systemic intervention* as “purposeful action by an agent to create change in relation to reflection on boundaries” (Midgley, 2000, p. 8). To support this, he proposes a methodology comprising three interdependent dimensions: boundary critique (questioning inclusions and exclusions), methodological judgment (choosing appropriate theories and methods), and action for improvement (taking action while recognizing that notions of improvement are shaped by prior choices). Building on this foundation, this study proposes an integrative food systems intervention framework, as shown in Exhibit 1.

Exploring the Value of Critical Systems Thinking in Food Systems Interventions: the Case of RAISE-FS

Exhibit 1. A Food Systems Intervention Framework Grounded in CST.



The triangle in Exhibit 1 conceptualizes food systems intervention as a systemic process, comprising three interdependent dimensions, navigated by a central actor component. At the top of the triangle is *food systems framing*, which refers to how an intervention’s boundaries are defined, influencing who and what is considered relevant, and affect which concerns are rendered visible or sideline. In food systems interventions, early-stage framing processes are therefore especially consequential. Rather than requiring consensus, boundary critique is a key practice for making an intervention systemic. It emphasizes including diverse viewpoints and creating space for contestation and revision, ideally through collective dialogue using tools such as Ulrich’s (1983) Critical Systems Heuristics (CSH).

The bottom-left corner of the triangle represents the selection of *food systems approaches*, which are shaped by the framings established earlier. Systems approaches in interventions often serve three overlapping purposes: making sense of complexity, surfacing divergent perspectives, and addressing power and boundary tensions (Reynolds & Holwell, 2020). In this sense, *conceptualization of systems* becomes *framing of a common concern*, aligning with Reynolds and Wilding’s (2017) view that boundary critique frames methodological design. Yet in real-world interventions, boundary disagreements are common. When multiple framings co-exist, they may create zones of marginalization around issues or perspectives not aligned with the dominant boundary (Midgley, 2000). Midgley hence argues that reflection alone is insufficient to address this risk; creative strategies are needed to challenge marginalization and enable more inclusive practice. These include reinforcing secondary boundaries, transcending narrow values, challenging stereotypes, highlighting shared connections, uniting around common concerns, and amplifying marginalized voices through empathy (Midgley, 2016; 2020). In food systems interventions, systems approaches should thus not only reflect on boundaries, but also actively apply such strategies to broaden participation and support more reflexive forms of coordination.

The bottom-right corner represents *coordinated action*, or the outcomes that emerge from the application of food systems approaches by multiple stakeholders. This dimension reflects how effectively the intervention enables collaboration, addresses marginalization, and supports systemic change.

At the center of the triangle lies the *agent*—either individual or collective actor undertaking the intervention. In many cases, the agent is not a single actor but a group, such as a coalition of researchers, funders, and implementers. These actors may hold different assumptions about the purpose of the intervention or the boundaries of the food systems in question. Such divergence can lead to contested

Exploring the Value of Critical Systems Thinking in Food Systems Interventions: the Case of RAISE-FS

framings or shifts in direction over time. Recognizing this, the framework foregrounds the agent as both a driver and a site of tension within intervention processes, with the capacity to either reinforce or reframe dominant narratives.

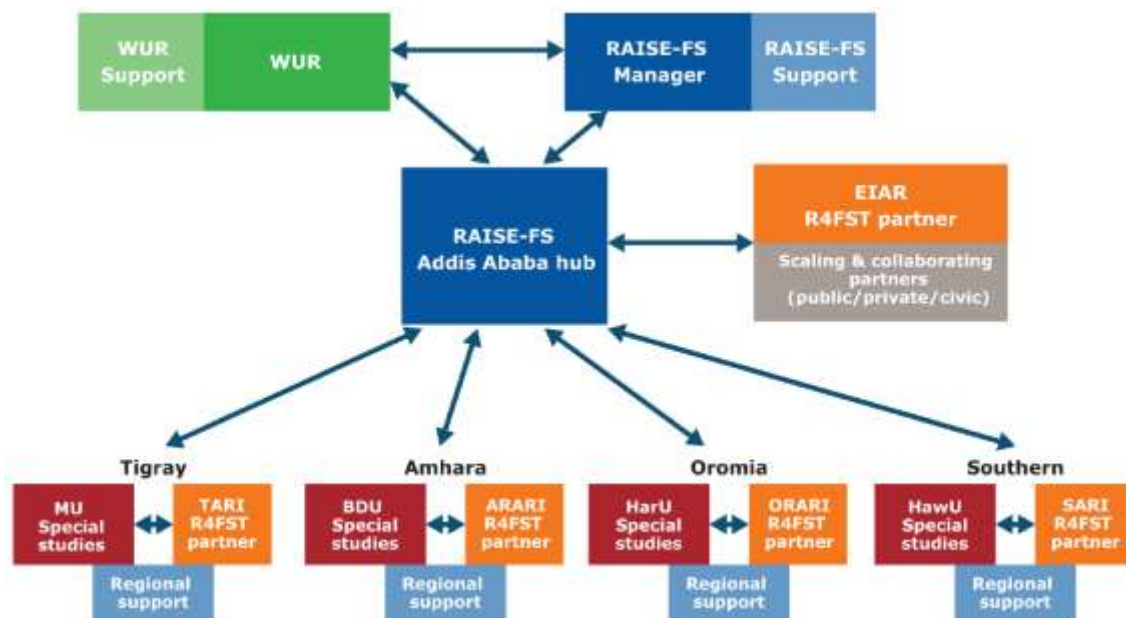
The proposed food systems intervention framework, adapted from Midgley’s methodology for systemic intervention (2000), serves as a heuristic tool in this study to examine how the three dimensions — food systems framing, methodological judgment, and coordinated action — intersect in practice as actors navigate the intervention process. It also emphasizes boundary critique and strategies to address marginalization as two core features of CST, as highlighted in Midgley’s work and taken up in this study.

3 | Research Design

The Resilient Agriculture for Inclusive and Sustainable Ethiopian Food Systems (RAISE-FS) program was selected as the case study for this research due to its strong relevance: it represents a context where research and innovation (R&I) actors play a central role in food systems interventions.

RAISE-FS is a four-year program (2021–2025) aimed at transforming Ethiopian food systems. It is funded by the Dutch Embassy in Addis Ababa, hosted by Stichting Wageningen Research Ethiopia (SWR Ethiopia), and led by the Wageningen Center for Development Innovation (WC DI). As shown in Exhibit 2, in addition to seeking national-level support, the program’s structure is designed with primary operation at the regional level, specifically in Tigray, Amhara, Oromia, and the South. In each region, a RAISE-FS liaison office coordinates efforts with local universities (marked in red) and Agricultural Research Institutes (ARIs) (marked in orange), collectively referred to as implementing partners. These partners conduct R&I activities to generate evidence for context-specific innovations aimed at transforming local food systems. In particular, ARIs are managed by regional governments but collaborate closely with the Ethiopian Institute of Agricultural Research (EIAR) and the Ministry of Agriculture to align regional research with national priorities and support extension services. RAISE-FS explicitly targets strengthening these partners’ capacity in Research for Food Systems Transformation (R4FST), recognizing that while agricultural research in Ethiopia has produced technical innovations, it has often failed to meet end-user needs due to a lack of demand-driven, interdisciplinary, and systems-oriented approaches (WC DI, 2021).

Exhibit 2. Organizational Structure of RAISE-FS (WC DI, 2021).



Exploring the Value of Critical Systems Thinking in Food Systems Interventions: the Case of RAISE-FS

Data collection included a desk review of program documents to understand the program’s design, complemented by informal interviews with program personnel. Surveys and semi-structured interviews focused on regional implementing partners and RAISE-FS liaison staff: an online survey was completed by 45 respondents across the four regions, followed by face-to-face interviews in Ethiopia with 9 of these participants, solely from the South region. Finally, participant observation focused on the collaboration period with the RAISE-FS team during survey design, as well as on interactions between program personnel and regional implementing partners at the 2025 Program Annual Planning Meeting in Addis Ababa.

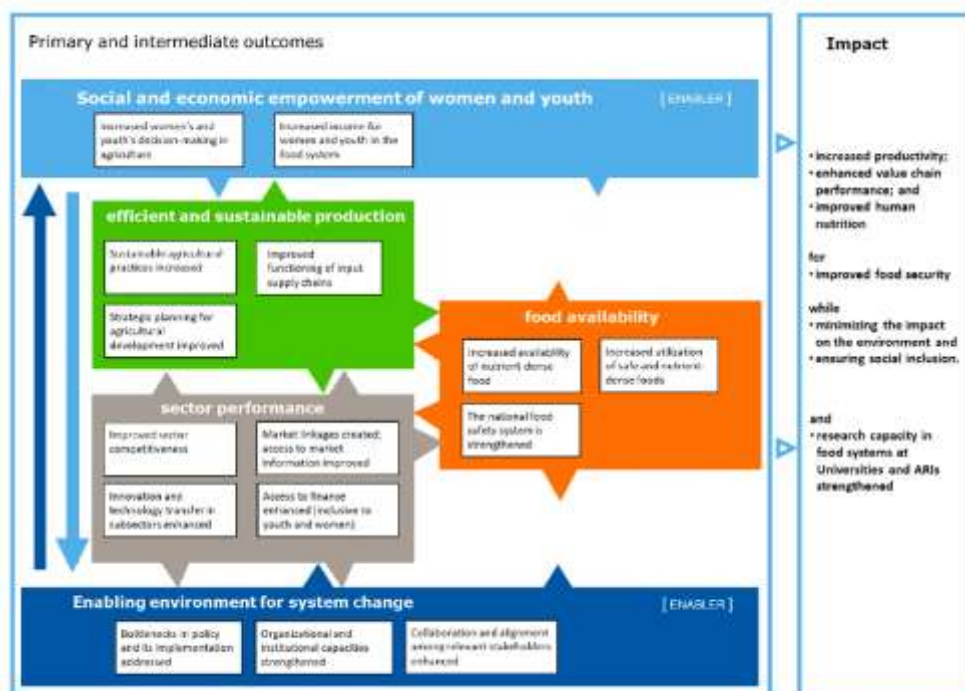
Data analysis was guided by the proposed food systems intervention framework. Here, food systems framing refers to how the program defines its targeted system of intervention—essentially, its stated goals. Food systems approaches capture specific design elements and implementation strategies. Coordinated action refers to reported examples of stakeholder collaboration aligning with program objectives. The presence (or absence) of boundary critique and strategies to address marginalization—the two core features of CST—were examined across food systems framing, food systems approaches, and in the responses and practices of R&I actors, including contributions to coordinated action. Atlas.ti software (2023) was used to code survey and interview data, supporting framing analysis and thematic analysis to explore how actors understood, negotiated, and acted upon the program’s framing and approaches.

4 | Results

4.1 | Food Systems Framing in RAISE-FS

The food systems framing in the RAISE-FS program is best understood through its vision for transformation, which is built on principles of resilience, inclusiveness, and sustainability. Exhibit 3 illustrates how this vision is operationalized through five interdependent targeted program outcomes (colored boxes), which link to their respective intermediate outcomes (inside each color box) and to broader intended impacts (shown in the right column).

Exhibit 3. RAISE-FS Outcomes and Impact as Part of the Food System (WCDI, 2021).

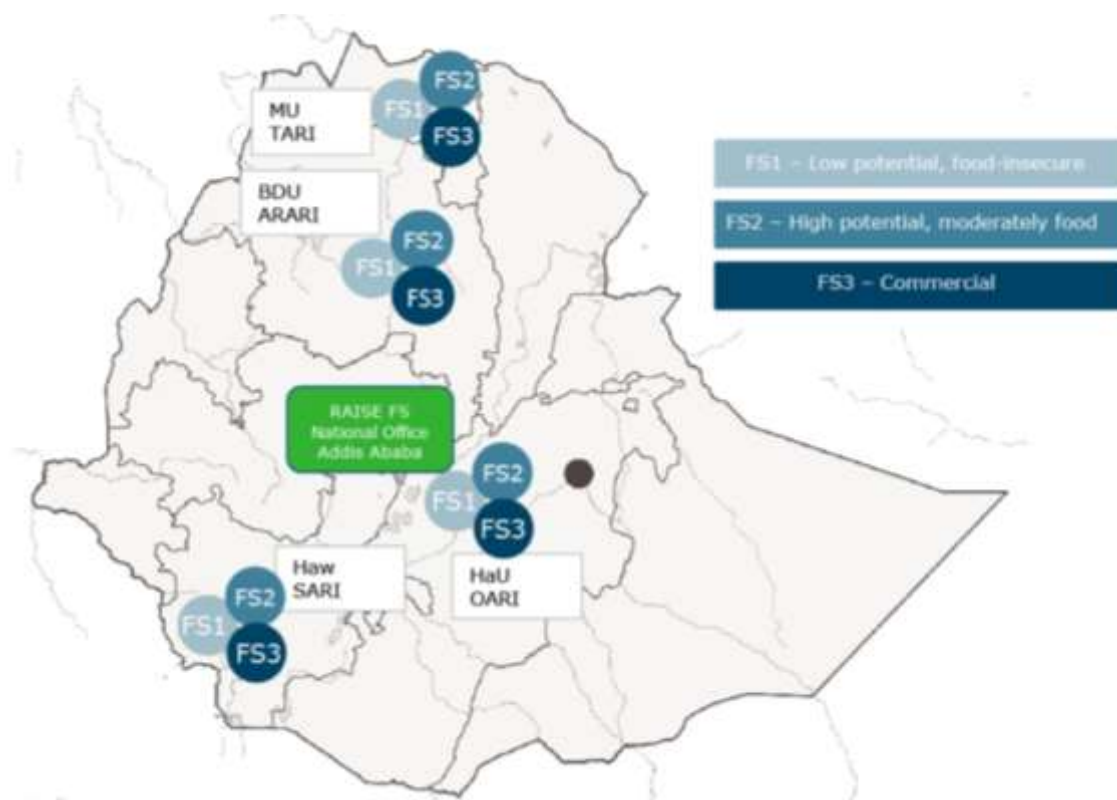


Exploring the Value of Critical Systems Thinking in Food Systems Interventions: the Case of RAISE-FS

Notably, the proposal suggests both Outcome 1 (social and economic empowerment of women and youth) and Outcome 5 (enabling environment for systemic change) are considered as enablers, critical for achieving the other three outcomes: Outcome 2 (efficient and environmentally sustainable production), Outcome 3 (sector performance and value chains), and Outcome 4 (availability of safe and nutritious foods) (WCDI, 2021). While most of the impacts listed in the right column of Exhibit 3 correspond to the primary and intermediate outcomes outlined on the left, one last impact at the bottom right corner stands out: *research capacity in food systems at universities and ARIs strengthened*. Unlike other impacts, this one is not tied to a specific measurement of success in terms of outcome achievement. The program proposal frames this as an additional impact—a spin-off of the implementation modality, reflecting RAISE-FS’s broader commitment to fostering long-term systemic change within the Research and Innovation (R&I) community related to food systems, which until now remains predominantly agriculture-focused.

The afore-mentioned targeted outcomes are further implemented within the administrative and geographic boundaries defined by the program, as shown in Exhibit 4. Ethiopia’s administrative structure consists of five levels: federal, region, zone, woreda (district), and kebele (ward). Exhibit 4 highlights the primary intervention areas at the woreda level in four regions — Amhara, Oromia, Tigray, and the South — with the intention of scaling up through regional and national policy support. Selected areas range from lowlands below 600 meters to highlands above 3,500 meters, providing diverse contexts for testing innovations tailored to different food system types (Snel et al., 2022). In each region, three woredas were initially chosen to represent different food system types: food-insecure (low potential), semi-commercial (high potential), and commercial systems, with predefined commodities assigned accordingly. As additional woredas have been included over time, the program now broadly targets more than a dozen woredas across these regions.

Exhibit 4. Geographical Coverage and Organizational Setup of RAISE-FS (WCDI, 2021).



Exploring the Value of Critical Systems Thinking in Food Systems Interventions: the Case of RAISE-FS

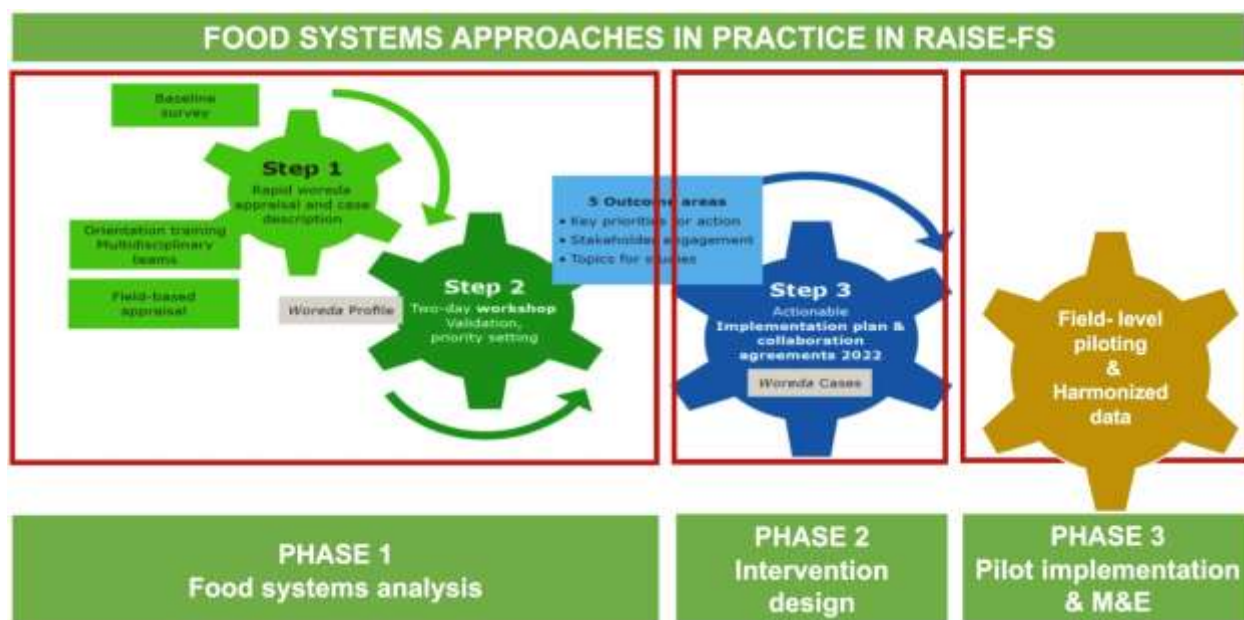
In terms of indicators of Critical Systems thinking (CST), strategies to address marginalization are evident in RAISE-FS' food systems framing. Informal interviews with program personnel reveal that Outcome 1 (social and economic empowerment of women and youth, hereafter simplified as *gender issues*) and Outcome 4 (availability of safe and nutritious foods, hereafter simplified as *nutrition issues*) were explicitly emphasized. This emphasis reflects the recognition that these issues have often been overlooked in the Ethiopian agricultural research system, which typically tends to prioritize production and value chain development. While no formal boundary critique using Ulrich's (1983) Critical Systems Heuristics (CSH) was applied, informal boundary reflection nonetheless occurred. Some reluctance to prioritize the empowerment of women and youth alongside other outcomes was reported during the program's early phase; however, by the time of data collection in 2024, high alignment with these priorities had been observed, albeit with nuance as detailed later in Section 4.3.

4.2 | Food Systems Approaches in RAISE-FS

RAISE-FS positions its food systems approach as aligned with mainstream food systems literature, specifically referring to a food systems analysis process guided by the framework developed by van Berkum et al. (2018), and informed by data from a baseline survey and the Rapid Food Systems Appraisal (RFSA). The program's governance structure was also designed to reflect this approach, operationalizing its implementation strategy around the five targeted program outcomes (WCDI, 2021). Together, the food systems analysis and governance structure illustrate how the program's boundary framing strongly shapes both activities and organizational setup.

However, varying interpretations of the program's food systems approach were observed. For example, Exhibit 5 depicts a broad, comprehensive conceptualization of this approach that emerged during co-creation of the survey with program personnel, although this understanding has not been validated across all program stakeholders.

Exhibit 5. Overall Food Systems Approach in RAISE-FS and its Three Phases.



All three phases are carried out primarily by the regional implementing partners, each forming a multidisciplinary team ideally covering the five program outcome areas. Phase 1: Food Systems Analysis lasts around six months. During this phase, each team receives orientation training and conducts a baseline

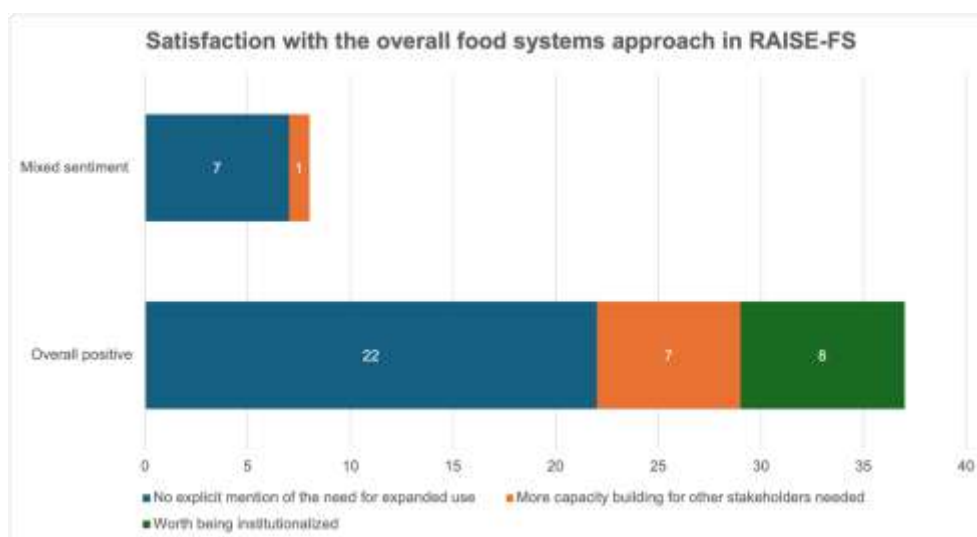
Exploring the Value of Critical Systems Thinking in Food Systems Interventions: the Case of RAISE-FS

survey and Rapid Food Systems Appraisal (RFSA) at the kebele level in selected woredas across the four regions. The aim is to understand the local food system, assess whether the pre-assigned food system type requires adjustment, and identify challenges and opportunities related to the five outcome areas. Findings are validated with local communities—particularly farmers and extension staff—through a two-day woreda-level workshop, resulting in synthesized *woreda profiles*. Phase 2: Intervention Design lasts under six months and focuses on developing tailored innovation activities to address the challenges identified in Phase 1, using leverage points validated by local stakeholders. While mostly commodity-based, these innovations also include social elements (e.g., empowering women through home gardens). Team composition may change during this stage, with additional expertise brought in as needed. Finally, Phase 3: Pilot Implementation and M&E is the longest and still ongoing phase. It involves field implementation through pilot activities and demonstrations, with potential for scaling. Multidisciplinary teams maintain close engagement with extension workers (woreda officials and development agents at the kebele level) and farming communities, requiring continuous communication and coordination. This is supported by trainings to raise awareness particularly on gender and nutrition issues. Harmonized data collection underpins ongoing monitoring and evaluation (M&E).

Within RAISE-FS, the understanding of a *food systems approach* hence appears to have evolved beyond a narrow focus on analysis tools (used in Phase 1) toward a more systemic perspective on intervention design and implementation. This broader perspective incorporates three additional program designs to support the overall process: the establishment of multidisciplinary teams (across all three phases), trainings related to program outcomes (mainly in Phases 1 and 3), and field-level innovation activities (conducted in Phase 3).

Survey responses (n = 45) indicate strong overall alignment of regional implementing partners with the program’s overall food systems approach, as shown in Exhibit 6. The vast majority, 37 respondents, expressed positive sentiment, with 8 explicitly advocating for institutionalization; in contrast, 8 reported mixed sentiments. Notably, calls for more capacity building appeared across both groups. Positive perceptions emphasized the approach’s value in identifying problems and solutions, using bottom-up, field-level evidence to design and implement innovation activities. Supported further by targeted trainings, this approach was seen as enhancing stakeholder engagement, improving data use for local decision-making, and addressing broader social issues such as gender and nutrition. Challenges cited included low stakeholder awareness and the complexity and resource intensity during data generation.

Exhibit 6. Satisfaction with the Overall Food Systems Approach in RAISE-FS.



Exploring the Value of Critical Systems Thinking in Food Systems Interventions: the Case of RAISE-FS

In terms of features related to Critical Systems Thinking (CST), no specific program designs were established to actively support ongoing reflection on food systems framing. Instead, across all four program designs described earlier (multidisciplinary teams, food systems analysis tools, trainings, and innovations), there was a strong intent to emphasize gender and nutrition issues to ensure their uptake within the agricultural research system and to influence other actors. This emphasis is illustrated in Exhibit 7.

Exhibit 7. RAISE-FS Program Designs as Strategies to Adress Marginalization.

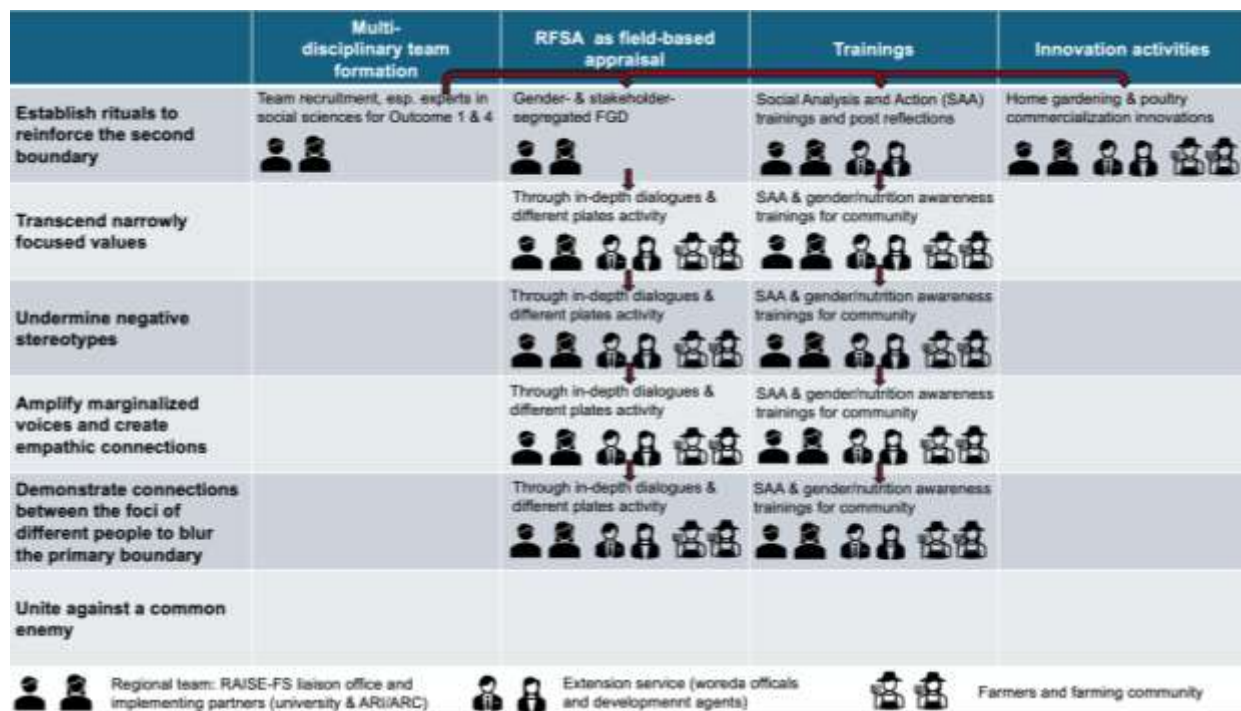


Exhibit 7 shows the alignment between the four key program designs in RAISE-FS (top row) and Midgley’s (2020) strategies for addressing marginalization (left column). The extent to which these strategies are experienced varies across stakeholder groups — from implementing partners (the primary focus of this study) and RAISE-FS liaison staff at the regional level to extension workers and farming communities in selected woredas and their subordinate kebeles. The red arrows highlight the main knowledge flows and interdependence among these designs, suggesting a general sequence while allowing for iteration.

All four program designs share a common strategy: *establishing rituals to reinforce the secondary boundary*. In this context, the secondary boundary refers to the deliberate inclusion of marginalized priorities—such as gender and nutrition issues—that are often overlooked in mainstream agricultural research focused on production and value chains. Rituals here mean structured, recurring practices that integrate these priorities. For example, multidisciplinary teams intentionally include social science expertise in gender and nutrition; the program’s food systems analysis tools like Rapid Food Systems Appraisal (RFSA) uses gender- and stakeholder-segregated focus group discussions (FGDs) to ensure marginalized voices are heard; interactive trainings like Social Analysis and Action (SAA) require ongoing follow-ups; and innovation activities such as home gardening and poultry commercialization empower women in generating income and making nutrition-related decisions. As depicted in Exhibit 7, beyond rituals, RFSA and trainings also strongly incorporate four additional strategies to address marginalization, embedded in tools like *In-depth Dialogues* and *Different Plates Activity* in RFSA, as well as in gender and nutrition awareness sessions that help participants connect social roles to agricultural and nutritional

Exploring the Value of Critical Systems Thinking in Food Systems Interventions: the Case of RAISE-FS

outcomes. Overall, these designs align with one of CST's core features posited in this study—strategies to address marginalization—by emphasizing social inclusion and often overlooked gender and nutrition issues. However, there is a lack of explicit mechanisms for the other CST core feature, boundary critique, which ideally involves ongoing, collective reflection on who defines system boundaries and how interventions might be fundamentally reframed.

4.3 | R&I Actors' Response and Contribution to Coordinated Action

While survey findings indicated overall alignment with RAISE-FS's food systems framing and approach, interviews (n = 9) from the South region revealed more nuanced patterns of alignment among regional R&I actors. These can be grouped into four broad types: disagreement (1), passive alignment (3), adaptive alignment (4), and critical alignment (1).

Disagreement. Only one actor expressed relatively clear disagreement, suggesting that food production should remain a central priority in food systems transformation. He argued that even less nutritious but high-yield crops might be important to meet immediate local food security needs. Although he attempted to voice these concerns, they were not taken up by the program.

Passive Alignment. Among the remaining eight respondents who generally aligned with the program, three demonstrated passive alignment. They described how tasks were carried out without reporting specific challenges, giving the impression that they implemented predefined activities without deeper reflection or internalization. For example, one respondent explained their actions by saying, “the program asks us to...”.

Adaptive Alignment. Four respondents demonstrated adaptive alignment. They actively engaged with the program's framing and took initiative to strengthen its impact on marginalized groups. For example, these actors described adopting new approaches to data collection (e.g., more gender-segregated data) and applying lessons from Social Analysis and Action (SAA) training not only in professional contexts but also in their personal lives, such as sharing household chores and paying more attention to nutrition intake.

It is noteworthy that all four actors held coordinator roles within their institutions, mainly serving as liaisons to RAISE-FS and facilitating multidisciplinary team collaboration. This seemed to encourage deeper interdisciplinary understanding and more proactive engagement. One respondent shared:

I started using black soldier fly. It involves biology and poultry science. I went to Google, read papers, summarized articles, and then gave it to the livestock expert involved in RAISE-FS, saying “We have this in Ethiopia and Kenya; it's better to try it this way.” They said, “You're going ahead of the expertise.” (Respondent 17).

Additionally, this group reported three notable instances of coordinated action during Phase 3 of RAISE-FS' overall food systems approach, when innovation activities designed based on the food systems analysis findings were put into practice. First, farmers began adopting orange-fleshed sweet potato, a more nutritious alternative to the commonly grown white-fleshed variety, reflecting a meaningful shift in production practices aligned with the program's nutrition goals. Second, the poultry commercialization initiative unexpectedly fostered stronger interdepartmental collaboration within the woreda office, helping to break down typical institutional silos and improve cross-sector coordination—an unintended but foreseeable spillover effect. Third, one respondent proactively shared gender-sensitive approaches and lessons learned with other universities, demonstrating a proactive diffusion of knowledge that extended the program's influence beyond its original scope—an unanticipated outcome.

Critical Alignment. Finally, one actor from the RAISE-FS liaison office demonstrated critical alignment, showing deep reflection not only on the overall program framing but also on very specific, often overlooked boundary issues. Despite a natural science background, he strongly advocates for integrating social science

Exploring the Value of Critical Systems Thinking in Food Systems Interventions: the Case of RAISE-FS

expertise and questioned the blind application of frameworks without local adaptation. He emphasized that data should not be generated for its own sake but grounded in clear research purpose.

My intention was to ask partners, “How do you feel? Have you practiced this one? What is the difference between this? Who told you that? How you did this one? Why? What is the difference between this and doing that? Do you feel that difference between? Sir, what is the challenge? ...And people, the biophysicists, are waiting for leaf weight or root weight and so on. They are waiting for that, but I’m asking why. (Respondent 2)

While he sees value in training, this respondent explicitly highlighted the importance of critical thinking and stressed that transforming research practices would require institutional-level commitment over several years, given the highly compartmentalized nature of Ethiopian research institutions.

Summary. The nine interviewed regional implementing partners and RAISE-FS liaison staff in the South region largely align with the program’s framing and actively engage with its targeted gender and nutrition issues, which are prone to further marginalization in the current agricultural research system. However, they do so with varying levels of reflection and agency. Only one respondent, who demonstrated critical alignment, stands out as embodying a capacity for boundary critique similar to CST. His approach—probing into very specific, seemingly minor boundary issues and posing reflective questions about inclusions, exclusions, and underlying assumptions—contrasts sharply with the program’s more structured focus on predefined priorities that risk being marginalized in agricultural research systems (e.g. gender and nutrition). This suggests that CST can also be embodied individually, even without formal program support, and highlights the potential for deeper systemic learning when actors critically engage with framings rather than simply operating within them.

5 | Discussion

Overall, the findings indicate strong alignment among regional implementing partners with the program’s overall food systems framing and approaches. Concrete cases of coordinated action collected during interviews, both within and beyond the program scope, make the program’s impact more tangible and illustrate how alignment has translated into practical outcomes.

A key insight is that strategies to address potentially overlooked program target outcomes, such as gender and nutrition, were actively and effectively implemented. These priorities were integrated through multidisciplinary teams, food systems analysis tools, targeted trainings, and inclusive innovation activities. This reflects one of CST’s core features: addressing marginalization. In contrast, the other core feature of CST, continuous and purposeful boundary critique ideally conducted through collective dialogue, was largely absent. While some boundary reflection or negotiation likely occurred during data collection and earlier program stages, interviews suggest that only one respondent clearly demonstrated critical reflection on system boundaries by actively questioning inclusions, exclusions, and underlying assumptions. This indicates that although strategies to address marginalization were strongly embedded, deeper critical engagement with overarching system framings was limited. Nevertheless, RAISE-FS’s learn-by-doing approach to capacity strengthening in Research for Food Systems Transformation (R4FST) appears to be effective in reinforcing its priorities and fostering coordinated action.

However, the strong alignment with the dominant program framing, combined with limited evidence of boundary critique, raises important questions. Are these R&I actors at regional level simply following predefined designs, or do they have the capacity and space to critically engage and adapt beyond those boundaries, especially if future program designers are less inclusive?

While the findings highlight RAISE-FS’s strengths in addressing marginalization, they also point to opportunities for future interventions to integrate continuous boundary critique more explicitly. CST was originally developed to help actors navigate complex, multi-stakeholder systems by reflecting on boundaries, thereby surfacing power dynamics and potential marginalization (Ulrich, 1983; Midgley, 2000). Early signals from Helfgott and Midgley (2020) also suggest that actively addressing competing frames

Exploring the Value of Critical Systems Thinking in Food Systems Interventions: the Case of RAISE-FS

through boundary critique can be a learning opportunity to gain new insights and promote mutual understanding. Therefore, incorporating boundary critique more intentionally in future food systems interventions may help actors engage more fully with systemic complexities and support more inclusive and adaptive transformations. This would require not only promoting CST more widely, for example, through the practical use of Ulrich's Critical Systems Heuristics (CSH) (Ulrich, 1983), but also developing broader frameworks for food systems interventions, such as the one proposed in this study.

The current food systems intervention framework was used as an exploratory, heuristic tool in this study. While it appeared to help illuminate interactions between framing, methodological choices, and coordination among actors, it was not tested as an intervention framework in practice. As such, its suitability for guiding actual program design and implementation remains to be further examined. Future empirical research could assess its practical utility in different contexts, refine its components based on field realities, and explore how explicitly integrating CST principles, such as continuous boundary critique, may enhance its effectiveness.

6 | Conclusion

This study explored how RAISE-FS's food systems framing shaped the actions of regional implementing partners and whether elements of Critical Systems Thinking (CST) could be observed in practice, even without explicit integration. By proposing a food systems intervention framework rooted in CST as a heuristic tool, this research examined how framing choices around food system boundaries and priorities have been reflected upon and acted on, and how they may influence coordination among diverse actors.

The findings show that RAISE-FS's progress toward its five program outcomes was not hindered by the absence of explicit collective boundary critique. Instead, the program's framing was reinforced through key program designs that together shaped its overall food systems approach. In particular, Outcome 1 (social empowerment of women and youth) and Outcome 4 (availability of safe and nutritious foods) were actively emphasized through tailored food systems analysis tools and targeted training, facilitating their integrated uptake within Ethiopia's agricultural research systems.

In raising awareness among Ethiopian research and innovation actors about gender and nutrition, RAISE-FS succeeded in building capacity through its learn-by-doing approach to Research for Food Systems Transformation (R4FST). However, it remains unclear to what extent actors critically reflect on the program's dominant framing of food system priorities or whether they are prepared to navigate disagreement and value conflicts. Food systems are complex and shaped by many competing perspectives and power dynamics. No intervention can address everything, so choices about what to include or exclude are inevitable. In this context, the practice of boundary critique, as the main principle of CST, is essential.

Building on these insights, this study proposes the concept of a *systemic food systems intervention*, drawing on Midgley's definition of systemic intervention (Midgley, 2000), to stimulate further debate and critical reflection.

Systemic food systems intervention: purposeful action by an agent to create change in food systems through reflection on boundaries.

This formulation is intended as a prompt to encourage researchers and practitioners to critically consider whether interventions labeled as *food systems* are truly *systemic*. It emphasizes that systems are not simply *hard* technical structures or *soft* social constructs, but dynamic configurations shaped by ongoing boundary choices. These choices are inherently political and value-laden, and should be *critically* examined through collective reflection to ensure that relevant stakeholders are included, including those indirectly affected or without a direct voice, such as nature and future generation. Future research could further explore, develop, and adapt the food systems intervention framework proposed in this study, as well as examine the value of explicitly integrating CST, especially boundary critique, within R&I systems in food systems intervention contexts. Such efforts could help strengthen capacities for critical reflection and support interventions that are more coordinated, inclusive, and resilient to future food systems challenges.

Exploring the Value of Critical Systems Thinking in Food Systems Interventions: the Case of RAISE-FS

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Exploring the Value of Critical Systems Thinking in Food Systems Interventions: the Case of RAISE-FS

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