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The Role of Research in Food-System Transformation

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Highlights

- Research is a fundamental catalyst for change in our food systems, playing a key role in diagnosing the problems, setting empirical targets and pathways, and developing and scaling solutions on the ground.
- Unlocking the transformative functions of research will require fundamental changes in the research agenda and the way knowledge is produced and disseminated.
- Research will need to be context-sensitive, inclusive, built on long-term strategic engagements, responsive and adaptive to emerging needs, and packaged in accessible formats.
- In some cases, participatory, action-oriented research will need to be combined with reductionist, technology-driven approaches to support the behaviour changes required for systems transformation.
- Additional efforts will be required to unlock and incentivise the transformative attributes of research, including relevant theories of change, strategic partnerships, nested scales approaches, and a creative leadership style.

3.1 Research as an Agent for Change

This book focuses on the actions needed to transform food systems (the 'what', Chapters 4–14), in addition to the researchers and research processes (the 'how', Chapters 15–18). Many would argue that researchers are not necessarily key actors when it comes to systems transformation. Research results can be slow to appear or hidden behind paywalls; researcher incentives are not aligned with societal needs – for example, they may focus on sourcing funding or on producing publications. Similarly, science can support the status quo rather than being disruptive (Kuhn, 1962). However, we would argue that research is a fundamental agent of change in

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our food systems. This is apparent in the intentions of research or the questions it addresses; its design and the methods it proposes; and how it is carried out, that is, the processes employed, such as nurturing partnerships, all of which can influence broader development processes and outcomes (Abson et al., 2016). A CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) funding partner once claimed that '. . . we need the discipline of thinking through how we think the world works and how you actually create change. Science has in many ways failed to create change so often – putting data in front of people does not create change.' It is not the act of science delivery that matters most; instead, its development, content, packaging, and the timeliness of its delivery to the reader, that helps determine whether science can fulfil its promise to move society in the right direction.

Most – if not all – actions intended to create an environment conducive for the transformation of our food systems (Chapter 2) are knowledge-intensive; there is a need for reliable, robust, readily available, and actionable evidence about *where*, *when*, and *how* actions will unlock the desired transformations. This presents several golden opportunities – and the responsibility – for science to act as a catalyst for change; to thoroughly diagnose the intertwined problems and drivers in the system; to set reliable, empirical transformation targets and pathways; to generate quick-win technological advances, and to play a key role in the development, testing, monitoring, evaluation, and scaling of on-the-ground solutions.

Chapter 3 is an introduction to the 'how' chapters. In the first section, we argue that research processes will need some fundamental changes to rise to the transformation challenge. In the following section, we demonstrate why we believe research can be a fundamental part of transformation, using CCAFS and other examples. In the third section, we distill key attributes of research to enable food-system transformation. The last section introduces each of the 'how' chapters.

3.2 Changing Research Approaches

We argue that unlocking the *transformative* functions of research will require fundamental changes in the research agenda and how knowledge is produced and disseminated, in order to narrow the gap between research and action. A prominent paradigmatic shift discussed in the agriculture research for development (AR4D) literature suggests moving away from reductionist, linear thinking models, which focus on studying food system elements in isolation, that is, production and consumption. Instead, systems thinking should be adopted, which allows understanding of interdependencies, feedback loops, and the dynamics of system elements, essentially taking a whole-system approach (den Boer, 2020). In terms of

the knowledge co-design and diffusion process, this means – among others – integrating different knowledge systems, such as multiple disciplines, indigenous and local knowledge; methods, such as soft/qualitative and hard/quantitative research approaches; and stakeholders, including researchers, policymakers, civil society, the private sector, and farmers. Ultimately, this integrative approach can enrich the portfolio of transformative solutions and ensure more just food systems.

There are multiple signs that AR4D has evolved to incorporate systems thinking. Examples of this are the participatory agricultural research approaches developed in the 1980s, which aimed to replace traditional top-down technology transfer methods inherited from the Green Revolution (Chambers, 1994; Farrington & Martin, 1988). Early designs of participatory approaches – most often implemented in the form of on-farm trials or rural appraisals, based on farm surveys, group discussions, farming systems research, participatory mapping approaches, etc. – have allowed for more appropriate tools to understand local contexts and empower farmers. Through participatory agricultural research, farmers' role has shifted significantly, from mere consumers of research to active partners in the design, implementation, and evaluation of the research questions and solutions. Such approaches diversified their actors over the years, evolving to include community-based organisations, policymakers, investors, etc. Similarly, they have widened the scope of research into knowledge co-production, social learning, and capacity building. Some notable examples in this sense include farmer field schools, mobile-based crowdsourcing for seed selection, and participatory future scenarios for regions, countries, or communities (Kristjanson et al., 2014).

Likewise, integration of agriculture and climate change considerations through approaches such as agroecology, climate-smart agriculture, or climate-smart food systems, is another way research has evolved to include systems thinking. Using *hard* and *soft* research methods – from complex impact models and policy simulations to rapid appraisals, multi-criteria analyses – these approaches have facilitated a deeper understanding of linkages and feedback loops between climate, social, economic, policy, and institutional drivers of change. They have also drawn attention to a richer diversity of agriculture-related outcomes that go beyond yield and economic gains; these include aspects of resilience and adaptive capacity, human development, justice, equity, health, environmental sustainability, and mitigation, among others. Such approaches have been incorporated to varying extents into major global policy mechanisms, such as the Sustainable Development Goals and the Paris Agreement, as well as national policy agendas including climate adaptation plans, nationally determined contributions, etc., all of which reinforce the importance of integrated, systems thinking into policy and action.

To enable food-system transformation, the above approaches to research are critical but still insufficient. Rather than the exception, systems thinking needs to

become standard in research design, implementation, and dissemination, to enable outcomes at scale. Research agendas and funding streams need to intentionally address the food system rather than parts of it, to unlock solutions that measure up to the magnitude of tomorrow's challenges (see the following chapters for a detailed overview of a transformative research agenda). Moreover, the intent and design of research need to reflect a more nuanced configuration, with a more diverse pallet of attributes and principles that can unlock the outcomes and impacts essential for system transformation.

3.3 Research Can Make a Difference

CCAFS (see Chapter 1) was a large programme, which, from the outset, was outcome-focused. Some of its achievements are summarised in Figure 3.1, and targets were exceeded for many indicators. Through engaging in policy processes and having an aggressive communication style that focused on actions, technologies, and institutional innovations, in collaboration with other players, CCAFS was able to inform US$3.5 billion of climate-action investments, and earn over 70 policy wins in ten years. On the ground, nearly 20 million farmers have benefited from innovations, based on research and the novel application of existing technology.

CCAFS was not the usual research project or programme, running long term 2009–21, and being well-funded to the figure of US$350 million. The programme could take risks; though several individual projects failed, its portfolio still exceeded expectations. While CCAFS was deeply rooted in its target countries, it had plenty of independence, with flexible team locations – the programme was largely virtual from 2009 – that allowed the hiring of top researchers. Opportunistic and adaptable, able to shift resources to new initiatives, CCAFS could practise outcome-based budgeting to mould the portfolio for optimal results.

CCAFS largely took a systems, participatory, action-orientated approach. We argue that this approach is vital to achieve transformation. However, reductionist high-tech approaches are also needed. This is best demonstrated in Chapter 9 where the exponential rise in plant-based meat innovations originated from considerable investments in more reductionist technological research. While CCAFS was undertaking participatory work with farmers, it was drawing on the technologies of more reductionist research from other research efforts, for example, development, release, and uptake of drought-adapted maize varieties, heat-adapted livestock breeds, alternate wetting and drying of rice paddies, etc. The systems-based approach also leveraged a legacy of policy and institutional innovations with proven potential to transform farmers' livelihoods, derived from the work of political scientists, social scientists, and gender experts, among others.

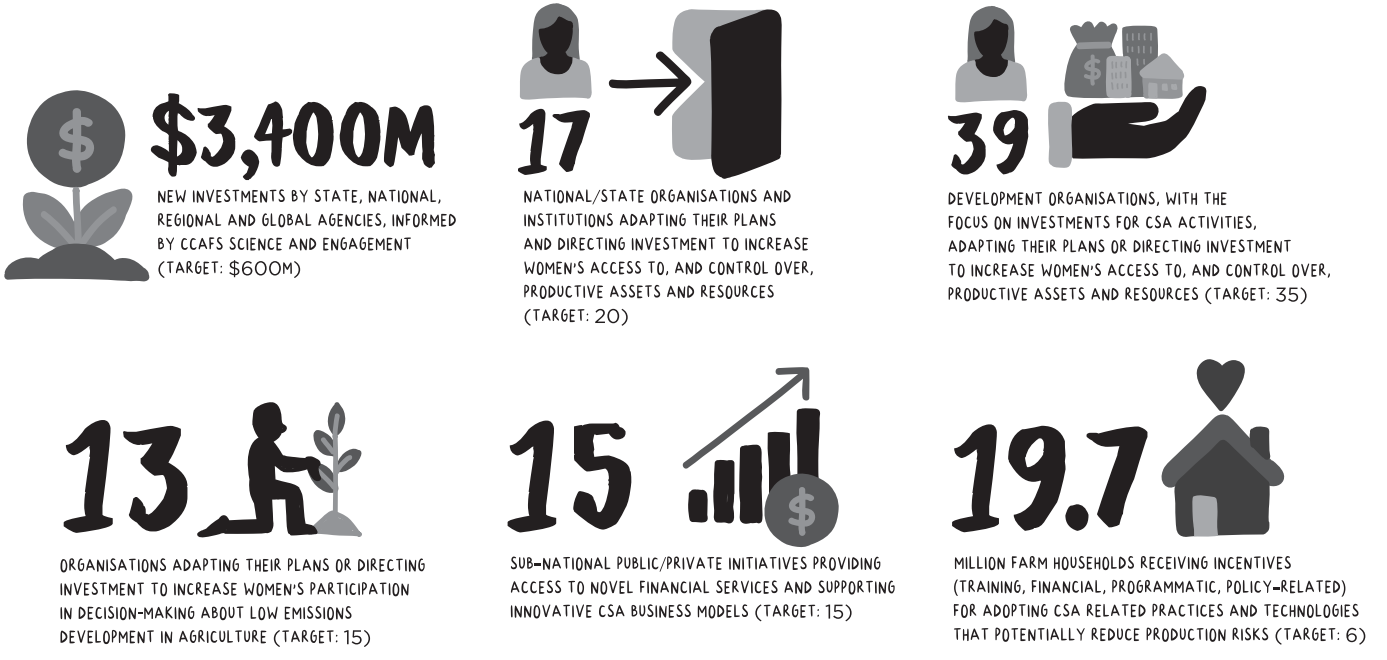

Figure 3.1 CCAFS's achievements during part of its second phase, 2017–20 (Nowak et al., 2021)

3.4 Distilling Key Attributes of Research to Enable Food-System Transformation

Transforming knowledge to action, to outcomes, and impacts has been the modus operandi at CCAFS, first established as a research theme and then mainstreamed in projects through a programmatic theory of change (Chapter 15). Over the years, research has proved its role as an active change catalyst, including through outcome-oriented and user-focused participatory engagement processes; transdisciplinary and social learning approaches to understand complex systems; innovative methods to communicate relevant, useful research; investments in capacity strengthening to empower users; and an army of partners across decision-making levels to bring results to scale (Dinesh et al., 2018; Kristijanson et al., 2014, 2009). Such factors have also been discussed widely in the literature, particularly regarding the science–policy interface (Ball & Exley, 2010; Bednarek et al., 2018; Dunn & Laing, 2017; Oliver & Cairney, 2019; Smith et al., 2021; Whitty & Wisby, 2016).

More than a decade of user-focused, actionable AR4D at CCAFS has distilled a set of desired properties and attributes of the research process that help unlock its role in food-system transformation and reinforce systems thinking. Learnings and reflections from selected literature, paired with our own successes and failures, have provided a more neutral overview of what AR4D should look like in the context of food-system transformation (Table 3.1). The list of features is not exhaustive, but illustrates the diversity of important aspects in delivering transformative actions, outcomes, and impacts while providing practical examples of their use in research design, implementation, and dissemination.

3.5 Unlocking Research's Potential

As much as they are crucial for the transformation process, the traits in Table 3.1 are not native to the way we do research. Additional efforts will be required to unlock and incentivise these attributes and put research itself on the transformational pathways. These enabling elements are discussed in detail in Chapters 15–18. Useful, time- and resource-smart theories of change, that provide critical guidance on the engagements, partnerships, and research required for the transformation are discussed in Chapter 15. Chapter 16 discusses strategic, multi-actor, multi-level partnerships – sometimes informal – that build trust, address intertwined challenges, and foster outcomes and impacts. Chapter 17 discusses nested scales approaches to facilitate learning, maximise benefits, and achieve impact, while Chapter 18 explores the outward-facing, inclusive, creative, independent, and accountable leadership style used to unlock research's potential

Table 3.1. *Select attributes of research to enable food-system transformation*

Criteria	Description	Select references
Context-sensitive	Research questions and methodological choices should be based on an in-depth analysis of the context and/or use past diagnostic studies to understand all relevant context-specific factors. These include environmental, social, cultural, governance, policy, and economic factors, etc.	Hebinck et al. (2018) Oliver & Cairney (2019)
Inclusive	A diversity of actors, voices, values, and perspectives should be engaged during research design; knowledge co-creation and dissemination are key to reducing/eliminating power imbalances. Moreover, internal inclusiveness should be fostered through a diverse research team composition, e.g., senior vs junior researchers and multi-disciplinary teams, to enhance the credibility and legitimacy of the process and results.	Kristjanson et al. (2009) Dinesh et al. (2021) Ball & Exley (2010) Pearce et al. (2014) Smith et al. (2021)
Built on long-term, strategic engagements	Repeated, long-term engagement with immediate users should occur to forge trust and gain a deeper understanding of the issues at stake. Being and becoming solidly part of influential networks before, during, and after the research project is key to developing significant research outcomes.	Oliver & Cairney (2019) Ball & Exley (2010)
Relevant, responsive, and adaptive	Research should make active efforts to respond to policymaker and relevant stakeholder needs, by engaging during agenda-setting and responding to intermittent opening of windows of opportunity, i.e., the moments when scientific evidence can have the most impact.	Dunn & Laing (2017) Smith et al. (2021)
Available, accessible, and effectively communicated	Research results should be open-access and communicated to the relevant stakeholders in appropriate formats using knowledge transfer mechanisms, e.g., brokers, boundary spanners, gatekeepers, etc. Research should also use additional mainstream strategies to inform public opinion and other stakeholders, e.g., traditional media and/or social media.	Cvitanovic et al. (2014) Cvitanovic et al. (2015) Bednarek et al. (2018) Smith et al. (2021) Oliver & Cairney (2019)

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for food-system transformation. Despite the required reforms in its content, intent, and design, research alone will still not trigger the transformations needed in our food systems. Other agents of change – including individuals, policy, institutions, and partners (Chapter 1) – will be equally important in driving transformation.

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