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Wageningen Economic Research | Supporting paper 3

Transforming Food Systems

Pathways towards inclusive food system transformation

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Preface

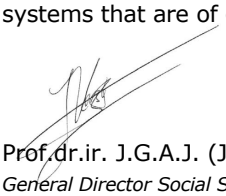
The UN Food Systems Summit UNFSS and the many dialogues and extensive research preceding it create the momentum to re-define and re-think our food systems. Acknowledging that many trade-offs in current food systems are structural and leading to unacceptable outcomes, and that many global goals as reflected in the SDGs will not be met, implies our food systems need profound transformations. This can only be achieved when we understand how our systems evolve, interact and can be steered towards more desirable outcomes.
During 2019 and 2020 Wageningen University & Research (WUR) coordinated and implemented background research that informed IFAD's 2021 Rural Development Report (RDR). In addition to 23 background papers, a modelling paper and a regional consultation report, four supporting papers were prepared. These have been published as standalone papers: 'Transforming Food Systems supporting paper 1, 2, 3 and 4.' The papers were written from the perspective of an overall report and refer to concepts, examples and recommendations in the final RDR report.

- Key messages: these are the key findings, possibilities and priorities Wageningen University & Research sees coming out of all the background research, reports and papers.
- Supporting paper 1 provides more extensive explanation of the need for food systems transformation, in particular due to structural undesirable trade-offs between nutrition, livelihoods and environment. It places possible responses in the context of the need to focus on rural transformation broadly, beyond a focus on primary agricultural production.
- Supporting paper 2 provides greater detail on the governance necessary to drive urgent and accountable implementation of food system agendas.
- Supporting paper 3 provides more detail on possible pathways to food systems transformation in different contexts, which consider integrated, desired outcomes of health, inclusion and sustainability.
- Supporting paper 4 provides an overview of how four categories of food systems perform against key system indicators.

The research and papers are the result of a fruitful collaboration between Wageningen and IFAD. The main objective was to generate and share insights, peer-reviewed information and robust evidence on impacts of different strategies to support improvements in the performance of agri-food systems in the dimensions of safe and healthy nutrition, inclusiveness, sustainability/resilience and efficiency. All background work thus contributes to insight into the impact of different types of innovations and investments on multiple food system dimensions and for specific target groups (children, women, young people).

A special thanks goes to Romina Cavatassi and Leslie Lipper from IFAD for their intellectual contribution to and strict but indispensable and professional process guidance during the analytical and writing steps.

We are very grateful to IFAD for the grant that made the background research and these publications possible. We hope this will contribute substantially to healthy food systems that are of greater benefit to all.



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1 Introduction

THow do we get there from here: from food systems as they now are to food systems as we think they need to be? First, we start with a will to act. We know that we need a global transformation of food systems to strengthen rural livelihoods, support healthier diets and respect environmental limits. To create a constituency of fully engaged stakeholders, we have to create opportunities for coherence among these three goals – and to raise awareness of the collective resilience that is attainable when food systems pursue all three.

Only with this will to act, and this awareness, can we convene stakeholders within an integrated policy framework for desirable food system transformation. Such a policy framework needs to be organised around the effort to map clear, concrete pathways towards better linkages among food system components – food production, consumption and value chains – that can deliver desired outcomes on all three dimensions.

These pathways for policy will need to be oriented around change processes needed for desirable food system transformation – and they must account for the various external drivers that will affect the change environment (Box 1.1). The process for identifying pathways must align fundamental interests, while also enabling negotiation from points of difference to mutually relevant policies. Because of the difficulty of pursuing nutrition and health, livelihood opportunities and sustainability together, stakeholders will need mutual assurances; ministries will need to cooperate; and strategies will need to focus on overcoming the most costly trade-offs among different food system outcomes.

As the Rural Development Report (RDR) and supporting papers argue, the policies that can promote desirable food system transformation include varied instruments. Some are public investments (infrastructure). Others are policy-driven market incentives (changes in prices and taxes). Still others are private sector innovations (new

Box 1.1 The change processes needed for desirable food system transformation—and the external drivers that affect their pace and potential for success

Food system transformation can only happen as part of several simultaneous change processes:

- *Structural transformation through rural transformation* (Supporting paper 1) – the creation of productive, rewarding employment – both on and off the farm – by increasing the value added of agricultural produce.
- *Changes in the nutrient composition of diets through changes* in products and in consumer behaviour (RDR Chapters 2 and 6) – the shift from emphasising food access and availability (the quantity of food produced) to the affordability and desirability of healthier diets (the quality of food consumed).
- *Changes in production through sustainable intensification* (RDR Chapters 3 and 8) – a shift in farming systems' priorities for resource use, moving away from cheap calories and towards more nutrient-dense products.
- *Changes in markets through integration and trade reform* (RDR Chapters 4 and 5) – policies for food value chain midstream partners that enable competitive market opportunities while ensuring true pricing (to reflect decent farm incomes, living wages and environmental externalities).
- *Changes in production and consumption through a commitment to circularity and planetary boundaries* (RDR Chapters 7 and 8) – the re-use and recycling of food, feed and waste throughout the food system, to shift away from linear and towards circular and bio-based processes.
- *Changes in governance structures and processes* (Supporting paper 2) – the shift from single topic, blueprint interventions to cross-sectoral policy experiments, with broader stakeholder engagement in both the negotiation and the implementation of governance measures.

Various economic, social, technological and institutional drivers will affect these change processes and may reinforce each other – but may also lead to growing tensions. The key external drivers are:

- *Demographic drivers* – rapid growth in urbanisation, limited labour absorption by agriculture, increasing rural-urban and international migration, youth unemployment and aging farmers.
- *Technological drivers* – many innovations in the areas of biotechnology, communication technologies (ICT, sensors, block chain), agrologistics (cold chain, solar energy), blue growth (algae, seaweed) and new product development (biodegradation).
- *Climate drivers* – efforts for reducing greenhouse gas (GHG) emissions and strategies for managing growing uncertainties on temperature and rainfall.
- *Economic drivers* – economic crises resulting in erratic growth patterns, alongside generally growing business concentration and income inequalities (all compounded now by Covid-19).
- *Financial drivers* – impact investing, more responsible financing, carbon credits, climate funds, payment for environmental services.
- *Social drivers* – strong middle-class growth, with consumption shifts and increased recognition of the importance of gender empowerment and social media for inclusive development.
- *Institutional drivers* – engagement with the informal sector; re-evaluation of public roles with greater community participation; promotion of public-private partnerships; at the same time, trends towards autocratic governance.

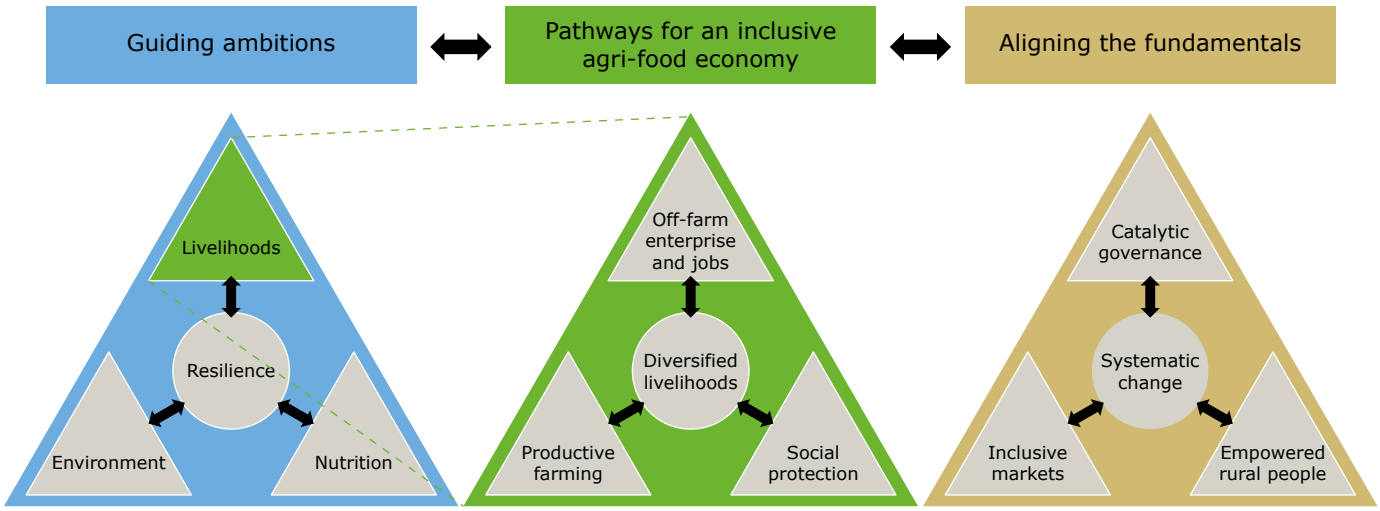

Figure 1.1 Key dimensions of food systems transformation for equitable rural livelihoods

Source: Authors' analysis.

technologies and products). As important as all these are, however, social and public sector innovations (adjusted approaches to governance) deserve equal attention. Governance structures—from the local to the national and international—affect the choice of goals and instruments: for this reason, an equitable involvement of different stakeholders is essential.

In laying out pathways, no general rule exists for combining and sequencing policy instruments that are identified as potentially transformative. Space for experimentation, and for making mistakes, will be vital. Only through innovation and practice will the interactions and feedback effects of particular policy choices become fully evident. The lessons will then guide renewed efforts to overcome food system trade-offs.
The three main sections in this paper outline three steps toward the transformative policy process that is required, illustrated in the three stages of Figure 1.1.

Thus, Section 1.1 sets forth *guiding ambitions* for desirable food system transformation. Section 1.2 looks at ways of identifying transformation pathways through the RDR's main lens – that of *livelihoods and inclusion* – with a focus on trade-offs that affect the other two outcome dimensions (nutrition and the environment). Finally, Section 1.3 synthesises our thinking on how policies in three policy areas – *incentives, investments and innovations* – and their supportive governance regimes that can conduce to the three main elements of transformed food systems: *inclusive markets, empowered rural people and catalytic governance*.

1.1 Guiding ambitions: shaping inclusive food system transformations

Current food systems are failing to provide healthy and sustainable diets and decent livelihoods for almost half of the world's population. Levels of malnutrition and hunger are particularly high in rural areas and among the rural and peri-urban poor. Food systems leave a huge environmental footprint, with 37% of global greenhouse gas emissions, and with large global contributions to water pollution and biodiversity loss. Over a third of the world's population are in households that derive livelihoods from various food system segments, yet a large majority of rural farmers and workers cannot afford a decent diet. Moreover, malnutrition and obesity go side by side – a strong argument for the view that what we need from food systems is not more of the same, but rethinking and transformation.

The challenges of poverty, malnutrition and environmental harm are not independent but intimately related and must be addressed in concert. Rural underinvestment and underemployment lead to widespread poverty and malnutrition that only can be overcome with simultaneous changes in land use and cropping patterns, combined with vocational training to support work outside agriculture. Social safety nets can temporarily support rural livelihoods, but they also need to accompany the shift towards employment (including self-employment) in midstream agri-food segments and other economic sectors. Investments in food processing to reduce waste and losses reinforce circular food systems but also contribute to food quality upgrading. Promoting climate-smart agriculture is initiated by training farmers but, ultimately, will prosper only when consumers are willing to pay for sustainability properties and governments apply incentives such as reducing VAT on healthy foods. Potential trade-offs among food system components need

to be acknowledged, and trade-offs can be overcome only with innovative approaches. To overcome trade-offs among livelihoods, nutrition and environment (Figure 1.2), it is critically important to identify and stimulate system innovations that build resilience to adjustments and can change stakeholder dynamics and interactions.

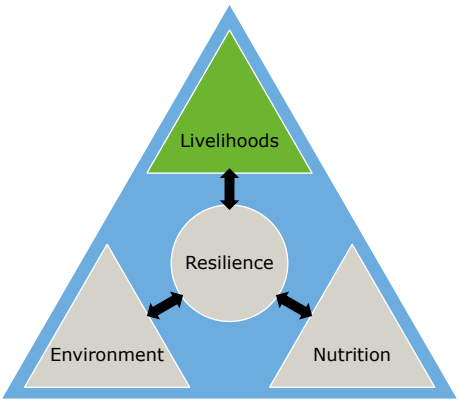

Figure 1.2 Guiding ambitions for the establishment of transformed, resilient food systems. *Source: Authors' analysis.*

Land use for food production generally has environmental effects that can be adequately addressed only if traders, consumers and other stakeholders – including investors – appreciate and reward investments in more sustainable cultivation practices. While food processing is usually associated with overweight rates, it can also be oriented towards improving food quality when combined with dietary guidelines and consumer awareness campaigns. Midstream investments in cold chains and contract farming can easily lead to collusion but may become more inclusive when novel blockchain technologies are used.

The transformation of food systems requires new initiatives that actively steer interactions among the production, processing, distribution and consumption of nutrient-dense commodities while considering social and environmental externalities. Taking a systems approach means doing things differently and moving beyond the narrow optimisation of single element interventions. It implies instead focussing on actions that promote synergies among improving livelihoods, eradicating hunger and malnutrition and moving towards an environmentally sustainable and circular food system. These actions require active engagement by public and private sector stakeholders and civil actors to form strategic alliances that contribute to these different goals.

Major shifts are needed to adjust each key food system component and thus enable a fundamental reorientation of the system toward different outcomes. The most important adjustments involve:

- *Common goals for food security, rural livelihoods, public health, and the environment* – these must be combined into an integrated development strategy that paves the way for ambitious national and global food policy transformation agendas (in line with recent WCS FST guidelines).
- *Joint engagement on nutrition, environmental and climate challenges* – only combined efforts to tackle these challenges can lead to food system transformation that provides real-time dividends for rural livelihoods, gender empowerment and youth employment.
- *Supportive national and international research and information systems* – needed to provide insight into strategic alternatives, for policy makers to reduce trade-offs and to create synergies.
- *Broad stakeholder involvement and multi-stakeholder cooperation among governments, civil society and the private sector* – necessary to create a political constituency for speeding up the shift towards more nutritious diets (on the demand side) and more sustainable and circular food production (on the supply side).

Given the uncertainties related to food system transformation, building resilience into food systems is vital to support adaptation to crises and shocks. Climate shocks, changes in political regimes and socio-economic disruptions call for immediate responses. In the longer term, resilience and adaptive capacity must be ensured at the food system level through strengthened interconnections among different food system dimensions. For example, resilient diets and affordable nutrition are critical inputs to improve labour productivity and protect health conditions that underpin inclusive rural livelihoods. Similarly, resilience to climate change is needed to safeguard agricultural yields, but also to restore dietary diversity and bio-diversity. And resilient livelihoods enable rural smallholders and workers to invest in nutritious diets and to adopt more climate-smart production systems.

Because resilience cannot be wholly systematised, the adaptability of stakeholders is central to food system transformation. Their will and ability to respond creatively to unforeseen events and shocks, and their capacity to re-design interactions as needed, are at the core of the transformation process.

1.2 Diversifying livelihoods while addressing trade-offs with other food system outcomes

Food systems provide livelihoods to some three billion people who are directly engaged in farming or who work in agro-processing, rural banking or retail, whether self-employed or as temporary or permanent workers. Food systems also provide food and nutrition to people, both in rural and in urban (including peri-urban) areas. This double role of food production, as a source of income

and a cost of living, implies that food system transformation must pay due attention to the different and overlapping roles and interests of farmers, traders and consumers. Optimising the potential of food systems to support equitable rural livelihoods requires a focus on these upstream and downstream linkages. But it also requires attending to the potential trade-offs with other food system outcomes.

1.2.1 Three key features of pathways to diversified livelihoods—and more inclusive food systems

Pathways towards an inclusive agri-food economy need to combine three components (figure 1.3):

- *Productive farming* – improving land use and resource efficiency in farming systems, tackling rural poverty and inequality with diversified livelihoods including on- and off-farm options. While small-scale agriculture will remain crucial for food security and rural livelihoods in the years ahead, adjustments to ensure viability are essential.
- *Midstream employment* – enhancing agricultural value added with better market integration and with strong rural-urban linkages, based on midstream alliances that can improve rural economies and livelihoods. Realising these food system linkages requires room for informal as well as formal entrepreneurship, and it entails broad partnerships with the private sector.
- *Social protection* – stimulating demand for healthy foods with social safety net programs and cash transfers to poor people (conditional or unconditional). Safety nets are especially effective for reaching women, wage labourers and migrants, to create purchasing power and support their food demand. Safety nets also effectively support recovery from undernutrition in conflict and post-conflict settings and after major shocks, such as the Covid-19 pandemic.

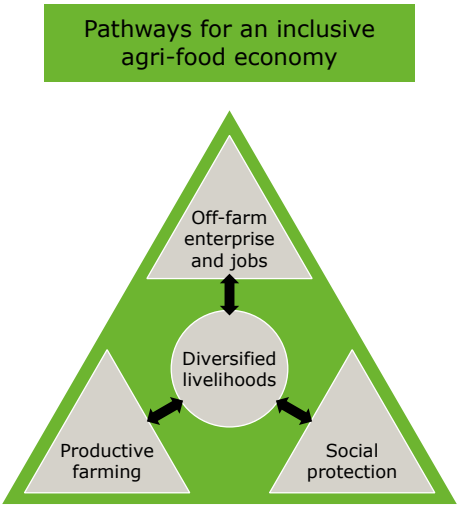

Figure 1.3 Major pathways for inclusive food system transformation. Source: Authors' analysis.

Food systems, with their key role in rural economies, are a strong influence on transitions in agrarian systems. Livelihood improvement opportunities in food systems thus depend largely on improving the productivity, nutrient content and resource use efficiency of agricultural production, on growth in domestic and foreign markets and on shifts in labour use from agriculture to off-farm and non-farm employment (including in the midstream of food value chains). These changes affect farm size structure, land use and cropping systems and the integration of input, output and labour markets.

A huge potential exists for shifting food systems towards more nutrient-dense foods, with higher value added and more labour-enhancing technologies, by connecting rural livelihoods with activities in the agri-food value chain and creating more rural-urban linkages. Realising this potential means focusing on combinations of activities that not only provide opportunities, but also mitigate risks by carefully diversifying ecosystems, production, employment, markets and diets. These diversified livelihoods may support the integration of more circular and regenerative systems: systems that do not rely exclusively on mineral fertilisers but that include organic inputs, and that re-use food waste and loss while reducing food-feed competition on scarce agricultural land.

1.2.2 Confronting potential trade-offs among desired outcomes of food system transformation

Food system transformation policies need to address likely trade-offs between outcomes for nutrition, inclusiveness, sustainability and growth. Our foresight analyses of alternative future food systems transformation strategies, with a horizon to 2050, provide useful insight into opportunities and constraints for reaching nutrition, inclusiveness and sustainability goals simultaneously and in an economically efficient and socially just manner. Different extreme scenarios show possible outcomes that take account of interactions—both positive and negative—between changes in production and in consumption through adjustments in trade flows, input and factor use, wages, profits and prices.

1.2.2.1 Paying the true cost of food

The RDR highlights the significant costs to society from externalities in food markets that do not account for nutrition related poor health, natural resource decline and climate change. These externality costs are partly born by todays generations and will be heavily born by future generations. The costs are also heavily borne by the state in terms of expenditures that need to be made on public health and responding to environmental and climate impacts. The poorest people in society are those most affected by food prices, as consumers and producers. Consequently, an equitable transformation of food systems must ensure that internalising the true cost of

food must be done with policy mechanisms that defray the costs across society at large and do not inequitably increase food prices for poor consumers or decrease returns for poor producers. This will require substantial and integrated policy reform and careful policy implementation. The Magnet foresight modelling illustrates how different scenarios for food systems change can impact both positively and negatively on inclusion.

1.2.2.2 Staples versus nutrient dense food production
RDR Chapter 3 analyses the potential for small-scale producers to shift to more nutrient-dense foods for own production and marketing. The production and post-harvest requirements for nutrient dense foods such as fruits and vegetables, dairy are significantly more complex than that of staple food grains. Although these products are higher value, they also involve higher costs and risks. A critical set of small-scale producers may have a comparative advantage in certain types of fruit and vegetable production, particularly where labour use requirements are high capital requirements low. However, there are substantial barriers to small-scale producers in entering and benefitting from commercialised production, including access to land, water, technical information, adequate processing, storage, refrigeration and transport facilities.

The Magnet model simulation of imposing the Eat-Lancet flexitarian diet which has both environmental and nutrition benefits gives us some insights into the question of how the impacts of food prices increases may be distributed (RDR Chapter 2). Unsurprisingly, the simulation indicates a strong improvement in in the affordability of cereals and to a lesser extent the (imposed) healthy diet for the lowest paid workers. Compared to the business as usual (BaU) scenario, the flexitarian diet simulation keeps notably more of the lowest skilled labour in agriculture, hence a decline in the share of non-agricultural employment in the poorest regions. Higher food prices lead to a larger share of household expenditures on food, signalling concerns for the affordability of the healthy diet for the lower paid labour types not employed in industry and services. In this simulation, consumers are likely to bear more of the rise in food cost.

Moderating processed food consumption through a consumer tax decreases inclusiveness with mixed impacts on nutrition (RDR Chapter 7). Reducing processed food consumption through a consumption tax increases the costs of food but stimulates fruit and vegetable consumption. However, micro nutrient consumption may decrease as processed food are also an important channel for nutrients. Lack of adequate product targeting combined with use of taxes will contract the demand for primary production, lowering the wages of the poorest household such that affordability of calories as well as healthy food declines. Lack of targeting also reduces employment in processing and food services, thus slowing the move into higher value added parts of the food supply chain.

The Magnet simulation of the implications of a 50% yield gap reduction for cereals (as a source of calories for the poor) and fruit and vegetables (as an important source of micro-nutrients) gives further insights (RDR Chapter 3). The productivity increase leads to lower food prices for consumers and rising (nominal and real) agricultural wages, improving the affordability of healthier diets for net-buying agricultural households. Low-skilled rural workers and small-scale semi-subsistence farmers benefit more than medium-size and larger commercial farmers, because declining demands for land reduce land rental rates. While the simulation results indicate that very small-scale producers may face difficulties in generating surplus food for the market, it also highlights the considerable nutritional benefits that these very producers can achieve by closing yield gaps on nutrient dense foods.

1.2.2.3 Trade-offs in trade—local versus regional and international
In food market trade, potential trade-offs are related to concerns about food supply vulnerability and the need to maintain control over agri-food systems. As RDR Chapter 4 has noted, growing food import dependency has raised concerns in recent years due to the costs of paying for food imports—including debt servicing—as well as the risk of supply shortfalls in case of dependency on a single supplier. Import dependency also puts local producers under competitive pressure. Yet it also brings benefits, such as expanded access to low cost food supplies and, in some cases, reduced risks of food price instability.

Another concern is that trade openness can also increase access to unhealthy food and thus drive obesity and diseases and that the highly concentrated global agri-business sector could exercise excessive control of domestic food systems. However, there are clearly benefits to engaging in trade, including lower food prices and the potential for more stable food supply and prices due to the possibility of having a wider supply source. Most importantly, global food trade is expected to be a major component of climate change adaptation strategies, and key to reducing the number of hungry and impoverished people that climate change could impose.

What would happen if a 100% import tariff were imposed on top of existing tariffs for food products? The Magnet model simulation of food self-sufficiency seeks to give some insights on this question. The results indicate that trade protection increases pressures on domestic

production, likely causing a rise in food prices which makes cereal-based diets less affordable for the poorest people in the least developed economies. Countries with limited land resources suffer major land rental price increases. In countries better endowed with labour, the loss of export markets leads to a reduction in rural employment and a decline in agricultural wages – possibly bringing low-skilled non-agricultural workers back into agricultural jobs. The higher cereal prices and the general increase of the food price index lead to a substantial decline in nutritional status. In addition, pressure on domestic land and water resources increase, even while feed and fertiliser imports are allowed and can somewhat relieve land constraints. Fossil fuel emissions from transport become reduced, but overall GHG emissions slightly increase in the simulation.

1.2.2.4 Efficiency versus employment in the midstream
RDR Chapters 5 and 6 provide an analysis of the important role that small and medium enterprises (SMEs) play in the midstream sector of food systems in countries with emerging or transitioning economies – as a key source of employment relying on labour-intensive technologies, and often with higher participation rates among women than men. These SMEs mostly operate in the informal sector, outside government regulations on food product and labour standards. Labour productivity in these value chains is low compared with more modern and capital intensive chains. The question is whether it is possible to maintain high employment levels while also increasing productivity.

Where do trade-offs exist? The Magnet model simulation looking at a major expansion of midstream employment in food systems gives some indications (RDR Chapter 5). The scenario is built by the imposition of a subsidy on the lowest skilled labour category in food processing, transport, trade and warehousing, leading to a major expansion in both employment and wages in these sectors. The combination of higher wages for the poorest and high numbers of employment in better paying non-primary sectors translates into substantial improvements in the labour based GINI coefficient indicating improvements in income equality. Targeting non-agricultural employment for the lowest skilled labour type widens the gap with those remaining in agriculture substantially despite a wage increase for all. Nutritional indicators for the general population worsen however, due to higher food prices and declining wages for non-targeted workers pushed out of midstream employment. The environmental impacts are generally favourable due to less reliance on primary production although water use increases.

1.2.2.5 Implications of circularity for inclusion and poverty
RDR Chapter 8 provides an analyses of the potential for improving environmental performance of food systems by adopting circular systems, with a particular look at animal sourced foods. While small-scale and low income producers have some potential advantages in adopting these systems and have successfully done so, there are potential barriers and costs they may face. It details the importance of livestock in livelihoods of the rural poor especially women and the high degree of circularity already in these systems: these circular systems are inclusive. Trade-offs may arise in reducing food waste however, as increasing food supplies by reducing food waste could hurt producers and help consumers if it results in food price decreases.

The Magnet model simulation of halving post-harvest level losses in cereals and fruit & vegetables indicates an overall increase in productivity and improved nutrition status due to the higher total food supply (RDR Chapter 6). However, lower food prices and declining agricultural wages decrease the affordability of diets and reduce the prospects for inclusiveness, particularly in the least developed economies that have limited opportunities for employment outside agriculture. In more diversified economies, the outflow of labour from agriculture may reduce non-agricultural wages and therefore the labour share in GDP remains structurally low, delaying the process of rural transformation. Lower pressure on land and other resources supports livestock expansions through cheaper feed production. Exports of cereals can increase, but effect on sustainability remain modest (especially compared to the scenario closing yield gaps). Looking across these different analyses of trade-offs (Box 1.2), it becomes clear that they largely reflect the inherent tensions between labour rewards (received by farmers and workers) and food prices (paid by consumers) that determine the affordability of diets and influence relative prices between food groups (staples, vegetables, meat and fish). In addition, changes in land use and labour demand within and outside agriculture strongly influence food purchasing power. Inclusion is further stimulated by developments outside primary production – but it can be severely hindered by restrictive trade policies.

Box 1.2 Summarising Magnet model simulation results across food system components

Trough modelling different strategic policy options are compared to the Business-as-Usual (BAU) baseline scenario. Although the scenarios have not been designed to highlight how intervention design affects outcomes we can compare results by scenario to an overall assessment of synergies and trade-offs to get some insight in the importance of intervention design. To this end we group the scenarios by supply chain stage focus of the intervention: primary producer, supply chain and consumer. We then select a reference indicator best matching shared objectives for each group of scenarios to get common ground for a comparison across scenarios. Converting scenario indicator scores for all low and middle income economies (as reported in the each of the RDR chapters and supporting papers) to correlations to the reference indicator we can highlight how choices in intervention design result in different synergies and trade-offs (Figure 1.4).

Note: We selected three key indicators in each food system domain (see Table 1.4 in Supporting paper 1) closely linked to objectives of food system policies (N1, N,2, N4 for nutrition; I2, I4, I7 for inclusiveness, E1, E2, E5 for economy, S1, S4, S6 for sustainability). For each reference indicator we show the synergies and trade-offs across all MAGNET scenarios (RI column) followed by synergies and trade-offs by scenario.
Reducing land area by increasing productivity of primary producers. Three scenarios implement different types of productivity increases at the primary production stage: reduction of yield gaps and food loss and improvement in feed productivity. They share a common impact of reducing the agricultural land area. This creates synergies nutrition and most sustainability objectives, but may result in trade-offs with inclusiveness and economic growth objectives. Reducing the yield gap avoids inclusiveness trade-offs by stimulating use of (hired) labour and lowering food prices. For growth all primary productivity interventions delay outflows out of agriculture despite stimulating demand for non-food commodities, while improving the comparative trade advantage relative to high income countries. Cheaper feed, either direct or through spill overs of crop productivity increases, increase GHG emissions from livestock.

Income distribution and import dependency with supply chain interventions. Two distinct interventions in the supply chain are simulated: promoting midstream employment and reducing food import dependency. Pulling substantial amounts of workers out of primary production into midstream employment increases primary production costs. While higher wages for agricultural labourers allow an improvement in healthy diet affordability alongside an improved GINI, the wage with those in non-agricultural jobs widens. As food prices increase and only part of the workers experience increased wages a trade-off with nutrition objectives appears. A contraction in primary production when shifting to midstream sectors generates synergies with sustainability objectives. On the other hand, increasing food self-sufficiency by raising import tariffs mainly leads to trade-offs with nutrition, due to less affordability of healthy diets. The import barriers for primary and processed foods stimulate domestic food production but generate trade-offs with sustainability as more land is needed to replace imports from more efficient economies.
Fruit and vegetable consumption in consumer focussed scenarios. Two scenarios alter the food system by changing household consumption decisions: imposing the flexitarian diet and halving the consumption of processed food. Overall increased fruit and vegetable consumption is associated with synergies in nutrition and inclusiveness, but trade-offs on economy and sustainability. The diet scenario improves agricultural wages and affordability of healthy diets while reducing GHG emissions. While very appealing it may overestimate gains as it relies on a strong but costless preference shift. In contrast the processed food scenario relies on taxes, using the observed responsiveness of consumers to price incentives. Increasing the costs of food leads to a contraction in primary production and lower wages of agricultural workers (creating trade-offs with inclusiveness), while stimulating non-agricultural sectors whose products are not taxed. The contraction of primary production generates environmental synergies by reducing land and water use and lowering agricultural GHG emissions.

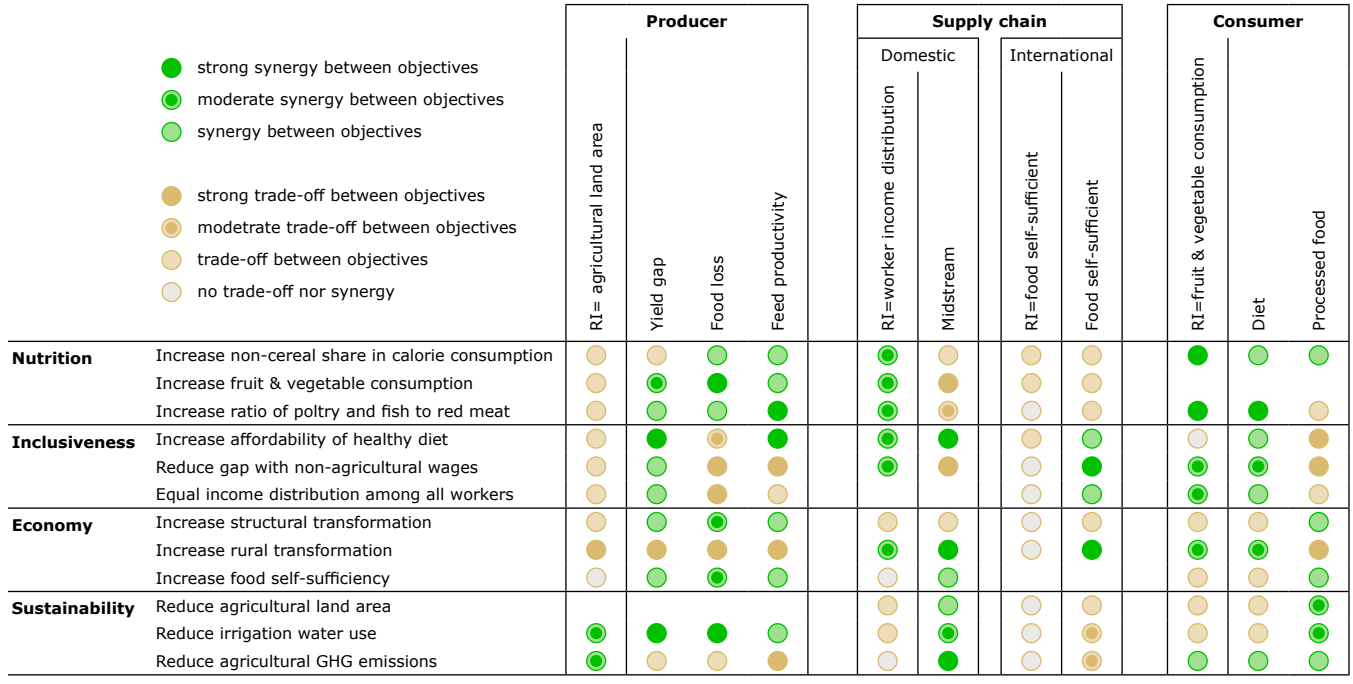

Figure 1.4 Synergies and trade-offs: Effects of different types of policies on food system outcomes. *Source: Kuiper and van den Bos Verma (2021).*

2 Next steps towards inclusive food systems—three transformation strategies for system change

Overcoming the current trade-offs in food system performance requires decisive efforts to change basic factors in the food environment. Our reason to advocate for transformation – as opposed to single-topic interventions – lies in the need to simultaneously improve nutrition, inclusiveness and sustainability outcomes. The nature and gravity of the challenges linking agriculture and food value chains to diets, health and ecosystems can no longer be ignored: the evidence is irrefutable (Webb et al., 2020; Fanzo et al., 2021; see supporting paper 2).

Inclusive food system transformation can begin by aligning policy discussions in three directions: towards catalytic governance, inclusive markets and empowered rural people (Figure 1.5).

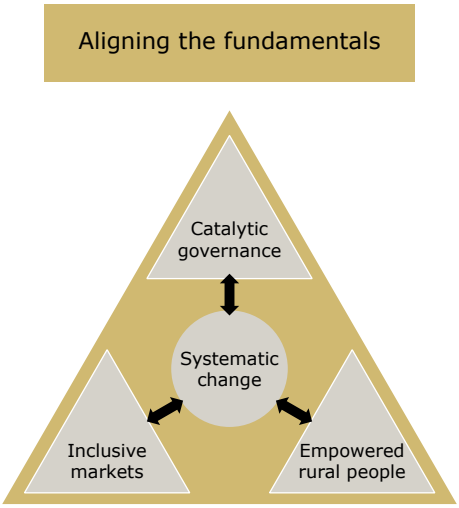

Figure 1.5 Governance principles for inclusive food system transformation. *Source: Authors' analysis.*

The transformation of food systems, however, refers not only to improvement on any outcome or to changes within any particular food system component (production, midstream, consumption; see Figure 1.3), but to reforms in the food environment that shape interactions and feedback among components – thus influencing multiple outcomes. Transformation must be guided by catalytic governance reforms, technical innovations, economic incentives and social practices that support strategic food system interfaces.

1.3.1 Catalytic governance

The food system interfaces that most require reshaping through catalytic governance are those between:

- Agri-food and non-food sectors.
- Rural and urban populations.
- Formal and informal markets.
- Local and regional/global trade networks.
- Linear and circular resource use.
- Innovation and learning/adaptation processes.
- Bargaining and power shifts.

Catalytic food system governance implies creating a new context for decision-making about natural resource use, food markets and rural livelihoods – in particular, through varying relationships among food system niches, landscapes and regimes. (Niches are alternatives to the present system that are still under development but could prove transformative.) The transformation of current practices can take place only if the wider governance structure puts it under pressure to change.

Catalytic governance regimes enhance trust and legitimacy based on voice and empowerment, and they are capable of acting from an integrated food system perspective. To take into account all the various change processes and external drivers identified at the outset of this paper (see Box 1.1), common policy agendas must ensure broad engagement and the sharing of perspectives on future food system outcomes. Systemic transformation will call for inclusive public investments and responsible private entrepreneurship to support an equitable, sustainable transformation process.

To overcome governance failures and catalyse change, measures across the public and private sectors need to coalesce around a shared vision rooted in societal understanding and political will to act. Dialogue and policy innovation will need to overcome vested interests and power relations that lock in existing institutional arrangements, policy settings and incentive mechanisms. The initiative of national governments is critical—but forms of decentralised governance are also needed to enable local action, while global market constraints on national policy making must be addressed.

1.3.2 Inclusive markets

Inclusive food markets are markets that support nutrition, that reduce environmental externalities and climate emissions and that redress the perverse outcomes of existing subsidies and investment programmes. To benefit rural people, food markets need to be accessible on fair terms and be incentivised to deliver on shared prosperity, healthy diets and environmental sustainability—a vision that presumes fundamental, structural change in the incentives now driving food markets and trade.

Inclusive markets thus pose a challenge to the entire international community: one that cuts across global, national and local food markets. The rural agri-food

economy must be supported with good infrastructure and services, with an enabling business environment and with responsible business and investment practices by larger private sector firms.

1.3.3 Empowered rural people

Rural people will be empowered when they are enabled to become game-changers—to engage in creative, effective, disruptive food system innovations that establish new synergies among public, private and civic stakeholders. To ensure that vulnerable and marginalised rural people are not left behind, focused public investments and programmes will be needed to create stepping stones from economic exclusion to economic inclusion. Countries with diversifying and transformed economies will need to invest more heavily in rural development, while countries with agricultural economies are likely to need further overseas development assistance (ODA).

The least advanced countries have GDP that currently depends heavily on agriculture with low value added per worker. Advancing equitable rural livelihoods through diversification is critical to food system transformation in countries with low agricultural productivity.

1.3.4 Translating catalytic governance into transformative change through (market) incentives, (technological and social) innovation, and (business) investment

Context-specific approaches will be needed to translate catalytic governance principles into concrete activities and actions. Divergent food system dynamics in countries with different levels of structural transformation and rural transformation will have significant implications for policy choices. Across and within these country categories are also substantial differences in the nature of food systems – differences related to types and levels of malnutrition, to consumption levels of processed, ultra-processed and packaged foods, to the balance between informal, transitional and modern markets, to food quality and safety standards and to the degree of economic concentration in food chains. All of these factors influence opportunities for rural livelihood diversification through food systems, and each plays a role in determining the feasibility and effectiveness of particular intervention measures.

We distinguish three types of food system transformation strategy:

- *Incentives* – setting both monetary and motivational incentives that influence the behaviour of producers, trade and consumers and create opportunities for effective rural-urban linkages, support engagement into public-private partnerships and balance opposing interests through market and institutions (grades and standards).
- *Innovation* – undertaking critical knowledge and learning efforts that increase food system efficiency (improve resource use), upgrade food product quality, integrate food supply chain activities and support connectivity (digital technologies) between food systems actors.
- Investment – improving physical and communicative infrastructure and related agricultural knowledge and innovation systems (AKIS) by combining public investments and (blended) finance.

Each of these transformation strategies requires **institutional change** for establishing broad-based governance to engage society and stakeholders into dialogue over food systems that help create the societal understanding, political commitment and negotiated action for change and foster scaling through collective competences and conducive spaces for policy experiments (Supporting paper 2). It is clear that there are no blueprints for food system governance reforms. All food systems are ruled by complexity, and outcomes cannot be guaranteed. Nonetheless, investing in cross-cutting cooperation, civil society engagement, balancing power in agenda-setting and decision making, collaborative structures and innovation are all necessary and worthwhile efforts to nudge and push food systems to deliver on more desired outcomes.

The policy alternatives for transforming various aspects of food systems can be summed up here in a portfolio of actions to initiate inclusive food system transformation (Table 1.1).

Table 1.1 Food system transformation strategies, by strategy type and government principle

	Incentives	Innovation	Investment
Catalytic Governance	Creating consumer demand for fair and sustainable food Generating societal understanding of the consequences of business as usual Nudging societal change	Food system dialogues Use of innovative technologies to generate better data for evidence-based decision making	Data for evidence-based decision making Public awareness raising and education programmes Multi-stakeholder dialogue processes
Inclusive markets	Market incentives for nutritious food consumption and production (taxes, laws and communication) Internalising environmental and climate costs into markets (taxes, laws and communication) Reducing international trade inequalities Grades & standards (SPS & HACCP) responsible business practices (due diligence)	Use of digital for transparency Use of digital to lower costs for small-scale producers and entrepreneurs Agricultural sustainable intensification Food quality upgrading Midstream & logistics innovation (cold storage, E commerce); biobased & circular systems	Rural infrastructure Rural services Responsible private sector partnerships Environment and climate programmes Trade infrastructure Payments for environmental services
Empowered rural people	Rural community organisation with voice and political influence Women seen and promoted as food system entrepreneurs Improved rural advisory services for production and enterprise	innovative financial services Digital for advisory services Market linked social protection innovation	Programmes that support small-scale farmers and entrepreneurs to access markets Microfinance Tailored education and skills building Productive social protection schemes

Source: Authors' analysis, based on RDR and supporting papers.

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