Stockholm University

Pulses and power

Linking actors and actions to shift towards healthy, sustainable diets in Sweden

Mary Scheuermann

Doctoral Thesis in Sustainability Science at Stockholm University, Sweden 2026

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Abstract

Many scientists, policymakers, and other societal actors acknowledge the need to change food systems to improve human and planetary health, now and into the future. Increasing the supply and human consumption of grain legumes is an important strategy to orient diets towards health and sustainability. Enabling this shift requires an understanding of which actions are required, and who can do what. This thesis addresses questions, challenges, and actionable steps for future research and practice using the grain legume value chain. The grain legume value chain is embedded in the agricultural, knowledge and innovation system (AKIS), which conceptually organizes interconnected areas including innovation, agriculture, education and rural development. Sweden offers a rich contextual focus due to its capacity for grain legume cultivation and potential to increase consumption, typical of high-income countries in Northern Europe. This thesis is based on four articles in which I use qualitative and quantitative methods to investigate actors and actions at two food system scales – the grain legume value chain in Sweden, and a global multistakeholder initiative at the science-policy-society interface. In **Paper I**, I employ the leverage points framework to assess the potential of system-level actions in peer-reviewed and grey literature to increase grain legume consumption. I find that fewer actions address deeper leverage points with the potential to shift norms, values, and beliefs, and more actions focus on changes to production rather than consumption or a value chain approach. To link actions to actors, in **Paper II** I explore a novel methodology to determine what types of influence a set of actors in the grain legume value chain and AKIS have over these actions. Through semi-structured interviews and social network analysis, three types of influence are identified – self-perceived, attributed, and structural. Findings indicate that actors largely attribute influence to value chain or AKIS roles other than their own, and that few actors have all types of influence for any group of actions. **Paper III** further deepens the focus on actor agency, exploring how a set of actors in the grain legume value chain and AKIS perceive change happening and what types of power they have using social network analysis and semi-structured interviews. Findings suggest individual actors and actor groups may use types of power in different ways to facilitate or hinder changes to dietary patterns. Together, **Papers II and III** show that identifying actor influence and power beyond common approaches targeting size or market share can reveal opportunities and constraints to system change relevant for regional or sectoral efforts. **Paper IV** broadens the scope beyond grain legumes and Sweden, focusing on the outcomes of a multistakeholder initiative focused on healthy, sustainable, and just food systems in conjunction with the launch of the 2025 EAT-*Lancet* Commission. The analysis centers on the linkages between actor groups and actions from a cross-sectoral workshop, with particular attention to the role for national institutions, as well as principles of legitimacy and representational justice. Together, this thesis contributes methodological tools towards the larger goal of linking actors to responsibility for change as part of wider food system transformation processes.

Keywords: *Food system, consumption, diet, legume, influence, actor, transformation, transition, leverage point.*

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Cover image: Peas and lupin growing together on Ronny Andersson's farm in Harlösa, Sweden
Photo by Mary Scheuermann

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For my mother,
and all of the women
who boil the beans

Abstract

Many scientists, policymakers, and other societal actors acknowledge the need to change food systems to improve human and planetary health, now and into the future. Increasing the supply and human consumption of grain legumes is an important strategy to orient diets towards health and sustainability. Enabling this shift requires an understanding of which actions are required, and who can do what. This thesis addresses questions, challenges, and actionable steps for future research and practice using the grain legume value chain. The grain legume value chain is embedded in the agricultural knowledge and innovation system (AKIS), which conceptually organizes interconnected areas including innovation, agriculture, education, and rural development. Sweden offers a rich contextual focus due to its capacity for grain legume cultivation and potential to increase consumption, typical of high-income countries in Northern Europe.

This thesis is based on four articles in which I use qualitative and quantitative methods to investigate actors and actions at two food system scales – the grain legume value chain in Sweden, and a global multistakeholder initiative at the science-policy-society interface. In **Paper I**, I employ the leverage points framework to assess the potential of system-level actions in peer-reviewed and grey literature to increase grain legume consumption. I find that fewer actions address deeper leverage points with the potential to shift norms, values, and beliefs, and more actions focus on changes to production rather than consumption or a value chain approach. To link actions to actors, in **Paper II** I explore a novel methodology to determine what types of influence a set of actors in the grain legume value chain and AKIS have over these actions. Through semi-structured interviews and social network analysis, three types of influence are identified – self-perceived, attributed, and structural. Findings indicate that actors largely attribute influence to value chain or AKIS roles other than their own, and that few actors have all types of influence for any group of actions. **Paper III** further deepens the focus on actor agency, exploring how a set of actors in the grain legume value chain and AKIS perceive change happening and what types of power they have using social network analysis and semi-structured interviews. Findings suggest individual actors and actor groups may use types of power in different ways to facilitate or hinder changes to dietary patterns. Together, **Papers II and III** show that identifying actor influence and power beyond common approaches targeting size or market

share can reveal opportunities and constraints to system change relevant for regional or sectoral efforts. **Paper IV** broadens the scope beyond grain legumes and Sweden, focusing on the outcomes of a multistakeholder initiative focused on healthy, sustainable, and just food systems in conjunction with the launch of the 2025 EAT-*Lancet* Commission. The analysis centers on the linkages between actor groups and actions from a cross-sectoral workshop, with particular attention to the role for national institutions, as well as principles of legitimacy and representational justice. Together, this thesis contributes methodological tools towards the larger goal of linking actors to responsibility for change as part of wider food system transformation processes.

Keywords: food system, consumption, dietary shift, legume, actor, influence, transformation, transition, leverage point

Sammanfattning

Många forskare, beslutsfattare och andra samhällsaktörer är överens om behovet av att förändra livsmedelssystemen för att förbättra människors och planetens hälsa, såväl nu som i framtiden. Att öka utbudet och konsumtionen av baljväxter är en viktig strategi för att anpassa kosten till förbättrad hälsa och hållbarhet. För att möjliggöra denna omställning krävs en förståelse för vilka åtgärder som behövs och vilka aktörer som kan göra vad. I den här avhandlingen behandlas frågor, utmaningar och praktiska åtgärder för framtida forskning och praktik med utgångspunkt i värdekedjan för baljväxter. Värdekedjan för baljväxter är inbäddad i ett jordbruks-, kunskaps-, och innovationssystem (AKIS), som konceptuellt sammankopplar områden såsom innovation, jordbruk, utbildning och landsbygdsutveckling. Sverige erbjuder ett rikt kontextuellt fokus tack vare sin kapacitet för odling av baljväxter och potential att öka konsumtionen av dessa, vilket är typiskt för höginkomstländer i Nordeuropa.

Denna avhandling bygger på fyra artiklar där jag använder kvalitativa och kvantitativa metoder för att undersöka aktörer och åtgärder på två nivåer inom livsmedelssystemet – värdekedjan för baljväxter i Sverige och ett globalt initiativ med flera intressenter i gränslandet mellan vetenskap, politik och samhälle. I **artikel I** använder jag ramverket för hävstångspunkter för att utvärdera potentialen av åtgärder på systemnivå i vetenskapligt granskad och grå litteratur när det gäller att öka konsumtionen av baljväxter. Resultaten visar att färre åtgärder riktar sig mot djupare hävstångspunkter med potential att förändra normer, värderingar och övertygelser, och att fler åtgärder fokuserar på förändringar i produktionen snarare än i konsumtionen eller utifrån ett värdekedjeperspektiv. För att koppla åtgärder till aktörer utforskar jag i **artikel II** en ny metodik för att fastställa vilka typer av inflytande en grupp aktörer i värdekedjan för baljväxter och AKIS har över dessa åtgärder. Genom semistrukturerade intervjuer och analys av sociala nätverk identifieras tre typer av inflytande – självupplevt, tillskrivet, och strukturellt. Resultaten visar att aktörerna i stor utsträckning tillskriver inflytande till andra roller i värdekedjan eller AKIS än sina egna, och att få aktörer har alla typer av inflytande för någon grupp av åtgärderna. **Artikel III** fördjupar ytterligare fokuset på aktörers handlingskraft och undersöker hur en grupp aktörer i värdekedjan för baljväxter och AKIS uppfattar förändringar och vilken typ av makt de har, med

hjälp av analys av sociala nätverk och semistrukturerade intervjuer. Resultaten tyder på att enskilda aktörer och aktörsgrupper kan använda olika former av makt på olika sätt för att underlätta eller hindra förändringar i kostvanor. Tillsammans visar **artikel II och III** att en kartläggning av aktörers inflytande och makt, utöver vanliga metoder som fokuserar på storlek eller marknadsandelar, kan avslöja möjligheter och hinder för systemförändringar som är relevanta för regionala eller sektoriella insatser. **Artikel IV** breddar perspektivet bortom baljväxter och Sverige, och fokuserar på resultaten av ett initiativ med flera intressenter som inriktar sig på hälsosamma, hållbara och rättvisa livsmedelssystem i samband med lanseringen av 2025 EAT-*Lancet* Commission. Analysen fokuserar på kopplingarna mellan aktörsgrupper och åtgärder från en sektorsövergripande workshop, med särskilt fokus på de nationella institutionernas roll samt principerna om legitimitet och representativ rättvisa. Sammantaget bidrar denna avhandling med metodologiska verktyg användbara för att koppla aktörer till ansvar för förändring i den övergripande processen av omvandling av livsmedelssystemet.

Nyckelord: livsmedelssystem, konsumtion, kostförändring, baljväxt, påverkan, aktör, omställning

List of papers

Paper I
Scheuermann, M., Wood, A., Gordon, L.J., Röös, E., Schultz, L., 2024. Leverage points for increased grain legume consumption: a Swedish case study. *Renewable Agriculture and Food Systems 39*, 1–14. https://doi.org/10.1017/S1742170524000267.

Paper II
Scheuermann, M., Hileman, J., Gordon, L.J. Schultz, L., 2025. Who can change what? Self-perceived, attributed and structural influence among actors in the Swedish grain legume system. *Environmental Research: Food Systems 2* (045004). https://doi.org/10.1088/2976-601X/ae07e4.

Paper III
Scheuermann, M., Hileman, J., Gordon, L.J., Sonesson, U., Schultz, L., 2026. Actor power to change dietary patterns: a case study of grain legume actors in Sweden. Manuscript.

Paper IV
Scheuermann, M., Hileman, J., Bunge, A.C., Conti, C., Glavan, S., Gu, X., Hupp, L., Laila, A., Massarenti, M., Oliveira, T.D., Rønning, E., Sundiang, M., te Wierik, S., Bajaj, S., DeClerck, F., Erriest, I., Gibson, M., Harding, A., Jonell, M., Norberg, A., Gordon L.J., 2026. Multistakeholder initiatives for transformative change towards healthy, sustainable, and just food systems: lessons from a global dialogue process. In review, *Food Policy*.

Contributions to papers in thesis

For **Paper I**, I conceptualized the project and study design with co-author AW; collected the data; performed the analysis with the support of my co-authors; wrote the initial draft; reviewed and edited the paper.

For **Paper II**, I conceptualized the project; designed the methods in consultation with LS and JH; collected the data; performed the qualitative analysis; wrote the initial draft with the support of JH; reviewed and edited the paper. JH led the quantitative analysis.

For **Paper III**, I conceptualized the project; designed the methods and data sources in consultation with JH; collected the data; performed the qualitative analysis; wrote the initial draft; reviewed and edited the paper. JH led the quantitative analysis.

For **Paper IV**, I conceptualized the project with the support of my supervisors; designed the workshop methods with AH, MM, SG, IE, ER and FDC; collected the data with co-authors; wrote the initial draft with support from JH and other co-authors; reviewed and edited the paper.

Additional peer-reviewed publications

Conti, C., Hall, A., Kok, K., Olsson, P., Moore, M.-L., Kremen, C., Laila, A., Gordon, L. J., Barnhill, A., Te Wierik, S., Norberg, A., Carducci, B., Bajaj, S., Gibson, M., Diniz Oliveira, T., Bunge, A. C., Williams, T. G., Mazac, R., **Scheuermann, M.**, & Fanzo, J. 2025. A quest for questions: The JUSTRA as a matrix for navigating just food system transformations in an era of uncertainty. *One Earth, 8*(2),101178.https://doi.org/10.1016/j.oneear.2025.101178.

Sánchez-García, P.A., Jónás, K., Pellowe, K.E., Ekström, H., **Scheuermann, M.**, Loft, L., 2025. Toward an intersectional equity approach in social–ecological transformations. *Global Sustainability 8*, 1–14. https://doi.org/10.1017/sus.2025.2.

Wassénius, E., Bunge, A.C., **Scheuermann, M.**, Resare Sahlin, K., Pranindita, A., Ohlsson, M., Blandon, A., Singh, C., Malmcrona Friberg, K., Villarrubia-Gómez, P., 2023. Creative destruction in academia: a time to reimagine practices in alignment with sustainability values. *Sustainability Science 18*, 2769–2775. https://doi.org/10.1007/s11625-023-01357-6.

Additional relevant materials

Lead author of response to Swedish Food Agency guidelines for school meals (2025) and dietary guidelines (2024) on behalf of individual Stockholm Resilience Centre researchers.

Lead author of the science brief "*Achieving a healthy food system*" for the Executive Programme in Resilience Thinking, Module 2, Brief 6 (2022, 2023). Stockholm Resilience Centre and Pontus Schultz stiftelse för ett mänskligare näringsliv.

Glossary

Action Day: gathering of Communities for Action to work across food system sectors in advance of the Stockholm Food Forum on 4 October 2025

Actor: an organization or individual

Actor group: collection of organizations by a common characteristic, such as place in the value chain or sector of the food system

Actor role: refers to how an organization operates in a specific circumstance

AKIS: agricultural knowledge and innovation system, a network of actors at the national level connected to production and related activities

CAP: Common Agricultural Policy, a key European Union farming regulation

Communities for Action: groups of food system actors developing actions to support healthy, sustainable, and just food systems aligned with the EAT-*Lancet* Commission

EU: the European Union

Grain legumes: dried beans, peas, and lentils; also called pulses

Legumes: includes grain legumes, soybeans, and groundnuts used as food for humans, as well as other crops grown for feed and/or nitrogen-fixation such as alfalfa

MLP: the Multi-Level Perspective, a framework for understanding social transition processes that is often used and modified in sustainability science

Multistakeholder initiative: collective effort by many actor groups to address a societal challenge

Pulses: see grain legumes

Science-policy-society interface: the process of interaction between researchers, policymakers, and other social actors engaged in interdisciplinary, solutions-focused efforts for social change

Stockholm Food Forum: event to promote and work towards healthy, sustainable, and just food systems and launch the 2025 EAT-*Lancet* Commission

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Prologue

Bees and insects buzzed around the purple, white, and yellow flowers sprinkled randomly in the tall, bushy plants. The sun shone brightly and the slight breeze was welcome after a few hours in a warm barn engaging with farmers, small-scale processors, and other network members about their work to increase local pulse production and consumption in Skåne, Sweden. The 2022 summer meeting for the network *Lokala Baljväxter* (Local Legumes) was underway on Ronny Andersson's farm in Harlösa (left), about 30 kilometers east of Lund. I was thrilled to finally be in a literal field learning from the people and the insects. Ronny had always grown some pulses as feed for his sheep, and, like most farmers in Sweden, he also produced wheat. He was a keen observer of changes in soil quality over time, which motivated him to experiment with new practices in consultation with extension experts and researchers at the Swedish Agricultural University. Ronny started using different crop rotations and intercropping, planting multiple crops in the same field at the same time. The lupin and peas that stood in front of me would require an extra step after harvesting in order to separate, but planting them together helped reduce weeds and support plant structure. Plus, the pollinators were thrilled. Listening to Ronny and his insects instantly brought my new research to life.

After the meeting, another farmer in the network, Håkan Rasmusson, offered to drive me back to Lund as his peri-urban farm was just a short drive from the train station. He described the creative business model he had developed for Värpinge Gård, a membership-based 9-hole golf course with grazing sheep, a farm stand, and direct-to-consumer sales through the local REKO-ring. We took a detour past his fields of emmer and einkorn wheat, and he patiently explained why the extra work to harvest and process less "productive" varieties were better for bread quality and preserving landraces. A large banner hanging near his farm stand summed up how he connected ideas about production and consumption, urging people to "shop for the landscape that you want to see."

Both of these farmers added "extra" work for themselves to support soil health, preserve landraces, and feed pollinators. Pulses are powerful as plants and food. On the train ride home, I found myself thinking differently about what we need to value and incentivize to unlock this power. Let's dig in.

Introduction

The Swedish food system provides abundant calories and choices to most of its more than 10 million inhabitants, but this abundance comes at a cost. Current patterns of food consumption in Sweden contribute to preventable disease and deaths (Afshin et al., 2019; Livsmedelsverket, 2025; Skrindo Knudsen et al., 2026). Recent research estimates over 10,000 premature deaths in Sweden in 2023 were due to dietary risk factors, primarily leading to cardiovascular disease, diabetes, and cancer (Skrindo Knudsen et al., 2026, Supplementary Table S3). Producing the food consumed in Sweden also strains Earth systems through excessive nutrient application, deforestation and biodiversity loss, and greenhouse gas emissions, both in Sweden and around the world (Moberg et al., 2020). These current patterns of food production and consumption are misaligned with public health and environmental goals, leading to calls for transformative change in the food system (Wood et al., 2019).

Sweden shares many dietary patterns of other high-income countries – high consumption of sugar, salt, and animal-sourced foods, particularly red meat; insufficient fiber intake; and low consumption of vegetables, seeds, nuts, and legumes compared to dietary recommendations (Amcoff et al., 2012; Livsmedelsverket, 2025; Rockström et al., 2025; Wood et al., 2019). While there are some differences between demographic groups, most Swedes eat more protein than necessary from a nutrition standpoint (FAO, 2020). Because of the increased public health risks associated with overconsumption of red meat and because of the benefits of eating legumes, dietary guidance in Sweden and the Nordic countries emphasizes reducing the former and increasing the latter (Blomhoff et al., 2023; Livsmedelsverket, 2025). Legumes are rich in fiber, protein, and numerous micronutrients (Ferreira, Vasconcelos, et al., 2021). Recent research on Swedish diets shows that including more legumes (as plant-based meat alternatives, also called meat analogues, or as whole foods such as beans), while reducing animal-sourced foods, can meet nutrition requirements and reduce environmental pressures (Bunge et al., 2024).

The term legume can refer to different plants or foods depending on the context. When used in reference to food or diets, the term legumes usually refers to pulses (e.g., dry beans, peas, chickpeas, lupin, lentils; also called grain legumes) and soybeans (Livsmedelsverket, 2025; Rockström et al., 2025; Torheim & Fadnes, 2024). When used in reference to crops, the term legumes

usually refers to the family of nitrogen-fixing plants, which includes grain legumes, soybeans, and groundnuts, as well as plants used solely for animal feed (e.g., alfalfa) (Magrini et al., 2019; Watson et al., 2017). The term grain legumes refers only to pulses, which have a different nutritional profile than soybeans and groundnuts (Rockström et al., 2025; Torheim & Fadnes, 2024), and which are the principle object of investigation in this thesis.

Food systems encompass a range of activities (e.g., farming, transport, cooking, rulemaking) and actor groups (e.g., farmers, manufacturers, consumers, politicians), producing social, economic, and environmental impacts through dietary quantity, quality, diversity, and safety (HLPE, 2017). The dietary impacts of food systems influence food system drivers and can reinforce or disrupt food system behavior. Much of the research and interventions about dietary shifts has focused on influencing consumer behaviors through interventions such as nutrition labelling and product placement (Bucher et al., 2016; Henn et al., 2023; Ran et al., 2022; Rosenfeld et al., 2022). In the European context, numerous studies have focused on changes to behavior at the individual level that might increase pulse consumption (Duarte et al., 2020; Henn et al., 2021) and on the particular role of processed legume products in replacing meat consumption (Bunge et al., 2024; Henn et al., 2023; Röös et al., 2022; Spendrup & Hovmalm, 2022).

Yet, shifting diets by supporting different individual choices is intertwined with changes to the wider food system, which includes the value chain (European Commission, 2018; Ferreira, Pinto, et al., 2021) and the agricultural knowledge and innovation system (AKIS) (Spendrup & Fernqvist, 2019). European Union (EU) Common Agricultural Policy (CAP) regulations describe the AKIS as a network linking users and producers of knowledge about and related to agriculture at the national level (Regulation (EU) 2021/2115 of the European Parliament and of the Council, 2021). At the European scale, several projects have explored the roles of value chain actors in changing legume production for animal feed, and have also identified some factors relevant for increased human consumption (Hamann et al., 2019; Iannetta et al., 2021). Numerous studies evaluate changes to production practices that include using grain legumes, such as particular crop rotations or agroecological methods (Jensen et al., 2020; Reckling et al., 2020; Rodriguez et al., 2020). However, researchers have given less attention to the combination of changes needed across production and consumption together, and the food system as a whole, to increase the consumption of grain legumes in Sweden.

Changing diets and the wider food system raises questions about power and influence to make decisions and to take action (Avelino, 2017; Béné, 2022; Boonstra, 2016; Clapp et al., 2025). As individuals, we have a degree of agency over our food choices, and many people report wanting to eat more

healthily and sustainably than they can achieve for several reasons (e.g., convenience, taste, price) (Röös et al., 2022). However, individuals have limited ability to exercise agency when faced with constraints imposed by surrounding structures (Lister, 2021), which are created and reinforced by organizational and institutional actors with greater power and influence. Organizational actors in the food system have more control over what food is produced, manufactured, and sold; how it is priced and promoted; and how decisions are made about operations and policies that will have long-lasting impacts on food system behavior (Clapp et al., 2025). The studies in this thesis focus on organizational actors at two levels – actors and actor groups. The term *actors* refers to specific organizations and *actor groups* refers to a common grouping, such as a place in the value chain (e.g., processor, distributor), the AKIS (e.g., universities, national government), or sector in the food system (e.g., farmers and fishers; chefs, restaurants, and food service). *Actor roles* refers more directly to actor logic and orientation in specific circumstances, which can change depending on the situation (Wittmayer et al., 2017).

A collection of sustainability scholars recently called for research linking actors and actions for transformative change (Reyes-García et al., 2026), and scholars have called for studying power in social-ecological systems (Avelino et al., 2024; Boonstra, 2016) as a step towards linking actors to responsibility for actions. Power and influence have long been studied in sociology and social theory (Lister, 2021; Lukes, 2021; Parsons, 1954), and researchers have used different approaches to describing power in sustainability research (Dallas et al., 2019; Fritz & Meinherz, 2020; Morrison et al., 2019; Williams et al., 2023). However, there have been fewer attempts to operationalize power that can be tested in other cases. For example, studies draw on social network analysis to assess power and conflict (Vallet et al., 2020), evaluate dimensions of agency (Rölfer et al., 2025), and provide methods for testing collaboration in resource governance (Mancilla García & Bodin, 2019). This thesis explores ways to assess power and influence in the grain legume value chain and AKIS in Sweden to contribute to the evidence base in sustainability science. In addition, this thesis explores a participatory process for linking actions and actor groups as part of a global, multistakeholder dialogue process. Taken together, the papers in this thesis are one step towards the larger goal of linking actors to responsibility for change as part of larger transformation processes.

This thesis is structured as follows. In the following section I introduce the case study, describing the scope of the work and how each of the four papers relates to the thesis research questions. I then provide a background on grain legume production and consumption in Sweden, describe the value chain and AKIS in the Swedish context, and describe the research on grain legumes in Sweden. Next, I provide an overview of the theory and methods, followed by a summary of the paper results. In the discussion section, I answer the research

questions in dialogue across the papers and highlight contributions of this thesis; identify considerations for future work; and reflect on connections between research and practice and my own learning journey. I conclude with a brief summary of this work.

Scope and research questions

From the outset of my doctoral studies, my intention was to ground inquiry of dietary shifts towards healthy and sustainable diets as close to policy and practice as possible. This prompted an exploration of subsystems within Sweden to launch a case study, which allows for an in-depth research focus with a "real-world perspective" (Yin, 2018) to examine contemporary events. The idea to focus on legumes emerged from collaborative work initiated by the Nordic Council of Ministers (Wood et al., 2020, 2021) based on an assessment of Nordic food system production and consumption (Wood et al., 2019). Further examination of the Global Burden of Disease database (Afshin et al., 2019) revealed low consumption of legumes as one of the top risk factors for preventable morbidity (disease) and mortality (death) in Sweden. I chose to focus on grain legumes because of the collaborative identification of their potential and their link to public health consequences. I further focused on grain legumes because soy is not yet reliably produced in Sweden (Jordbruksverket, 2022), has a different nutritional profile (Willett et al., 2019), and receives more attention in research than pulses (Magrini et al., 2019).

I initially used the concept of the value chain to study the grain legume subsystem due to the focus on value chains in large research projects, domestic policy, and European Union policy. However, following data analysis from participant interviews and engagement with scholars in the field, I expanded my framing to the grain legume value chain embedded within the AKIS, reflecting the wider environment around market actors that enables and constrains their actions (EU SCAR, 2012; EU SCAR AKIS, 2019). This system is the focus of the majority of my research (Papers I-III). The specificity of the context helps me ground investigation of the system in multiple ways, including exploring relevant actions, actors, actor groups, and the links between them. In the final paper (IV) of this thesis, I widen beyond the AKIS and geographical scope to examine the role of multilateral processes and national governments in collaborative efforts for transformative food system change as part of a global multisectoral dialogue process. Including multiple scales and systems allows me to more deeply investigate the roles of different actions and actors to support transformative change towards healthy and sustainable diets.

Research questions and connections across papers

The overarching aim of this thesis is to understand who can do what in shifting towards healthy, sustainable diets. To address this broad query, I use three sub-questions to guide my research:

1) What actions have potential to increase human consumption of grain legumes in Sweden? (Paper I)
2) What actors and actor groups have power and influence to increase human consumption of grain legumes in Sweden? (Papers II and III)
3) How do cross-sectoral actor groups link actors and actions for healthy, sustainable, and just food systems at a global level? (Paper IV)

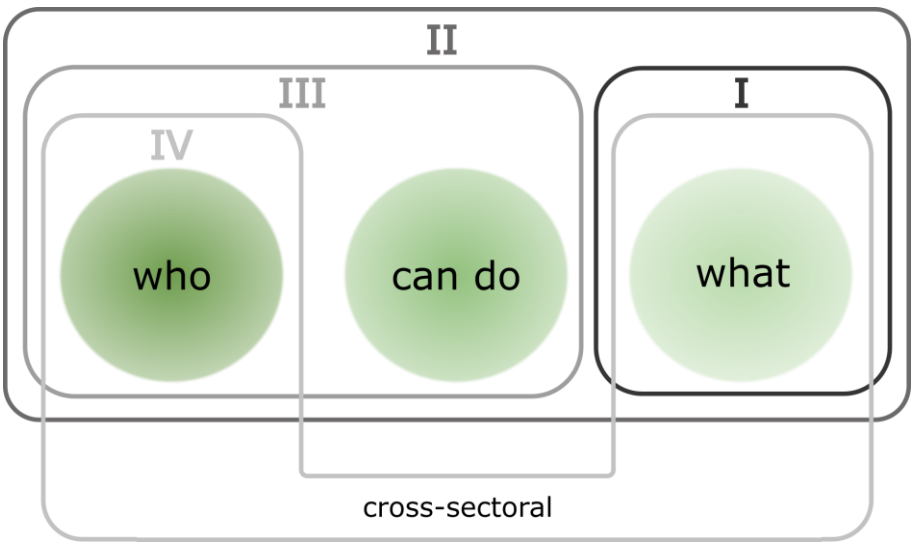


Figure 1. Thesis papers mapped to the overarching thesis aim – who can do what? Papers I-III focus on grain legumes in Sweden; Paper IV focuses on food systems at a global level. Figure by Agnes Pranindita.

In **Paper I**, I identify actions (the *what* in Figure 1) with the potential to increase grain legume consumption in Sweden as part of dietary shifts that support health and sustainability. I use Abson et al.'s (2017) leverage points framework to evaluate the depth of change of actions from peer-reviewed and grey literature, in particular project reports and materials from recent legume research projects in Europe.

Building on categories of actions along the leverage points framework in the first paper, **Papers II and III** draw on semi-structured interviews with actors within the grain legume value chain to understand their influence and power

(the *can do* in Figure 1) as actor groups and as actors (the *who* in Figure 1), respectively, in changing grain legume consumption in Sweden. Both large actors with diverse food portfolios and small actors focusing on specific grain legume products were included to understand a breadth of perspectives with respect to grain legume consumption. The different product portfolios may have relevant health consequences depending on the types of processing of the products, and may reflect competing interests in food and feed that complicate business priorities for dietary shifts.

In **Paper II**, I explore influence in three ways: how actors perceive their own influence, how they perceive others' influence, and how the connections between actors may indicate influence in taking action to support dietary shifts. Taken together, these types of influence can guide how new collaborations are built, which actions may require greater care in addressing trade-offs, and how policies include actors beyond the value chain. In **Paper III**, I focus on types of power that actors have at the organizational level, as well as their conceptualizations of change and their focus on specific product types. Using the Multi-Level Perspective as a reference point (Geels et al., 2023), I highlight how combinations of power and understandings of change may position certain actors to steer or influence transformation processes.

Paper IV widens the aperture of the research to global food systems, focusing on a multistakeholder dialogue process (the *cross-sectoral* link between *who* and *what* in Figure 1) at the science-policy-society interface to examine how food system actor groups and actions are linked by participants that can support a shift in food systems, including diets. Here, I uncover tensions between how food system actors perceive change happening through national governments or other actors, and the implications for the role of multilateral processes in transformative change. In addition to including actors from many locations, the intention of this multistakeholder dialogue process was to actively address the tensions, competing interests, and discomforts associated with transformative change (Hainzelin et al., 2023).

In addition, I reflect on the following question about translating research into action for each of the four papers: How can research findings and processes inform the connection between knowledge and action to support food system change? This guiding question is crucial to strengthen the connection between research and practice. Here, I look ahead to how detailed knowledge about influence may inform actor collaboration, policies, and other forms of system governance at different scales.

The thesis in the context of wider food system change

This thesis is situated within the context of numerous calls by practitioner and scientific experts for desired future food systems to be healthy, sustainable, and just for all (HLPE, 2025; IPES-Food & ETC Group, 2021; O'Brien et al., 2025; Rockström et al., 2025). A core assumption I am making in this thesis is that diets supporting these future food systems will include an increased share of grain legume consumption in Sweden (Röös et al., 2020; Wood et al., 2019), as well as most other countries (Rockström et al., 2025). My focus in this thesis is prospective, seeing dietary shifts including more grain legumes as part of wider transformations of food systems. In this thesis I focus on linking actors and actions for dietary shifts that can contribute to these wider transformations. While transitions and transformations have been contrasted for their different ideas about change (Olsson et al., 2014; Smith & Stirling, 2010), in recent years they have grown more aligned, with complementary elements combined into a shared framework (Herrfahrdt-Pähle et al., 2020).

Several of these transformation and transition frameworks have helped me understand how my case study fits into wider processes of social change to bring about healthy, sustainable, and just food systems. In studying these, I see broad connections between the phases of social-ecological transformations frameworks (Herrfahrdt-Pähle et al., 2020; Olsson et al., 2004), the X-curve (Hebinck et al., 2022), and the Multi-Level Perspective (MLP) (Geels, 2019; Geels et al., 2023). Both the X-curve and the MLP emphasize the development of smaller initiatives through experimentation that accelerate as part of the preparation phase of transformation. The processes that occur at the niche level and experimentation stage highlight the importance of innovation and scaling in preparing the system for wider change. In the navigation phase of transformation, the intersection of the "X" curves represents the collision of the emerging and declining elements of the system. This intersection is similar to the process of regime reconfiguration in the MLP, where some elements of the existing dominant system are kept in the remade dominant system (Geels, 2019). The X-curve articulates the breakdown and phase-out stages of change within the navigation and stabilization phases of transformation. Based on the multistakeholder dialogue experience and reflections offered in Hebinck et al. (2022), explicitly addressing breakdown and phase-out processes may open up stakeholder dialogues to a deeper discussion about transition "losers" and fair compensation.

While system change processes unfold at different times, most of the activity in the grain legume value chain and AKIS related to this future vision is in the preparation phase of transformation based on the empirical work in Papers I-III in this thesis. The multistakeholder dialogues at the science-policy-society interface in Paper IV actively aimed to move towards the place of intersection, where reconfiguration of existing systems and new elements occur. Taken

together, the four papers in this thesis build new understandings of specific elements of the grain legume value chain and AKIS in Sweden as part of shifting diets towards health and sustainability. This shift supports wider change towards healthy, sustainable, and just food systems.

Background

Grain legume production and consumption in Sweden

The earliest evidence of peas in Scandinavia dates to approximately 4,000 years ago, with archaeological evidence of breads baked with a blend of grains and pea flour (Leino, 2022). Interestingly, this type of blend was recently advanced in a multistakeholder research collaboration (SLU, 2018), showing that we can learn from practices long in the past and benefit from them in the present. Remnants of chickpeas from approximately 3,000 years ago have been found on Åland, showing the extent of trade with southern Europe as they did not (and still do not) reliably grow in Sweden (Andréasson Sjögren et al., 2020). Literary sources indicate peas were commonly eaten in soups from the 14th century, and tax records show the importance of pea production in the 16th-19th century, when the most common dishes, reflected in recipes and diaries, were pea porridge and pea soup, often flavored with pork (Leino, 2022). Other sources indicate faba beans were also commonly grown during this time on larger farms and in kitchen gardens (Andréasson Sjögren et al., 2020). These historical records imply that grain legumes were a regular part of diets for most people in Sweden. Yellow pea soup remains a common dish in Sweden, and was the most commonly reported legume dish in the most recent national dietary survey (Steib et al., 2020).

Figure 2. Above: charred pea from a burial site outside of Norrköping, Sweden, dating to the 7th century. The pea is thought to be either a gift for the deceased or remains from a funeral meal. Photo: Jens Heimdahl, Arkeologerna. Used with permission.

Swedish grain legume consumption

Despite keeping this cultural connection to yellow pea soup, modern Swedes consume an average of only 8-12 grams per day of legumes (dry weight, see Figure 3; Amcoff et al., 2012)[1], the equivalent of approximately 58 yellow peas. The amount of legumes to eat per day as part of a healthy diet ranges from 75 grams in the 2025 EAT-*Lancet* Commission to 100-110 grams in the scientific analyses supporting the development of the Nordic Nutrition Recommendations (NNR) (Skrindo Knudsen et al., 2026). The NNR informs the development of Swedish dietary guidelines, which encourage people to eat legumes every day without stating a specific amount (Livsmedelsverket, 2025). Thus, Swedes consume approximately 11-16% of ideal grain legume intake per day according to the 2025 EAT-*Lancet* Commission and NNR, on average. The gap between what is recommended and what is eaten motivates the focus of this thesis. The health benefits to increasing grain legume consumption are realized proportionately, meaning even a small change has some benefits for people and the environment (Bunge et al., 2024; Livsmedelsverket, 2025). The average Swedish diet would also benefit from many other changes that are complementary to increasing grain legume consumption from a nutrition perspective, including more vegetables and whole grains; and less sugar, refined grains, and red and processed meat (Blomhoff et al., 2023; Livsmedelsverket, 2025).

Figure 3. The current average consumption of yellow peas (12g per day, left) makes approximately 0.5dl of yellow pea soup, while the EAT-Lancet reference amount of 75g per day (right) makes approximately 4dl of yellow pea soup. Author's photo and measurements using yellow peas from Fagraslätt and yellow pea soup recipe from Gröna Bordet (Norheim, 1989).

[1] The dietary survey did not differentiate between types of legumes, so there is no specific grain legume consumption amount. Livsmedelsverket has not conducted an updated national survey, instead validating these results through Jordbruksverket consumption statistics and other sources (Livsmedelsverket, 2025).

Increasing grain legumes as part of dietary change would have significant health benefits for the Swedish population. Diet-related disease in Sweden is a leading cause of premature death, and both adult and childhood overweight and obesity continue to rise (53% of the adult population) (Folkhälsomyndigheten, 2025). Health research shows protective cardiovascular health effects (Afshin et al., 2014) of grain legume consumption as well as positive contributions to diabetes management (Ferreira, Vasconcelos, et al., 2021) and reduced risk for colon cancer (B. Singh et al., 2017) due to their nutritional profile of being high in protein, fiber, and micronutrients, with low fat content and a low glycemic index (Ferreira, Vasconcelos, et al., 2021; Lassen et al., 2020).

All grain legumes require some processing (i.e., soaking and boiling) to be digestible for humans (Röös et al., 2022), and the method and degree to which they are processed may impact the bioavailability of their nutrients (Mayer Labba et al., 2022) and the health benefits they confer (Gastaldello et al., 2022; Spendrup & Hovmalm, 2022). Evidence is not yet clear on these topics, yet I highlight the potential trade-offs of convenience, health benefits, taste, and affordability related to processing choices here as they may have implications for innovation and investment in the grain legume value chain and AKIS going forward.

Swedish grain legume production

Swedish diets have a large climate impact compared to other high-income countries, with animal products contributing the most to the environmental footprints of food production and consumption (Wood et al., 2019). The environmental impacts of the Swedish diet are distributed unevenly across the globe, which can drive land use change, biodiversity loss, and water shortages in distant places (Cederberg et al., 2019; Moberg et al., 2020; Rajão et al., 2020; Wood et al., 2019). Approximately half of the food eaten in Sweden, calculated by energy and by monetary value, is produced elsewhere (Einarsson & Röös, 2026; Strandberg & Lind, 2025).

Legume production can contribute environmental benefits, most of which are realized locally – atmospheric nitrogen fixation in conjunction with rhizobia on plant root nodules (Watson et al., 2017). This unique property of legumes can reduce excessive use of fertilizers (Jensen et al., 2020) that cause eutrophication impacting ecosystems, marine food supplies, and livelihoods (Moberg et al., 2020; Steffen et al., 2018). Thus, using legumes in well-managed rotational cropping systems can reduce or avoid the need for fertilizers, reducing the environmental impact of food production (Watson et al., 2017).

Grain legumes in Sweden

Swedish grain legume production is dominated by yellow peas and faba beans, both of which can be grown for food or feed, although the categories have different quality standards (Jordbruksverket, 2022). Brown beans, lentils, grey peas, and other types are also produced for food (Jordbruksverket, 2022), and several plant breeding tests are underway for chickpeas and other types of beans. While most grain legumes are grown in southern Sweden, some heirloom varieties are produced north of Mora (zone 6, see map on the right, Nordisk Råvara, 2026).

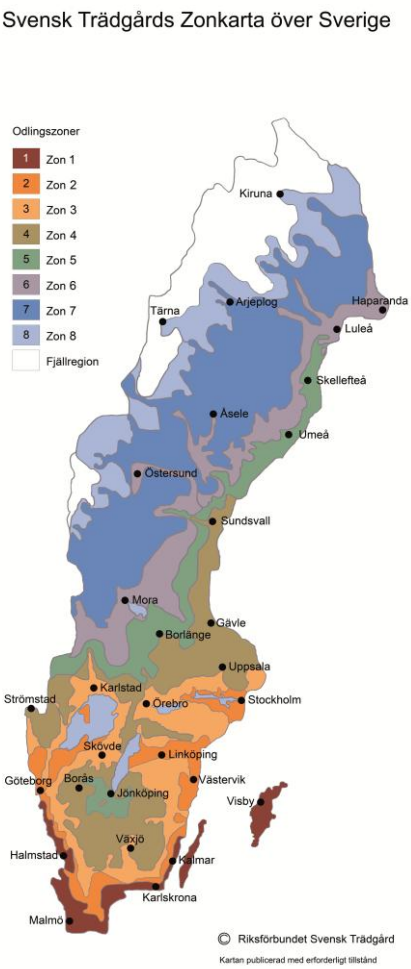


Figure 4. The Swedish Gardeners' Association map of growing zones (Svensk Trädgårds Zonkarta över Sverige, right) illustrates the wide climate variation from northern to southern Sweden that impacts crop production. The specific zone numbers apply mainly to shrubs and trees. Used with permission.

Humans have used legumes in crop rotations for their nitrogen-fixing benefits for millennia, long before official statistics were kept at national levels. In Sweden, peas were grown on more than 3% of arable land at the start of the 1800s (Frankow-Lindberg & Bergkvist, 2013), with the percentage declining until quite recently. Today grain legumes are cultivated on about 2.2% of arable land, and models suggest it would be possible to increase this to 3.2% (Röös et al., 2020) given geographical limitations and considering competing land uses.

National plant breeding initiatives began at the end of the 1800s and included many types of legumes (Frankow-Lindberg & Bergkvist, 2013), but Sweden ended its public feed and food legume breeding in 2004 (Leino, 2022). More legume varieties that thrive in cooler climates and are resistant to diseases such as root rot would likely help increase domestic production (Murphy-Bokern

& Font, 2022). Recent projects such as the Swedish Agricultural University's Grogrund program show renewed public investment in plant breeding in co-operation with private actors that have the infrastructure to conduct experiments (SLU Grogrund, 2025). This partnership exemplifies how the AKIS intersects with the grain legume value chain, discussed below.

Sweden's grain legume value chain and AKIS in context

The Swedish grain legume value chain and agricultural knowledge and innovation system (AKIS) are part of the wider Swedish food system, which is closely tied to international food systems and patterns of global trade and finance (Clapp, 2022; FAO et al., 2025; Livsmedelsverket & Jordbruksverket, 2025). As an EU member state since 1995, Sweden's food production and market have for decades been shaped by EU regulations, notably the Common Agricultural Policy. Most food imports come from other EU countries, and Sweden also depends on EU and global imports for production inputs such as fertilizer, seeds, and diesel fuel (Livsmedelsverket & Jordbruksverket, 2025). Sweden's highest value food exports are fish, cereals, and beverages to Norway and EU countries (Strandberg & Lind, 2025). Sweden has larger farms compared to the rest of the EU – approximately 89% of Swedish farms are over five hectares in size (about six football fields), while the majority of EU farms (about 64%) are under 5 hectares (Eurostat, 2022). Farms, food manufacturing, and food retail have each become increasingly consolidated in recent years (Gordon et al., 2022), mirroring patterns in many parts of the world and raising concerns about power within food systems (Clapp et al., 2025).

Sweden has an expanding food tech sector with a wide variety of products and services (Sweden Foodtech & House of Innovation, 2024). In the long run, this could shift food jobs away from rural areas towards urban locations (Nordin et al., 2025). From the consumer side, market concentration is considered high if the top four firms control more than 60% of a particular market (Clapp et al., 2025). With the top three grocery chains controlling 86.6% of the market (Lundberg et al., 2026), Sweden's food retail sector exceeds this threshold.

Municipalities and counties provide approximately three million public meals in schools, hospitals, and elder care facilities every day (in other words, roughly one-tenth of daily meals; Westling et al., 2022) through a mix of on-site kitchens, warming facilities, and catering arrangements. At a population level, women spend an average of 38% more time than men on food preparation per day (84 v. 61 minutes, SCB, 2021).

The AKIS encompasses functions of agriculture, innovation, education, and rural development (EU SCAR, 2012; EU SCAR AKIS, 2019; Spendrup & Fernqvist, 2019), and is organized at the national level, supporting links between knowledge and practice (EU SCAR AKIS, 2019). Because of this national organization, domestic value chains, including grain legumes in Sweden, can be conceptualized within the AKIS. The domestic grain legume value chain itself includes different actor groups depending on the type of product, including importers, logistics firms, farmers, processors, retailers, and consumers (Gereffi et al., 2005; Kogut, 1985). For example, chickpeas could be imported to Sweden then domestically processed into hummus sold in grocery stores (importer-processor-logistics-retail-consumer), or brown beans could be grown in Sweden and sold directly to consumers through a farm store (producer-consumer).

Actors in the AKIS interact with and influence these value chain operations through, for example, rulemaking, providing farm advice, setting loan terms, lobbying, forming research partnerships, and selecting topics of news stories. In Figure 5, I illustrate how grain legume value chain actors are embedded within Sweden's AKIS, drawing on an example from Landsbygdsnätverket (the rural network). To date, the Swedish AKIS has focused mostly on knowledge and innovation in agriculture and less on other parts of the food value chain, although upcoming projects plan to expand to include other actors (Landsbygdsnätverket, 2026).

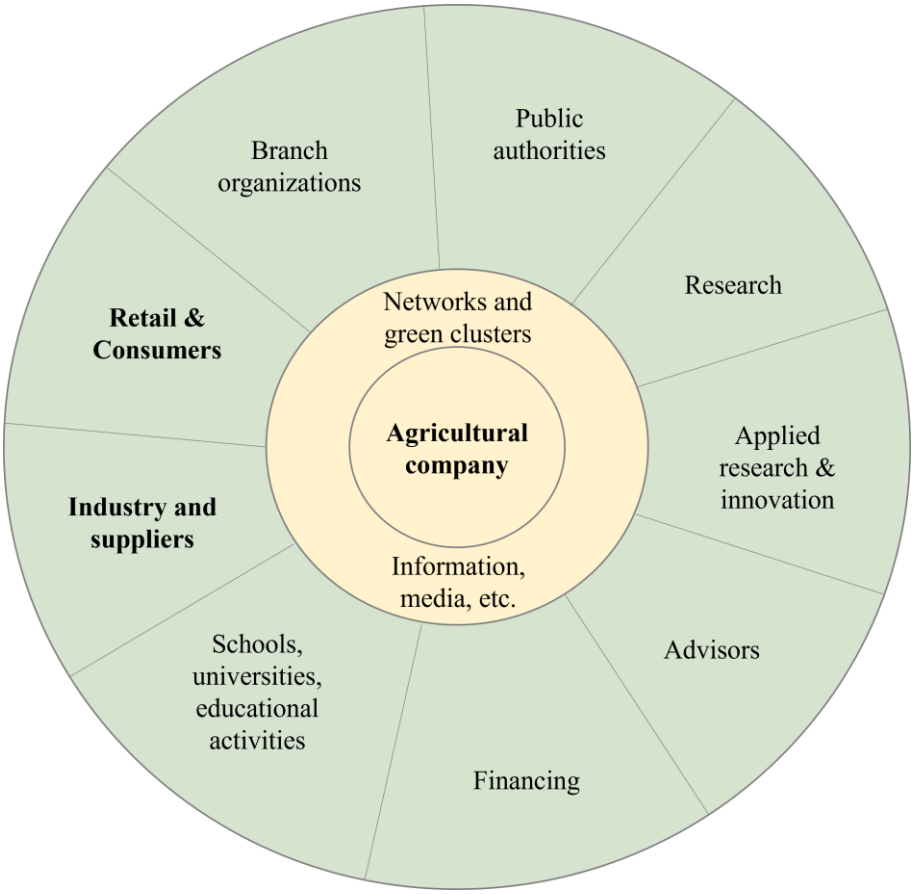


Figure 5. An example of the AKIS organization in Sweden from Landsbygdsnätverket, the coordinating body for the AKIS network in Sweden. Here, an agricultural company is at the center, closely connected to information as well as innovation networks and regional hubs (green clusters). The information and networks interface directly with other actors and institutions that are part of the AKIS. Translated from original Swedish (Landsbygdsnätverket, 2026). Bold added as emphasis to highlight actor groups included in the value chain in this thesis.

Policies influencing the grain legume and AKIS actors in Sweden

Several policies at national and EU levels enable and constrict how actors in the grain legume value chain and AKIS operate. First, the National Food Strategy, which emphasizes increased resilience, promoting exports, and quality and gastronomy (Landsbygdsnätverket, 2026; Regeringskansliet, 2025), strongly influences the AKIS in Sweden. The National Food Strategy has a strong focus on increased animal production (Kullgren, 2026). Most grain legumes in Sweden are used for animal feed (approximately 73%, Jordbruksverket, 2022), and the Swedish Agricultural Board does not yet collect granular domestic production data about grain legumes for food, instead relying on expert estimates (Jordbruksverket, 2022).

Although animal production is linked to increased resilience and preparedness in Swedish policy, a recent analysis has shown feed stores would provide calories for the Swedish population for 270 days, while slaughtering all farmed animals would provide calories for 18 days (Einarsson & Röös, 2026). While the quality standards for the grain legumes that can be used for both feed and food are different (Jordbruksverket, 2022), the varieties are the same and in a crisis the feed could be used as food. However, at the national level, the focus on animal production suggests the strongest current link between the AKIS and grain legume value chain is for feed rather than food.

Second, EU policies also exert substantial influence over domestic production. The Common Agricultural Policy (CAP) encourages but does not require legume production as part of good crop rotation practices (European Commission, 2024a). The majority of EU member states (n=20) use flexible payments that are part of the CAP budget to specifically encourage legume production for food (i.e., grain legumes or peanuts, n=14) and/or feed (i.e., soy, n=15; or fodder legumes such as alfalfa, n=13). However, Sweden has not chosen this strategy to date to support grain legumes for food or feed (European Commission, 2023b, 2024a). The EU also encouraged all member states to further develop and integrate the AKIS in strategic planning for the current CAP cycle (European Commission, 2023a). Linking CAP flexibilities, AKIS activities, and the National Food Strategy is a coherent approach to policy that could increase production of grain legumes for feed with little attention to consumption consequences.

On the other hand, joint goals from the Swedish Public Health Agency and the Food Agency aim to improve public health and health equity while reducing the negative impact that diets have on biodiversity, ecosystems, and the climate (Folkhälsomyndigheten & Livsmedelsverket, 2024a). One indicator within the joint set of goals is the increased of the consumption of legumes,

vegetables, and fruit by 50%[2] by 2035 compared to 2021 (Folkhälsomyndigheten & Livsmedelsverket, 2024b). Recently updated Swedish dietary guidelines encourage daily grain legume consumption and reduced red meat consumption (Livsmedelsverket, 2025), and the Swedish Agricultural Board estimates an approximate doubling of demand for legumes for food by 2030, equating to approximately 20 grams per person per day (Jordbruksverket, 2022). Even if achieved, these two agency estimates (~15 and ~20 grams per person per day, respectively) would result in consumption of only 20-27% of the EAT-*Lancet* reference diet (75 grams per person per day) (Rockström et al., 2025), but nevertheless show a commitment to shifting diets to support human and planetary health.

Grain legume actors in Sweden

In addition to public authorities operating at the national level, there are many actors within the grain legume value chain ranging in size from large multinational corporations with diverse food portfolios to small start-ups focused on grain legumes. This diversity provides the opportunity to include a range of perspectives and orientations towards food system change. To be more specific about the terms used in this thesis for the grain legume value chain and AKIS in Sweden, examples are presented in Table 1.

Table 1. Examples of terms used in this thesis applied to the Swedish grain legume value chain and AKIS.

Actor	Actor group	Actor role
Lantmännen	Farmer organization Processor	Producer Research partner Lobbyist
Swedish University of Agricultural Sciences	University	Researcher Project convener
Swedish Agricultural Board	National government agency	Rule interpreter EU liaison Distributor of funds
Skånebönan	Large project	Interface for multistakeholder alignment Resource keeper

These organizations are examples of publicly recognized actors relevant to grain legume production and consumption in Sweden. Because of the small nature of the grain legume value chain and AKIS in Sweden and assurance of

[2] Legumes, vegetables, and fruit consumption are calculated together for this indicator.

confidentiality to speak openly in interviews, actors participating in the interviews are not named in the studies, except those who explicitly wished to be acknowledged.

While many researchers agree on the need for transformative change in food systems, the degree of involvement and leadership of public authorities, private actors, and partnerships across actor types are debated (Zurek et al., 2023), and these have different implications for the applicability of the AKIS as an organizing framework. Several expert reports point out the role for national governments alongside diverse groups of stakeholders (IPCC, 2022; O'Brien et al., 2025; Rockström et al., 2025), prompting increasing engagement through science-policy-society interfaces.

The strong role for national governments in this model aligns with the AKIS. Other multistakeholder initiatives focus on particular private and civil society actors, such as large actor coalitions (e.g., Maniatakou et al., 2025) or partnerships between science and industry (e.g., Österblom et al., 2022). The strong role of private actors and science fit well with the AKIS as developers of innovation, knowledge brokers, influencers, and partners with governments (Dockès et al., 2011).

However, the supranational organization of many multistakeholder initiatives fits better with mission-oriented agrifood innovation systems, conceptualized as problem-oriented, cross-sector, and not limited to national borders (Klerkx & Begemann, 2020). The mission-oriented approach can be used as an analytical tool to evaluate societal efforts to change, along with being a tool to organize approaches to planning policy for technology and innovation (Mazzucato, 2018). Kok and Klerkx (2023) explicitly link the mission-oriented approach to the X-curve, calling for complementary phase-in and phase-out policies and practices to unlock system change. However, most food system policies are set at or require collaboration with national governments (e.g., EU policies that Sweden implements), rendering the national AKIS a useful conceptual framework for this study.

Research on grain legumes in Sweden

Within Sweden, there is a growing body of research on the social and environmental impacts of increasing plant proteins to replace red and processed meat consumption (Bunge et al., 2024; Moberg et al., 2020), consumer perceptions of grain legumes (Röös et al., 2022), and production potential to meet future grain legume demand (Carton et al., 2022; Röös et al., 2020). Researchers modelling possible land use and diet scenarios for Sweden have found that feed and food can be adequately produced with food waste

reduction, changes to diets, and changes to production practices (e.g., particular crop rotations; J. O. Karlsson & Röös, 2019; Röös et al., 2016, 2020). Other grain legume studies have focused on specific intercropping patterns for profitable production (Manevska-Tasevska et al., 2024), farmer perceptions about competing interests for food and feed (Koole, 2022), and consumer decisions in a retail environment (Collier et al., 2021; Mjöberg et al., 2023). These context-specific studies indicate knowledge and capacity for increasing grain legume consumption and production within Sweden to improve human and environmental health, but stop short of integrating consumption and production with value chain actor perceptions.

Multiple large research projects including value chain actors have also tackled grain legumes from different angles: the individual health effects of grain legume processing (PAN Sweden, see Auer et al., 2024; Karlsson et al., 2024); nutritional assessments, and environmental and social impacts of meat analogues based on grain legumes (FINEST, see Bryngelsson et al., 2022; Desiderio et al., 2023; Desiderio & Östergren, 2025); and how grain legumes would be included in future food scenarios to meet global climate targets (Mistra Food Futures, see Gordon et al., 2022; Höglund et al., 2025). Other projects have built networks of value chain actors and researchers, although funding for some networks ends before they are institutionalized, such as the regional stakeholder network *Lokala Baljväxter* (Local Legumes) that focused on smaller farms and companies producing grain legumes. Other networks, however, remain ongoing such as *Skånebönan* (Scania Beans), which engages actors from across the grain legume value chain in southern Sweden with the goal of increasing both production and consumption, and includes support from local and regional governments. These networks engaged actors in the value chain, but did not focus specifically on the connection between consumption and production at a national level.

Attention to production and consumption together are necessary for coordinated approaches to improve human and environmental health (Bair, 2008; O'Brien et al., 2025; Scoones et al., 2020). Mistra Food Futures recently published a case study on the legume supply chain in Sweden, pointing to the need for actors to collaborate and build relationships in new ways (Höglund et al., 2025). This thesis contributes to the growing research in Sweden about grain legumes by considering consumption and production, including value chain actor perspectives, and advancing methods to assess power and influence as a step towards responsibility in food system transformations.

Theory and methods

In this thesis, I employ several theories and frameworks to explore components of change involved in dietary shifts. The *leverage points framework* (Meadows, 1999, 2008) has its origin in systems theory, and posits that interventions at certain places in a system have varying degrees of difficulty that correspond to their likelihood of changing system behavior. I use leverage points to understand the potential of actions to shift system behavior. *Structuration theory* (Giddens, 1984) provides a useful base for investigating the relationship between agency and structure across scales, and I use it to explore different types of actor influence and power. The *Multi-Level Perspective* (Geels, 2019; Geels et al., 2023), foundational to many social-ecological systems, transition, and transformation studies, serves as a boundary object to discuss actor conceptualizations of change. Lastly, the *agricultural knowledge and innovation system (AKIS)* (EU SCAR AKIS, 2019; Spendrup & Fernqvist, 2019) and *value chain* (Gereffi et al., 2005) are frameworks to understand material flows and actor relationships in a market logic, and are used to draw system boundaries. *Participatory research* at the science-policy-society interface includes participant deliberation and ongoing interaction between science and diverse stakeholders (Duncan et al., 2022; B. K. Singh et al., 2022).

Table 2 organizes summary information for each paper by the research questions, data source, theoretical foundation, and methods. By using multiple approaches, I seek to foster novel methods and inspire new solutions to complex societal problems (Fabinyi et al., 2014).

	Paper I **The What** *Levers and leverage points*	**Paper II** **The Who** *Actor influence to take actions*	**Paper III** **The How** *Actor power and conceptualizations of change*	**Paper IV** **The Way Ahead?** *Multistakeholder dialogues and collaboration*
Thesis question	Who can do what in shifting towards healthy, sustainable diets?			
Sub-questions	What actions have potential to increase human consumption of grain legumes in Sweden?	What actors and actor groups have power and influence to increase human consumption of grain legumes in Sweden?		How do cross-sectoral actor groups link actors and actions for healthy, sustainable, and just food systems at a global level?
Paper research question(s)		Which actors can intervene in the Swedish grain legume system to leverage transformative change through specific actions?	What kinds of power do a set of Swedish grain legume value chain and AKIS actors have? How do these actors conceptualize change in the grain legume value chain and AKIS happening?	
Data Sources	Published and grey literature	Interview transcripts, published and project documents, company websites	Interview transcripts; published and project documents, company websites	Dialogue notes, food system actor documents, participant observation
Methods	Literature review; document analysis; open and axial coding; leverage points	Semi-structured interviews; text and document analysis; descriptive and thematic coding; social network analysis	Semi-structured interviews; open and thematic coding; social network analysis	Facilitated dialogues and documentation at actor group level; facilitated workshop dialogue and documentation across actor groups; descriptive and deductive coding
Theoretical foundations	Leverage points (systems theory)	Structuration theory	Structuration theory	Participatory research

Table 2. Summary of research questions, data, theory, and methods for papers in this thesis.

Leverage points framework

Developed by Donella Meadows (1999, 2008) and interpreted for sustainability science by Abson et al. (2017), the leverage points framework has been widely used to understand complex systems, such as to illustrate pathways for sustainability (Chan et al., 2020), to categorize outcomes of major food system reports by their potential for transformation (Slater et al., 2022), and to identify opportunities for system change using social network analysis (Lam et al., 2021; Rölfer et al., 2022). While transformations cannot be fully controlled nor predicted, understanding the depth of change of actions may help develop strategies and policies to influence the course of change towards desired outcomes (Moore et al., 2023). However, implementing strategies and policies depends on the active effort of multiple actor groups, including policymakers (Conti et al., 2025). Bundling actions across multiple categories of the framework using a "chain of leverage" (Fischer & Riechers, 2019) may be more likely to achieve change at deeper leverage points (i.e., more impactful, but more difficult to change), although this is an emerging area of research and will vary between contexts.

Starting with a review of peer-reviewed and grey literature, I identified actions with the potential to increase grain legume consumption in Sweden in Paper I. Next, I used Meadows' (1999, 2008) leverage points definitions to categorize the actions according to Abson et al.'s (2017) interpretation of the leverage points framework for sustainability transitions (see Table 3 for food system examples). Then, I grouped the actions into themes within each of the four system characteristics categories using open and axial coding, resulting in 15 action categories. Lastly, I used the results to illustrate a chain of leverage (Fischer & Riechers, 2019), where the intent action "create social norms for the consumption of healthy foods" (Brouwer et al., 2021) is supported by multiple interacting actions at other leverage points.

Table 3. Examples of actions in food systems that target the four system characteristics from Scheuermann et al. (2024).

System characteristic (Abson et al., 2017)	**Description and food system example**
Intent	Values, goals, worldviews of society that shape emergent direction of system *Example: alternate approaches to production, markets, diets*
Design	Social structures and institutions managing system rules and flows *Example: expanding eligibility for production subsidies to new actors*
Feedbacks	Interactions between system elements that drive internal dynamics *Example: building a system delay to allow time for planned changes such as new regulations*
Parameters	Mechanistic characteristics such as taxes and labeling requirements *Example: standards for products, labelling, or consumer education*

Structuration theory

Structuration theory proposes that structure influences actor behavior while actors are also able to influence the structure itself; that is, they shape each other (Giddens, 1984; Mancilla García & Bodin, 2021). The implications for this duality for social-ecological systems transformation is particularly relevant at the places of connection across scales. For example, in social-ecological systems, the constant change is rendered through the continuous interplay between actors and their structure in co-creation, as actors create the structure and respond to it, continuously affecting one another (Bodin, Mancilla García, et al., 2020; Mancilla García & Bodin, 2021). At the organization level, individuals have the agency to, for example, act as institutional entrepreneurs (Westley et al., 2013) in shaping organizational effort and purpose toward larger system transformation. At the individual level, the repetition of actions, such as choosing what to eat, results in habits that form identities (Biely, 2022), which can be considered a type of informal social structure to the extent that they uphold and reproduce social norms (Mancilla García & Bodin, 2021; Sarigil, 2015). These system, organizational, and individual behaviors hold and are held in place by norms, institutions, power, and culture in a continuous process of co-creation (Bodin, Mancilla García, et al., 2020). These same behaviors encompass the wide range of choices across system scales that influence production and consumption systems (Spaargaren, 2003).

Structuration, influence, and power

By definition, structuration processes involve interactions between actors, which means that power is involved and evident over time (Morrison et al., 2019). Actors require power to be able to exercise influence (Boonstra, 2016; Morrison et al., 2019; Partzsch, 2017), which shapes outcomes of their interactions across levels of the system, and thus the system's behavior. The types of power I use in this thesis incorporate elements of actor perceptions of influence over specific actions to increase grain legume consumption and actor connections measured through social network analysis, drawing on structural perspectives on power and influence (Bodin, 2017). Actor connections can grant access to information, resources, and opportunities for collaboration, cooperation, and coordination, which can all impact actor ability to gain and exercise power (Bodin, Mancilla García, et al., 2020; Hileman et al., 2020). Therefore, evaluating structural measures can aid in understanding the types of power actors possess and/or have the potential to use. It is not the only way to understand or assess power, but is useful to explore as another way of understanding the system and relationships that may not be evident through other methods. I detail how I operationalized measures later in this section.

I chose a widely used typology of *power to*, *power over*, and *power with* (Avelino, 2017; Gaventa, 2006; Wittmayer et al., 2017) to examine different ways in which actors may have and exercise power (see Table 4). *Power over* is further separated into four subtypes, and two are included in this thesis: *power over (visible)* and *power over (hidden)*. *Power over (invisible)*, which shapes cultural norms (Gaventa, 2006; Lukes, 2021), and *power over (unconscious)*, which socializes us through routines and practices (Avelino, 2021), are also important to consider, but are beyond the scope of this thesis. My aim here is to understand how relationships in the system might uncover power or influence that is not evident when market share, firm size, or similar characteristics are used as proxies for power in social-ecological or socio-technical research (Geels & Schot, 2007; Hileman et al., 2020; Kungl, 2024; Österblom et al., 2015).

Table 4. Types of power, descriptions, and sources used in this thesis based on reviewing sustainability transition and transformation literature.

Type of power	Description	Source
Power to	Capacity to act; to realize own interests and thereby influence processes in the wider system	(Parsons, 1954; Partzsch, 2017)
Power over (visible)	Formal rules, structures, institutions, procedures	(Gaventa, 2006; Lukes, 2021)
Power over (hidden)	Controlling access to decision-making spaces and agendas	(Gaventa, 2006; Lukes, 2021)
Power with	Capacity to create collective action, bridge interests	(Morrison et al., 2019; Partzsch, 2017; Vallet et al., 2020)

Building on assessments of influence in water governance (Jericó-Daminello et al., 2021; Mancilla García & Bodin, 2021), I assess three types of influence, illustrated in Figure 5: self-perceived influence, attributed influence, and structural influence. Here, self-perceived influence refers to how an actor sees their own power and agency, which is important for the ability to take action in response to change (Barnes et al., 2020; Brown & Westaway, 2011). Attributed influence refers to how an actor see the power and agency of other actors, which could indicate framing power whether or not the attributed actor recognizes it (Morrison et al., 2019). Building on prior research (Hileman et al., 2020), structural influence refers to the presence of open or closed structures at the actor group level, and is discussed in the following subsection.

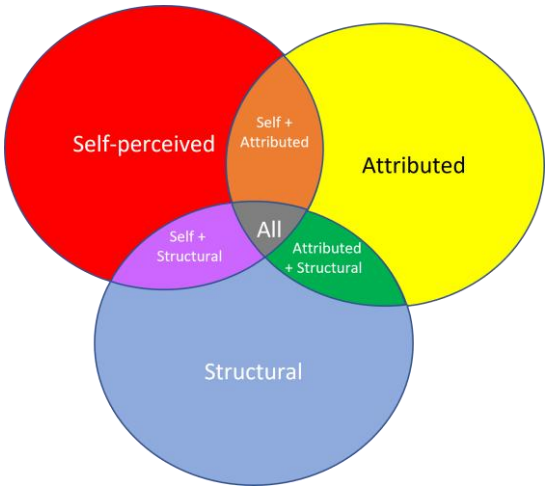


Figure 5. Influence types and their combinations reported in Paper II. Particular combinations are not assessed, but multiple forms of influence are assumed to make actors more influential. From Scheuermann et al. (2025).

To investigate these types of influence and power, I conducted semi-structured interviews. First, I defined the grain legume system as the value chain for products consumed within and produced wholly or partly in Sweden, and identified products through retail websites and expert opinion. I coded actors as belonging to one of five roles, with several actors belonging to more than one role: production, processing, distribution, consumption, or policy and regulatory environment. Next, I contacted multiple organizations within each of these roles to conduct semi-structured interviews aimed at getting deeper insight into each value chain role, ties between actors, and how actors perceive their (and others') influence in increasing grain legume consumption. I made a concerted effort to recruit actors working with grain legume products of different types (i.e., whole beans, processed products, and both) since research shows consumers perceive these products differently (Röös et al., 2022).

Ultimately, I interviewed 17 individuals representing 15 distinct organizations spanning the value chain roles. After conducting the interviews, I expanded the value chain role of policy and regulatory environment into seven categories to more specifically align with participant responses as a variety of actors were named as having influence over different action categories. This did result in multiple actor roles for which I lack interview data.

During the interviews, I asked open-ended questions and conducted a Likert-scale influence exercise to collect data about how actors perceive their own influence and others' influence over the action categories from Paper I. I coded the transcripts using MAXQDA 22, first using descriptive coding technique followed by thematic grouping (Tracy, 2013). I used this data in Paper

II to illustrate the context of the types of influence, and in Paper III as the basis of the conceptualizations of change analysis and two of the power measures.

Structuration and social networks

Mapping a system as a social network can reveal patterns of relationships between actors (Newman, 2018) that give insights into how actors exchange information and resources, build trust and norms, and collaborate (Barnes et al., 2025; Bodin, Baird, et al., 2020), which are all relevant for addressing social-ecological challenges. Many approaches and measures exist to evaluate structural elements of social networks at actor, actor group, and network levels. Particularly relevant for the papers in this thesis are measures at the actor group level as indication of closed (clustering) and open (betweenness centrality) structures. Closed structures facilitate building norms, trust, and collaboration, which can aid processes of transformative change (Berardo & Scholz, 2010; Bodin, Baird, et al., 2020; Hileman et al., 2018). Open structures help diffuse resources and knowledge from one part of the network to others (Hileman & Lubell, 2018; McAllister et al., 2015). These relationships are dynamic, so any network measurement is a snapshot of a particular point in time (Bodin, Mancilla García, et al., 2020). Actor level measures are also important in this thesis as a way to operationalize three types of power.

In tandem with the research to recruit interview participants, I constructed a list of connections between actors (i.e., an edgelist) based on the actors identified through desktop research and author expertise. I added additional actors identified by participants as having social ties (i.e., collaboration, information, project funding, ownership) to the edgelist, as well as organizations named in the influence exercise. To determine structural influence, I used the sna and igraph packages in R 4.3.1 (R Core Team, 2023) to calculate measures of centrality at the network and group (value chain and AKIS role) levels for Paper II, and the organization level for Paper III. I focused on measures that showed to what extent open and closed structures were present in the network (average path length for openness, clustering coefficient for closure) and within groups (betweenness centrality for openness, clustering coefficient for closure). I used UCINET to calculate the external-internal (EI) index at the group level to assess ties within and between groups as way to examine existing connections.

Operationalizing power and influence

The method I used to operationalize influence in Paper II is briefly explained under the "Structuration, influence, and power" subsection above, and summarized in Table 5. This method builds on prior work as indicated in Table 5, and is novel for the context of the grain legume value chain and AKIS in Sweden and for the combination of influence types.

Table 5. How self-perceived, attributed, and structural influence are operationalized in this thesis and their links to prior research.

Influence type	Measured by	Prior work
Self-perceived	Likert score of "5" on a scale of 1-5 for action categories with the potential to increase human grain legume consumption in Sweden	Action categories (Scheuermann et al., 2024) Concept (Jericó-Daminello et al., 2021; Mancilla García & Bodin, 2021)
Attributed	AKIS role named by another actor as having the most influence over action categories with the potential to increase human grain legume consumption in Sweden	Action categories (Scheuermann et al., 2024) Concept (Jericó-Daminello et al., 2021; Mancilla García & Bodin, 2021)
Structural	High clustering coefficient (closed structures) or betweenness centrality (open structures) at the actor group level	(Barnes et al., 2017; Constantino et al., 2022; Hileman et al., 2020)

The method I used to operationalize power in Paper III has face validity (in other words, it makes sense based on its explanation in the context; Leavy, 2023) in its grounding in social science literature, and is novel in its development and application (see Table 6). Actors with *power to* responded that they had the most influence over at least one action category with the potential to increase human grain legume consumption in Sweden during semi-structured interviews. *Power over (visible)* shows actors that receive ties from national agencies, indicating delegated authority in the form of funding for projects, or are themselves national authorities. *Power over (hidden)* combines structural results showing an above-average number of ties to other actors, but they were not named by other actors as having influence over any of the action categories with the potential to increase grain legume consumption in Sweden. *Power with* indicates where actors have high values for open and closed structures, indicating potential to contribute to building trust, norms, and collaboration and to serve as bridges to disseminate the same throughout the network (Barnes et al., 2017; Constantino et al., 2022).

Table 6. How types of power are operationalized in this thesis with examples.

Type of power	Data source	Measured by	Example
Power to	Interview transcripts	Self-perceived influence over actions to increase grain legume consumption	Rates own influence as "5" on Likert scale 1-5 as being able to influence particular action (e.g., change the food environment)
Power over (visible)	Social network analysis	Is or receives funding from government agency	Actor received grant from national agency e.g., FORMAS
Power over (hidden)	Social network analysis + interview transcripts	Above average out degree + not named as being influential by other actors	Actor has high centrality and is not named by other actors as being the most influential over actions with the potential to increase grain legume consumption
Power with	Social network analysis	Closure + centrality in network	Above average clustering coefficient + above average degree

Structuration and the Multi-Level Perspective

The Multi-Level Perspective (MLP) is a common conceptualization of the interplay between actors and their structures across system levels (e.g., Geels et al., 2023). This framework originated in socio-technical transitions (Rip & Kemp, 1998), has been continuously refined over the years (Geels, 2004, 2019; Geels et al., 2023) and also incorporated into social-ecological transformations research (Herrfahrdt-Pähle et al., 2020). Many iterations of the MLP exist, and I use the consumption-production system (CPS) MLP for its explicit inclusion of nature-society interactions and alignment with the topic of this thesis (Geels et al., 2023, see Figure 6). Niche actors co-construct the emerging radical innovation, which is influenced by both the broader landscape factors as well as the existing consumption-production regime, or dominant system. Collaboration at the niche level can increase the likelihood of successful breakthrough; however, this depends on many other factors including actor power and funding (Laakso et al., 2021; Moore et al., 2015). Another level of structuration occurs as the regime reconfigures with the contributions of the niche in the diffusion/disruption phase; these changes then allow the niche contributions to influence the landscape, which is crucial to shifting system

behavior as it reflects societal norms, values, and beliefs (Avelino, 2017; Smith & Stirling, 2010).

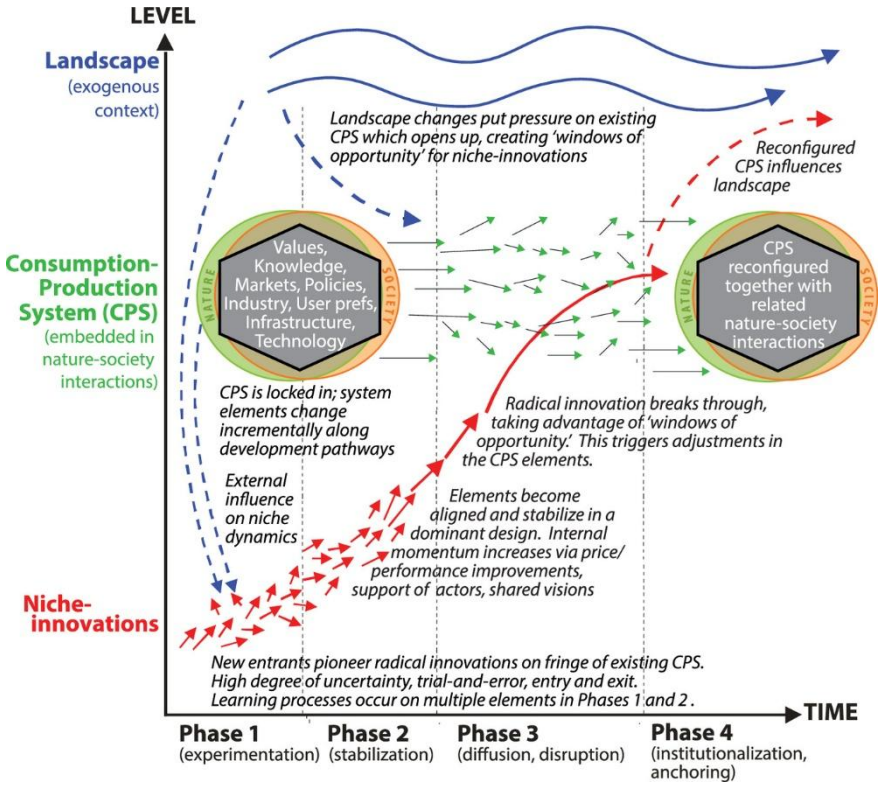


Figure 6. The Consumption-Production System (CPS) version of the Multi-Level Perspective illustrates how actors at different system levels interact with each other in processes of societal change. From Geels et al. (2023). Used with permission.

The CPS MLP is useful for understanding elements of the grain legume value chain and AKIS in Sweden for several reasons. First, conceptualizations about technology and its role in society are important elements in niche-regime dynamics (Geels et al., 2023; Rip & Kemp, 1998), and products emphasized by different actors draw on different technologies. Second, the grain legume value chain and AKIS contain a range of actors that represent both collaboration at the niche level and tension between incremental and radical development. Lastly, the links between consumption and production in the grain legume value chain and AKIS include food and feed, which can be perceived as sources of conflict or confusion in coordinating action across the food system (Koole, 2022).

A note on mixing methods

Using methods from both quantitative and qualitative traditions allowed me to combine multiple ways of understanding the grain legume value chain and AKIS in Sweden to answer the research questions. The social network analysis helped to understand the structural relationships of the system, and the semi-structured interviews to understand actor perceptions and priorities for grain legume products, dietary shifts, and system change. In this way, my approach is deliberately pragmatic, seeking to link empirics and their practical consequences (Johnson & Onwuegbuzie, 2004).

Data from Paper I undergirds Papers II and III, and is organized by leverage points, which are informed by system theory. Assembling the chain of leverage is based on perceptions of leverage point interactions; the effect of different actions on system behavior can never been fully known. The qualitative data used in Papers II and III considers individual perceptions and understandings as actual elements of reality under a constructivist approach. The broad approach to quantitative and qualitative data in both Papers II and III draws on structuration theory, using different types of data to operationalize influence and power. Structural influence, *power over (visible)*, *power over (hidden)*, and *power with* use social network analysis measures to analyze connections, which are grounded in participant perceptions of relationships. Self-perceived and attributed influence, as well as *power to* and *power over (hidden)* are also based on perceptions.

The theoretical bases of Papers I-III are related in that both structuration and leverage points place an emphasis on norms, values, and institutional rules as guiding system behavior and stability. Mixing methods, and the ontological and epistemological traditions often associated with those, is a way of understanding multiple elements of the system, and helps highlight the nuances necessary to uncover how power dynamics exist and influence relationships and system behavior. I designed this combination of methods based on their useful contributions to the research questions, the complementary benefits of the worldviews to aid understanding the system, and being aware of the differences between them when drawing insights from the data. Together, these frameworks and theories provide rich opportunity to use and advance methods for social-ecological research.

Participatory research

Paper IV originated in a participatory process at the science-policy-society interface informed by the science of the 2019 and 2025 EAT-*Lancet* Commissions. Co-hosted by EAT[3] and food system organizations spanning many roles and geographies, the dialogue processes leading up to the 2025 Stockholm Food Forum, and launch of the 2025 EAT-*Lancet* Commission, used a form of participatory research to redistribute discursive power around the concept of "who can do what?" for food system transformations. This format is an example of a multistakeholder initiative, where actors from many actor groups interacted under a broad structure designed by scientists and expert facilitators (Van Den Akker et al., 2024). Representation from many parts of the food system responded to calls for deepening democracy in food system research through participatory processes (Brock et al., 2024; Duncan et al., 2022).

Co-hosting organizations with supranational membership and spanning food system actor groups were recruited by EAT, and the organizations recruited participants from their networks. Participants opting to join the multistakeholder initiative broadly shared the vision of the 2025 EAT-*Lancet* Commission – healthy, sustainable, and just food systems. Participants met over a series of online dialogues within each sector group (i.e., Community for Action, hereafter "Community") that were led by expert facilitators. Representatives from each Community met in person for a cross-sector workshop ("Action Day") in advance of the 2025 Stockholm Food Forum. This workshop is the focus of Paper IV, and the prior dialogue process played a substantial role in preparing participants for the cross-sector workshop.

After the sectoral dialogues, I compiled the lists of actions identified by each Community during the process, which included actions to take; actions to stop; and actions needed by others to unlock change. I coded these actions descriptively, followed by categorical themeing to identify a list of 15 Common Action Areas across actor groups (Saldaña, 2021). These were presented to the in-person workshop attendees to inform their choices of breakout groups. During these groups, participants developed cross-sector actions and identified actor groups for each action. I analyzed the results of the workshop in a similar fashion, followed by deductive coding to identify multilateral processes or institutions. These results form the basis of Paper IV.

[3] EAT connects partners across science, policy, business, and civil society to achieve urgent and radical food system transformation by 2050. It hosted the 2019 and 2025 EAT-*Lancet* Commissions, which were independent, peer-reviewed scientific assessments.

The research process at the science-policy-society interface differed from my other work in more than just the expanded scale. First, the process was designed for stakeholders working on the front lines of food systems, and with a particular vision for the future. As such, this particular process may not be considered a full knowledge co-production process (Norström et al., 2020) as stakeholders were not involved in problem definition but were recruited for their mutual interest in a pre-defined shared vision of healthy, sustainable, and just food systems. However, the interaction between facilitators, participants, and researchers resembles models of knowledge co-production in the literature (Chambers et al., 2021), particularly in the importance of reflexive practice (Chambers et al., 2022).

Second, the Action Day workshop was facilitated by a mix of expert facilitators, researchers, and volunteering participants in person, while the online, sectoral dialogues were facilitated by a mix of expert facilitators and researchers. In these sessions, facilitators sometimes influenced the dialogue and workshop outputs by encouraging participants to identify ambitious actions that could transform their sector and/or food systems. Facilitators also developed the initial drafts of actions based on the dialogues and virtual whiteboard (dialogue notes) that were then edited by the participants. As a group, we tried to reduce the influence of any one individual on this filtering process by using multiple notetakers, discussing tensions and possible conflicts openly, and iterating and validating product outputs with the involved participants.

Ethical considerations

The Stockholm Resilience Centre Ethics Committee reviewed and provided guidance on the studies and materials in this thesis project, including the consent forms and the interview guide. Participation was voluntary and participants selected if and how they would like to be named in the work products for Papers II and III. Care was taken to remove identifying information from quotes used in the article, manuscripts, and thesis. Breakout group notes were used to analyze the data in Paper IV and identifying information was not collected, so being named was not possible. The studies in this thesis did not collect information of a personally sensitive nature, but the issue of dietary change and the implications for food system transformations can be sensitive topics. I am aware that respectfully engaging stakeholders in research is important to build trust not just for my own project but for their future relationship with researchers in general. I upheld these principles by being transparent with timelines, sharing draft work products, and distributing results so the work can be used in practice. In doing so, there were some uncomfortable moments when the research questions or results did not match their expectations or align with their vision of future food systems or dietary changes. In

these cases, I listened to their questions and feedback, responded using evidence from my research and documented the difference in perception in my notes. For example, in one case a participant asked me why anything needed to change in the grain legume value chain during an interview. I responded that some research had identified actions to reform the value chain based on my review of literature in Paper I. This example illustrates tensions inherent in researching processes of change where not all actors agree on what needs to change, even if they broadly agree on healthier, more sustainable diets. I chose to respectfully engage actors because their perspectives are important to understanding the system, and because building relationships between value chain actors and researchers can improve the dialogue between science and practice.

Summary of results

Paper I: Actions

Including peer-reviewed and grey literature to benefit from expertise and outcomes from European legume projects, I identified 96 actions with the potential to increase grain legume consumption by humans in Sweden. Over half (n=55) of the actions came from project reports or expert opinions, highlighting the relevance of including grey literature in a transparent manner when identifying actions that can contribute to transformative change in food systems.

Most of the identified actions with the potential to increase grain legume consumption fall into the categories of design and parameters using the Abson et al. (2017) framework, and fewer actions fall into the categories of feedback and intent. This is consistent with the findings from other studies (Dorninger et al., 2020; Slater et al., 2022) and may indicate a bias towards what is typically studied, and also the difficulty in both studying and translating system paradigms into discrete actions. Building on the chain of leverage concept developed by Fischer and Riechers (2019), I illustrated an example of a suite of actions (the "chain") to shift a deeper leverage point in Figure 7. While this example is specific to the practice and policy context of the case, it shows how a set of actions together could support a shift in social norms towards healthy diets (Brouwer et al., 2021), which would include an increase in grain legume consumption (Röös et al., 2022).

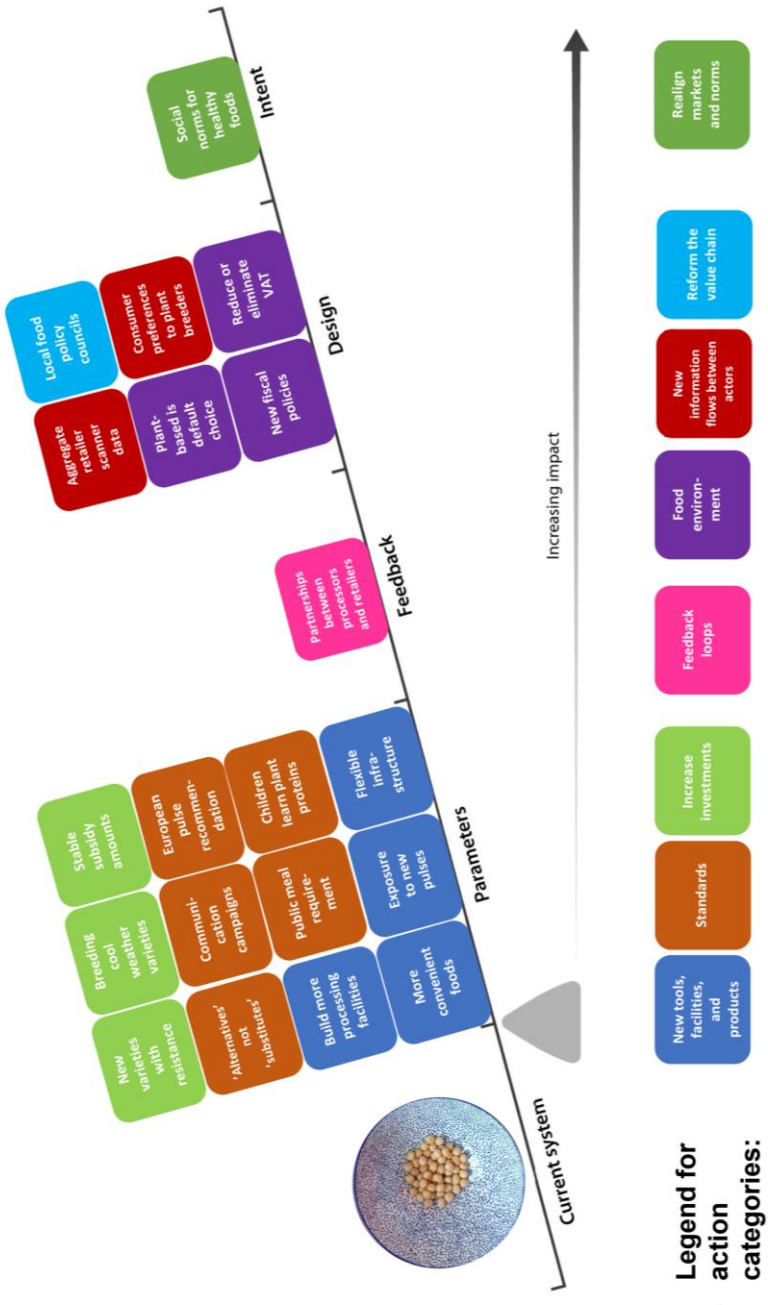


Figure 7. Example chain of leverage showing how a suite of actions may interact to shift the current system (low grain legume consumption) to a new paradigm of social norms for healthy foods, including increased grain legume consumption. Adapted from Scheuermann et al. (2024); concept by Fischer and Riechers (2019).

Paper II: Actor group influence and actions

The whole idea for us is that we want to be part of the whole chain.
-- Processor

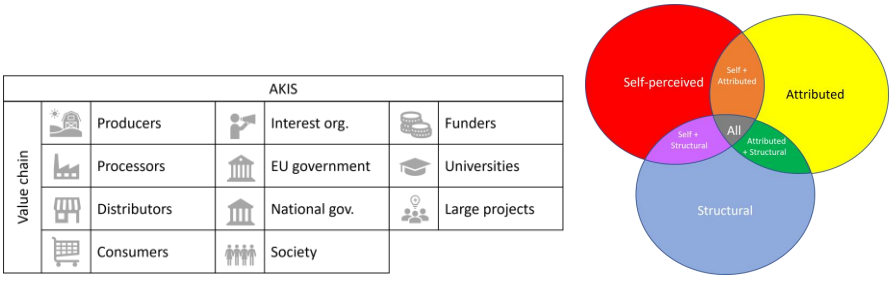
We sit outside and inside the whole system in a way.
-- Producer organization

Building on the action categories identified in Paper I, I used three types of influence in Paper II – self-perceived, attributed, and structural – to explore which actor groups can take what types of actions to increase grain legume consumption by humans in Sweden using materials from semi-structured interviews and desktop research. As illustrated with the quotes above, one finding from interviews was that the value chain was an insufficient framework for discussing actor roles in grain legume consumption, resulting in an expansion to the AKIS during the course of the study.

The synthesized results are presented in Figure 8 and briefly explained in this section. Interestingly, actor groups perceived and attributed a range of action categories across the leverage points framework to themselves and other actor groups; that is, there was no clear association between leverage points and particular actor group influence. The influence and actor group keys are repeated here to facilitate interpretation of the data.

Action category	Actors and their types of influence										
1. Realign markets and/or norms											
2. Develop national strategies											
3. Create knowledge/ collaborative networks											
4. Reform the value chain											
5. Build new information flows between actors											
6. Change regulatory approach											
7. Leverage CAP eligibility and/or farm regulations											
8. Change food environment											
9. Realign timeframes											
10. Create feedback loops											
11. Increase investments											
12. Change standards											
13. Share risk and profit differently											
14. Create collaborative structures											
15. Develop new tools, facilities, and/or products											

Figure 8. Self-perceived, attributed, and structural influence of actors over actions with the potential to increase grain legume consumption. The value chain actors included in interviews are located in the first four columns; all others are actors in the wider AKIS (note that self-perceived influence has not been assessed for these actors). The color scheme of the Venn diagram shows which combinations of influence actors have for the action categories. Blank cells indicate no self-perceived, attributed, or structural influence was identified. Figure from Scheuermann et al. (2025).



Producer organizations perceived themselves as having the most influence over three action categories (in grey), processors over thirteen categories (red or orange), distributors over four categories (red or orange), and the consumer organization over one category (red). None of the actor groups perceived themselves as having the most influence over two action categories: changing the regulatory approach and changing standards.

In the structural influence analysis, high results for the social network measures of open (betweenness centrality) and closed (clustering coefficient) structures at the group level were used to indicate where actor groups have structural influence. Closed structures can help build trust and collaboration, as well as develop new norms (Berardo & Scholz, 2010; McAllister et al., 2017). Open structures act as bridges to other groups in the network, able to diffuse resources and knowledge (Hileman & Lubell, 2018; McAllister et al., 2015). The EU government and society have high clustering (closed structures); interest organizations, the national government, and universities have high betweenness centrality (open structures); and producer organizations and large projects have high clustering and betweenness centrality. These cells are blue, green, or grey in Figure 8.

Paper III: Actor power and conceptualizations of change

> *It takes a good individual… it can be small scale and informal, and it can be the biggest store in the country. It is connected to a person.*
> -- Processor

> *What is our role here? We think our role is to make it possible to scale up from a little, good idea from a research or development study, and we can be the link to restaurants and big kitchens.*
> -- Farmer organization

> *I think that we can be the alternative system that is there for those that want it.*
> -- Processor

The findings in Paper III focus on the actor level rather than actor group level; that is, the results regard particular organizations in the grain legume value chain that participated in semi-structured interviews. The above quotations illustrate three levels in which participants perceive change happening – individual, organization, and system – based on inductive coding. Most actors perceived change happening at individual levels through consumer demand,

consumer knowledge, and individuals acting with organizations. Fewer actors emphasized change happening at the level of organizations (including large actors, large companies scaling smaller company innovations, and radical outsiders) and the system level (including innovation and technology, collaboration, and alternative systems to the mainstream). The emphasis on individual change contrasts with the need for changes at the system scale, yet reflects the reality of dietary shifts relying on different individual choices. Supporting individual behavior change may be better accomplished with more actors seeing system level change as necessary.

Looking at the types of power (see Table 6), the results show that the majority of actors have some form of *power to* – and together are perceived as having influence over all 15 action categories from Paper II**.** *Power over (visible)* focuses on the national government and its delegated authorities; half of the actors with this form of power emphasize the role of consumer demand in driving change in diets. This suggests a role for such actions as public campaigns to support dietary shifts supported by the government, similar to other public health campaigns.

An example of a combination of power that could be transformational is one actor with both *power over (hidden)* and *power with*. This actor emphasizes the role of niche development and interaction with the regime in processes of change. Unrecognized by others as having the most influence (*power over, hidden)* and simultaneously being highly connected (*power with)*, this actor could steer niche development in collaboration with others and result in a breakthrough innovation taken up by regime actors.

Using types of power at the organizational level, Paper III finds three actors have three different types of power that could give them influence over efforts to shift diets: one producer organization, and two processors. These actor roles are also perceived to have influence over many of the action categories in Paper II. However, actors that have *power with*, theorized to increase transformative potential (Partzsch, 2017), may also be important for dietary shifts despite fewer types of power and/or lower alignment of influence types. In particular, two processors with shared conceptualizations of change and a similar product focus on meat substitutes have the potential to influence production through volume and specification demands, and to influence consumption by shaping consumer tastes and preferences.

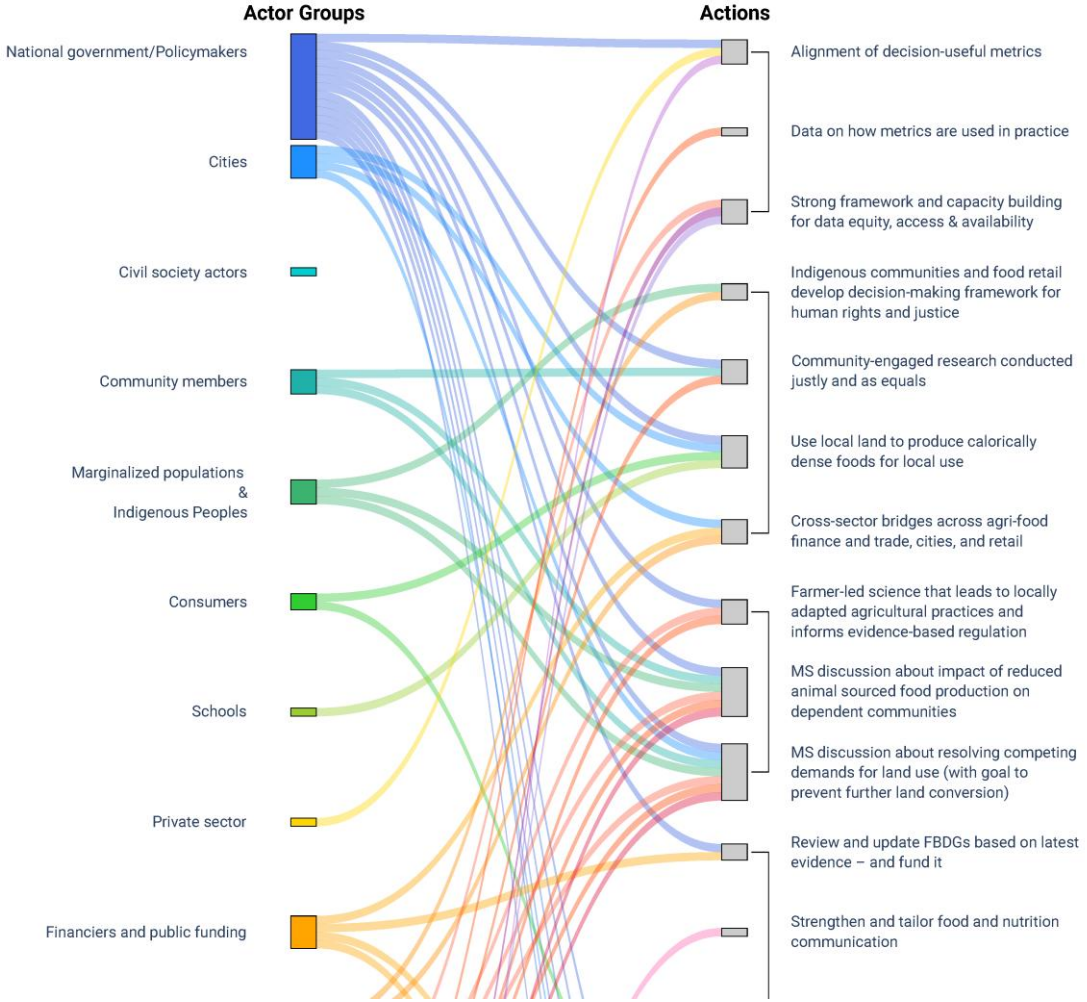
Paper IV: Multistakeholder dialogues to link actor groups and actions

> *We might think there are tensions, but maybe we just think that because we don't talk to each other that often*. – breakout group for "Enforcing healthy and sustainable diets" during Action Day workshop

In Paper IV, national governments are considered key actors for most actions to support transformative food system change. The height of the actor groups on the left side of Figure 9 shows that national governments are the most frequently identified actor group coming out of the cross-sector workshop. However, the particular ways in which they are asked to act differs: through direct legislative action, by enacting private sector and civil society recommendations, or by providing funding without dictating the terms of grants. These varied forms reflect their structural influence and power, as well as multiple calls for shifting some of that power towards communities.

The most colorful bars on the right side of Figure 9 show the actions with the greatest diversity of actor groups linked to them. These actions come from the same breakout group during the Action Day workshop, "Fix Farming," and involve multistakeholder dialogues at community levels to develop further actions. Only one action is linked to existing multilateral institutions (developing a framework and capacity building for data equity, access, and availability), and two breakout groups raised concerns about existing power dynamics within multilateral processes. Furthermore, one group named an action to create more safe multilateral spaces, but did not identify who would actually do so.

Notably, civil society actors are not linked to actions; these voices may be included within other actor groups associated with particular topics, such as consumers or community members. This type of gap points to the value of iterating between knowledge synthesis and action as part of the science-policy-society interface, where research can reflect back potential gaps for correction by the participants.


Actor Groups
Actions
National government/Policymakers
Cities
Civil society actors
Community members
Marginalized populations & Indigenous Peoples
Consumers
Schools
Private sector
Financiers and public funding
Alignment of decision-useful metrics
Data on how metrics are used in practice
Strong framework and capacity building for data equity, access & availability
Indigenous communities and food retail develop decision-making framework for human rights and justice
Community-engaged research conducted justly and as equals
Use local land to produce calorically dense foods for local use
Cross-sector bridges across agri-food finance and trade, cities, and retail
Farmer-led science that leads to locally adapted agricultural practices and informs evidence-based regulation
MS discussion about impact of reduced animal sourced food production on dependent communities
MS discussion about resolving competing demands for land use (with goal to prevent further land conversion)
Review and update FBDGs based on latest evidence – and fund it
Strengthen and tailor food and nutrition communication

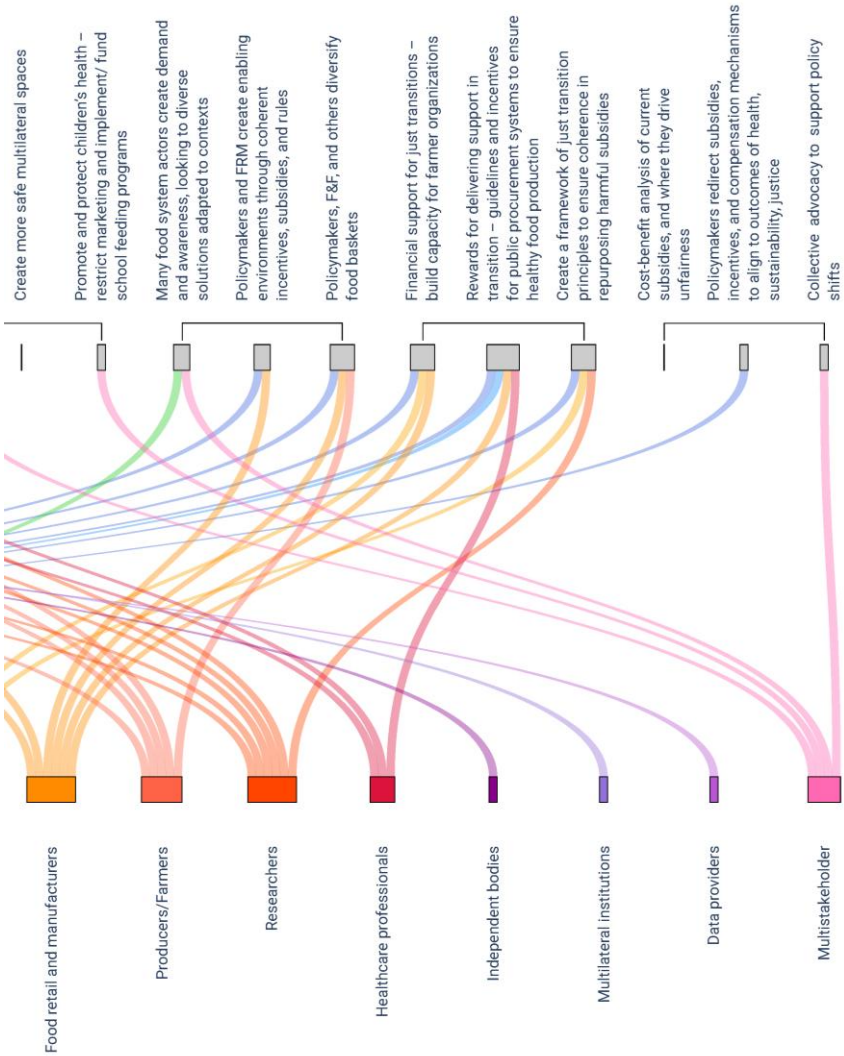


Figure 9. Links between actor groups and actions developed during the Action Day workshop. The height of the actor groups indicates how often they were named. On the right side, the colors indicate the actor groups for each action. The brackets indicate the three to four actions identified by each breakout group (N=7). (Scheuermann et al., 2026, in review; figure by Marina Sundiang).

Discussion

Who can do what in shifting towards healthy, sustainable diets?

What actions have potential to increase human consumption of grain legumes in Sweden?

The review of actions in Paper I focused specifically on the Swedish and European context for grain legumes. However, several actions from the global dialogues in Paper IV are similar to those in Paper I. Both sets of actions emphasize public procurement, changes to taxes and subsidies, investment in local value chains, recycling on-farm nutrients, collaborations between farmers and researchers, and public investment in underused crops as ways to support dietary shifts. While Paper I did not explicitly assess dimensions of justice, multiple actions relate to the 2025 EAT-*Lancet* Commission solutions addressing decent work and meaningful representation (Rockström et al., 2025), including redistributing risk and profit between value chain actors (e.g., Morel et al., 2020; Schwarz et al., 2021) and increasing the viability of smallholder farms through changes to Common Agricultural Policy (CAP) eligibility (Pia, 2020). Lastly, Papers I and IV both illustrate how actions identified by practitioners expand the available knowledge for tackling solutions for dietary shifts. Thus, these should be carefully considered alongside academic research to inform action.

The similarities across scales between Papers I and IV suggest common understandings of how to intervene in food systems to shift dietary outcomes, and could indicate shared food system drivers and institutional characteristics across multiple contexts. If so, coordinated action across national and supranational scales could synergize dietary shifts in several ways. Drawing on the X-curve, a bottom-up approach to experimentation and acceleration could identify groups of actions – such as those used in the illustrative chain of leverage in Paper I – to be adapted and replicated in other contexts. For example, setting a specific requirement for local grain legumes in school meals combined with experiential educational opportunities for children could create synergies between production (by increasing demand) and consumption. Sec-

ond, top-down action at the supranational level could unlock change at national and local levels. For example, changes to the scope of the CAP at the EU level could incentivize public investment in crop research for particular climates. Furthermore, framing these actions as innovations in the AKIS network could leverage additional resources and rebalance the focus on food and feed for grain legumes. While exact details would differ between contexts, the similarities of actions at the Swedish and global scales indicate coordination between national and supranational levels could be beneficial for shifting diets.

However, focusing only on production-related actions risks reinforcing the current feed-dominated system, as leguminous forage crops fix more nitrogen than grain legumes and may therefore be more attractive substitutes for fertilizer (Billen et al., 2021). This could reduce the supply of grain legumes available for food and hinder dietary shifts, prolonging preventable death and disease in the Swedish population. Likewise, focusing only on consumption may risk missing opportunities for improving soil and environmental health in Sweden through production changes (Watson et al., 2017). These possibilities reflect the "contrasting and sometimes conflicting" uses of legumes in visions of future food systems (Cusworth et al., 2021, p.8), reinforcing the need for a systems-level perspective to reduce unintended consequences to human and environmental health.

Intentionally expanding the interdisciplinary structure of the Swedish AKIS to include nutrition and health could be one way to start bringing together production and consumption implications for different actions in the same space. Drawing on the cross-sector dialogues in Paper IV, facilitated workshops with expanded AKIS participants – or with Swedish representatives of the Communities for Action – could focus on particular aspects of grain legume production and consumption for feed and food within Sweden. Grounding the cross-sector Communities for Action work in a place and on a particular topic would add specificity to the actions and actor groups, and could result in concrete policy recommendations at local, regional, and EU scales. The findings of this thesis could be a starting place for such discussions, serving as a boundary object for discussing elements of the current system to keep and those that need to break down or change in order to meet health and sustainability goals.

Contributions. In Paper I, I gather evidence for actions that can increase grain legume consumption in Sweden, which can be used to plan policies and advance research into particular interventions. I contribute to the conceptual understanding of the chain of leverage in Paper I by illustrating how actions could work in concert to shift social norms around healthy foods, which would represent a paradigm shift in Sweden. In addition, by bringing in expert

knowledge and project reports into consideration alongside peer-reviewed publications, I highlight the depth of knowledge developed in large projects – many of which are financed with taxpayer money – that remains hidden from academia when we focus solely on peer-reviewed studies for evidence. Carrying the findings from Paper I to the other work in this thesis, I link the scientific evidence and policy opportunities for leveraging existing knowledge and structures – such as the AKIS – to more strongly connect production and consumption to support human and planetary health.

What actors and actor groups have power and influence to increase human consumption of grain legumes in Sweden?

In this thesis, I find that different types of power and influence sometimes, but not always, coexist, revealing a complex picture of actor and actor group perceptions and capacities. First, Paper II finds that producers (farmer organizations) in the Swedish grain legume value chain are perceived as having a lot of influence by other actors and have structural influence, but do not perceive their own influence as often as others do. Paper III finds that one of these organizations has three types of power and the other two types of power, affirming their importance in transformative change as either potential enablers or blockers. These suggest a complex picture of farmer influence by different stakeholder groups and at different scales.

In Sweden (and at the EU scale, e.g., Copa Cogeca), farmer organizations have their roots in collective action to benefit smaller farms. However, farms continue to grow larger in Sweden even while the number of farmers falls (Eurostat, 2022), and these farms no longer match the size of smallholder farms that provide food in most parts of the world. Furthermore, the findings suggest that while individual farmers are located within the value chain, the farmer organizations are operating at the political and institutional level of the AKIS, able to influence the system drivers in addition to influencing diets. The lack of self-perceived influence for many actions on the part of farmer organizations may reflect responses rooted in their actor role as farmers as opposed to political institutions, or their disinterest in acknowledging influence if it does not align with the organizational agenda. Whatever the reason for the discrepancy, farmer organizations are likely important for helping or hindering dietary shifts.

A second finding calls attention to the discrepancy between how food processors/manufacturers see their own capacities versus how others perceive them. Paper II shows that processors perceive themselves as having the highest influence over 13 of 15 action categories to increase grain legume consumption in Sweden, but others name them as having the most influence over only seven

of these. Paper III finds that nearly half of the processors have *power over (hidden)*, and they also span different product types (e.g., whole beans, meat substitutes) suggesting their product line is not the main driver of their influence/power. Interestingly, food manufacturers were named only one time in the cross-sector workshop presented in Paper IV, where they are linked to creating an enabling environment for increasing access, affordability, and tastiness of healthy and sustainable diets in collaboration with food retailers and policymakers. The discrepancy between their own perceptions and what others recognize or ask of them exists across levels of the food system, and could indicate untapped potential for resources and responsibility in shifting diets for health and sustainability.

Furthermore, the way in which grain legumes are processed and manufactured impacts how convenient, healthy, and affordable they are, as well as their environmental footprint (Bunge et al., 2024; Tidåker et al., 2021). The lack of grain legume boiling and packing facilities in Sweden has been pointed out for many years (Tidåker et al., 2021), yet current investments are in factories with more "value-added" products, such as protein powder from peas (Lantmännen, 2025). Investment in infrastructure that supports a wider variety of product types to support health and convenience could help make preparing grain legumes more feasible for more people, and national authorities and food processors could work together to make this happen at a national or Nordic level.

Thirdly, most actors in Paper III conceptualize change in grain legume consumption in Sweden as happening at the individual level through increased knowledge and demand, and through individual roles within organizations. Seen through the lens of structuration theory, individual choices create and reproduce the social norms that further enable or constrain behavior (Biely, 2022). Research in Sweden shows that even if people want to eat more grain legumes, the social norms of beans being less fun, less popular, and less festive compared to meat (Röös et al., 2022) may deter them from choosing grain legumes. Here, the processors focused on meat substitutes that have *power with* could collaborate at the niche level to shape consumer demand, influence the type of grain legume production (e.g., high protein content, easy processing), and help shift the social norms of grain legume-based meat substitutes.

Lastly, an important way for all actors to be able to build and exercise influence and power is through inclusion in processes that impact them. Paper IV finds that intentionally recruiting actors from diverse geographies and enabling their participation through travel grants increased the diversity of voices and ideas present in cross-sector dialogues. This resulted in more balanced representations across actor groups, such as more farmers and representatives

of Indigenous Peoples, and may have opened the possibility for concrete partnerships, such as farmers leading collaborations with scientists to develop locally adapted agricultural practices. In addition, multistakeholder dialogues may be a promising way to foster *power with*, linked to collective action for transformative change and democratic deliberation (Bornemann & Weiland, 2019), at different levels of the food system. Identifying shared goals is a prerequisite for mobilizing capacities for transformative change; this process requires careful attention to representation across actors and actor groups, facilitation that identifies and addresses power dynamics, and commitment to continuous engagement over time (Apffelstaedt et al., 2024; Huttunen et al., 2022; Mena & Palazzo, 2012).

Contributions. In Paper II, I contribute to the evidence base of dietary shifts in Sweden by linking actions with the potential to increase grain legume consumption to actor groups in the grain legume value chain and AKIS. In Paper III, I integrate actor perceptions of change and types of power in dietary shifts to more concretely link social theory to food system sustainability and transformation research. Through both Papers II and III, I contribute to the methods for assessing influence and power in social-ecological systems research. Building on prior work (Jericó-Daminello et al., 2021; Mancilla García & Bodin, 2021), I link self-perceived, attributed, and structural influence and provide a visual tool through the analysis for presenting these to stakeholders. This presentation is adapted in Paper IV for self-perceived and attributed influence over actions at a global scale for food system sectors. I also respond to the call to assess power in social-ecological research by operationalizing four types of power in Paper III. This work is a building block towards assigning responsibility to specific actors for system change.

How do cross-sectoral actor groups link actors and actions for healthy, sustainable, and just food systems at a global level?

One of the tensions emerging from the cross-sector workshop included in Paper IV was the different perceptions between community-led (i.e., bottom-up) and government- or multilateral-led (i.e., top-down) action for healthy, sustainable, and just food systems. Groups focusing on social justice and farming emphasized the importance of community-led processes, and the two "intent" actions coming out of the workshop were from these two groups. This emphasis on changing system goals and paradigms – the essence of intent actions (Abson et al., 2017) – would rebalance power dynamics by assigning specific roles to farmers, community members, academics, and policymakers. The latter would be restricted to funding and/or taking up recommendations by partnerships to institutionalize them. Groups emphasizing more active roles for

national governments pointed to existing institutions to leverage coordinated action, such as multilateral processes; government authority to tax and subsidize production and consumption; and government functions that could be utilized such as public procurement, education, and urban planning. These actions suggest more incremental approaches to changing existing structures rather than building new ones.

The two actions linked to the most actor groups are: (1) "holding multistakeholder discussions at community levels about the impact of reduced animal sourced foods on dependent communities," and (2) " holding multistakeholder discussions at community levels about resolving competing demands for land use." Originating from the "Fix Farming" breakout group, these actions are both firmly rooted in community decision making, and could leverage governance models such as local food policy councils to institutionalize new structures focused on transformation (Rao et al., 2025).

In Paper II, the most similar results to holding multistakeholder dialogues are "creating collaborative networks" and "building new information flows between actors." Multiple actors are attributed influence and have structural influence for these action categories, yet only two perceive their own influence – farmer organizations and processors. As conveners of multiple actor groups, large projects could serve this convening function, but the task of identifying shared visions and developing the trust to openly communicate about tradeoffs requires longer time horizons and funding than most research grants currently allow (Bodin, 2017; Bodin, Mancilla García, et al., 2020; Österblom & Bodin, 2012).

Local action is essential for food system transformations, yet distributed decision making poses challenges to coordinating across food system levels. Greenhouse gas emissions, hydrological connections, global markets and financial systems, and supranational agreements such as trade rules bind communities to structures and processes larger than themselves. This interplay between local and supranational levels calls for re-examination of the nationally-organized AKIS as a useful framework for understanding actions and actors to change food systems. Yet, cohesive policy and practice approaches across sectors and national borders require coordinating institutions and processes. Here, other forms of public sector-led governance could lead collaborative initiatves with attention to power dynamics between actors (Patay et al., 2025) in order to prioritize the public interest in healthy, sustainable, and just food systems. Networks of city governments (e.g., Milan Urban Food Policy Pact, C40 Cities) actively contributed to the multistakeholder dialogues and workshop studied in this thesis, and may be positioned to experiment with this middle space of governance in collaboration with other actors. Other research has suggested the global food system transformation effort is moving towards the

intersection of the build-up and breakdown curves where reconfiguration happens. Building trust between actors, a shared understanding of the system, and a common enough view of change in advance could make institutionalization of this type of "shadow network" more likely (Olsson et al., 2006).

Contributions. In Paper IV, I contribute to the evidence linking actions and actor groups as part of food system transformations. I further develop the perceived influence analysis from Paper II and apply it to a global setting. I also contribute to the multistakeholder initiative literature by linking legitimacy and representational justice in the framing of the Action Day workshop. By analyzing a real-world process linked to a flagship food system report, I reflect back to the research community the results of the science-policy-society interface, continuing the interaction between stakeholder groups. Clearly articulating the interaction between researchers and food system stakeholder groups advances the literature of the science-policy-society interface and integrates practitioner knowledge into the food system transformation evidence base.

Study relevance to other contexts

These findings from a case study in Sweden are relevant for other contexts in several ways. Most people in high-income countries, and many people in low- and middle-income countries, face increased risk of preventable, diet-related disease due to over-consumption of some foods (e.g., snacks, red and processed meat) and under-consumption of others (e.g., vegetables and legumes). As societies, we eat fewer plant foods, including grain legumes, than research and traditional diets indicate are best for our health and the health of the planet.

The findings of this thesis indicate many actors perceive individual change and consumer knowledge as important parts of changing diets. The knowledge about grain legumes that people report needing is how to cook and prepare them (Röös et al., 2022), not just that they are healthy. Increasing this culinary knowledge – and protecting it where it still exists – is important for the health of future generations and for preserving food cultures around the world (Jaime & Braga, 2026). In addition, primary food preparation is also a critical skill for crisis preparedness in the case of disruptions to existing food operations (Livsmedelsverket, 2025). In many countries, public authorities have the legitimacy to address this public education issue in a way that fits the culture and context. Addressing the externalities of current food production and consumption – namely, increased healthcare and environmental costs – is one way to redirect financing towards healthy food systems interventions such as public education. The details of true cost accounting are beyond the scope of this thesis, and implementation faces numerous hurdles. Knowledge and innovation networks could use their resources to expand into such long-term, systemic challenges.

In this thesis, I show the coherent approach that an EU member state has to agricultural production in the alignment of the CAP, a national-level food strategy, and the national agricultural knowledge and innovation system – and how these conflict with the public health and environmental goals, as well as the dietary guidelines at a national level. Particularly with the increased focus on self-sufficiency and preparedness by the EU and its member states, health and nutrition should be considered alongside production policy. Coherent policies and strategies are needed to support enable healthy diets for the population, with or without a crisis.

Lastly, the methods I developed to assess types of influence and power can be used and further developed in other contexts, adding to the evidence base. These can be adapted for use in different sectors in addition to other parts of food systems. In particular, presenting the results of influence assessments (e.g., Figure 9) to the participants creates a boundary object, allowing participants to see how others perceive them. These ingredients can be used in any context to contribute to healthy, sustainable, and just food systems.

Reflections and future work

Is food special?

> *Market systems can only exist if there is supply and demand. Need becomes a demand only when an individual has the money to act on that need. Are we moving toward a system where only those who earn money will be able to eat?... If people cannot buy food, they die or they riot. The final question then becomes: Is the food system so different that it needs special policies?* – (Hendrickson et al., 2008)

Hendrickson et al. (2008) bluntly state the consequences for governments when there is food insecurity, which explain why food policies are a central element to government survival. Executive changes that are not aligned with producer capacities and means can topple governments and weaken wider social policies, such as Sri Lanka's 2021 switch to organic agriculture (Drechsel et al., 2025) and the EU Green Deal, which was weakened following farmer protests (European Commission, 2024b). Around the world, interests in national security and self-sufficiency highlight the importance of domestic and regional producers. In Sweden, this emphasis is clear in the National Food Strategy, yet nutrition and health must not fall by the wayside.

In participant interviews and dialogues, individuals frequently referenced "the market" as a source of a particular problem, solution, or mediating factor beyond anyone's control – sometimes even referenced as an actor itself. These perspectives show the power of the economic system to shape the food system, and how dependence on it can reinforce the existing system: actors can gain power and influence through markets, and use it to protect the market rules that benefit them (Baudish et al., 2024). In practice, markets are dynamic interactions between actors that are regulated by governments at multiple scales. Market share and concentration is particularly relevant to monitor where diversification of company portfolios reduces brand choices for consumers (for example, Lantmännen's dual investment in a yellow pea protein factory and purchase of Sweden's largest meat company) and risks perpetuating the status quo. This type of structural influence and power are critical to evaluate in order to increase equity and health at all food system scales.

Fostering deliberation in democratic spaces could help build shared visions and trust (Bornemann & Weiland, 2019; Hendriks, 2009), another form of structural influence that aids collaboration (Bodin, Baird, et al., 2020). In Sweden, this could be reactivating the citizen panel for food (Blom & Quetel, 2024) to examine power, equity, and desired changes for food systems. Swedish research shows that many people want to eat more healthy and diverse diets, including more grain legumes (Röös et al., 2022). Addressing reported barriers to eating grain legumes as part of healthy diets includes increasing both the innovation and value of convenient, minimally processed foods (Jaime & Braga, 2026). Examples of this include developing new types of grain legume products, not just substitutes of animal products (Bjurström & Lindgren, 2016), and reconsidering how value is added to foods: towards household and community kitchens, and away from ultra-processed foods (Jaime & Braga, 2026). Engaging people directly in planning how to make these changes and identify others may be a way forward for cohesive, acceptable strategies at the national scale. Kaljonen et al. (2025) describe a similar process in Finland, suggesting this could be readily adapted to the Swedish context.

At the same time, developing the body of research in the translational space between local and global food systems may help identify similarities across contexts and benefit from knowledge that already exists. Additional experimentation at the meso level – between communities and supranational entities – could help balance replicating and spreading (i.e., translating initiatives to dissimilar contexts; Lam et al., 2020) and fairly downscaling global targets (e.g., fair carbon budgets). Following Wood et al. (2023), polycentric regional governance with attention to agency and power could help navigate scales and rebalance power in food systems in this meso space.

Connecting research and action

A personal goal I had in my PhD studies was to connect my work with its implications for policy and practice. To that end, I asked myself how each of the papers could inform the connection between knowledge and action to support food system change.

Paper I shows how expert knowledge and project reports can be leveraged for expanding possible actions to increase grain legume consumption. The example chain of leverage shows one way to build a bundle of actions for dietary shifts, and this could be replicated in specific contexts. In this paper, I suggest that a range of food system actors be included in this exercise; after additional years of work and study, I would emphasize the importance of diverse participation and deliberative processes to this effort.

Paper IV allowed me to use the opportunity of the 2025 Stockholm Food Forum and EAT dialogues to link research done in Sweden to the global level. Adapting the influence analysis and results format of Paper II, I used a similar table in the Paper IV dialogue process, and actors were surprised at discrepancies between self-perceived and attributed influence. Anecdotal evidence suggests this allowed them to enter conversations about specific actions in a different way, opening up space for topics with tension, such as loss of livelihoods due to dietary shifts and the impact on community life. I presented the Paper II results to Swedish grain legume researchers and practitioners, who also found it a useful way to analyze possibilities and gaps between actor groups and actions.

Lastly, diving into specific forms of power and the potential of collective action led me to the potential of food policy councils for food system governance. Paper III suggests that these could be promising forms of regional governance as local food strategies are updated in Sweden following the National Food Strategy update.

Considerations for future work

The majority of work in this thesis focuses on one part of the Swedish food system, and future work can integrate these results with other components of the food system. For example, linking recent developments in the projected change in demand for feed with newly released plans for increasing cheese-making capacity in Sweden that could trigger larger dairy cow herds and increase in feed demand, including grain legumes (Arla Foods, 2026). Such a scope could be further expanded to a European level using the mission-oriented agrifood innovation system as a framework to evaluate increasing self-sufficiency along with national security links to healthy and sustainable diets. In doing so, this research could deepen the exploration of how components of

the food system move through the navigation and stabilization phases of transformation, particularly the breakdown and phase-out stages. In addition, engaging with the supply chain scholarship in the business community could provide an additional evidence base for advancing research on food system change.

Methodological choices I made during my research have their strengths and limitations. To maximize participant comfort and openness, I conducted interviews in their language of preference, English or Swedish; the majority of participants chose Swedish. I fully understood their responses but am not a native speaker, and may have asked more probing questions if I were. For the social network analysis, building a network that reflected the context in which actors operate – their connections to many types of actors, not just their connections to other interviewees – allowed for actor group analysis and a picture of a wider system. However, this choice limited the type of quantitative analysis that could be done, as the network was not closed and resources did not allow for interviewing all 543 actors. Another opportunity for future research would bring the stakeholders together in a workshop to present the results of the perceived influence exercise and use it as a boundary object to discuss "who can do what?" in a facilitated group setting. This structure would build on the methods used for the Paper IV workshop and apply it to the grain legume value chain and AKIS in Sweden. Having a shared policy and operational context (i.e., Sweden and the EU) has the potential to make workshop outcomes more concrete and actionable.

In Paper IV, I chose to create an opportunity for research during the multi-stakeholder dialogue and workshop process; however, the focus of the process design was for participant engagement and utility in sector and cross-sector groups working for food system change. In future cases, I would start earlier in creating opportunities for capturing reflections and tracking changes in individual and group positions and priorities over time. In addition, there are several possibilities for future work to leverage the existing Communities for Action structure. Building on the cross-sector workshop, participants from multiple sectors working in the same geographical area could form a place-based Community to continue their dialogues in a specific policy and operational context. Another possibility is for participants in multiple places to form a Community around a particular theme or group of actions across contexts. In both cases researchers can contribute to the processes through iterative analyses and facilitation, and can further develop the scientific literature by identifying commonalities across contexts linked to transformative change.

I also offer a brief reflection on the AKIS and value chain frameworks used in this thesis: these are largely economic in their focus, which is practical but risks perpetuating a capitalist system that is also pointed to as needing to fundamentally change (Avelino et al., 2024; Mattioni et al., 2022; Morrison et al.,

2022). Using these frameworks (e.g., to identify actors to interview) risks that actor visions are limited by the need to stay within that frame for survival. The food system does rely on private actors, so their perspectives are important, but theirs are not the only views that matter. Additional research can build on this work to include a broader range of operating logics – such as state and community approaches – for a more diverse set of perspectives and actors. While these may seem more radical compared to solutions centered in the current structure, one could argue these would be more transformative, if more difficult to implement.

Lastly, future research convening diverse participants from civil society and the grain legume value chain could inform approaches to knowledge and innovation currently steered by agricultural production priorities. Bringing in diverse perspectives and fostering *power with* by building relationships between actor groups could expand the possibilities for what is considered a worthwhile and valuable innovation from societal as well as business perspectives. Specific consideration of the trade-offs of health and convenience for different types of grain legume products – particularly in relation to the time women spend planning and preparing meals – has the potential to add societal value. Furthermore, including the health, environment, and justice consequences of production and consumption choices could also inform the AKIS direction in a way that supports preparedness, nutrition, employment, and sustainability in Sweden. Lastly, the X-curve has been used in participant workshops (Hebinck et al., 2022), and could be integrated to facilitate discussions about build-up and breakdown in the context of knowledge and innovation. Considering these topics in diverse actor groups can further advance understanding of actors and actions in food system transformation processes.

Learning journey

> *A core goal of public policy should be to facilitate the development of institutions that bring out the best in humans* – (Ostrom, 2010)

Embarking on my PhD journey came after 18 years of working in many types of institutions aimed at bringing out the best in humans: education; public health nutrition programs; national budgeting; hospital and health system contracting; mental health and substance use services; and university research. At many times the PhD felt like starting over, and only now towards the end do I see the red thread, with the help of Ostrom's words, and feel the confidence to integrate my experiences from many disciplines under this umbrella.

My penchant for public policy reflects an upbringing in Washington D.C., years as a U.S. Presidential Management Fellow, and training in public health, a discipline grounded in public authority and strong institutions. I have my parents and the community they helped create to thank for my grounding in social justice and belief in the best in people. These characteristics are part of who I am, and they have motivated my choices and my work throughout my life, including choices in research for my PhD.

I started this program when my child was 17 months old, providing me the humbling opportunity to study human behavior, power, and responsibility from many angles. In his foreword to Adam Kahane's *Collaborating with the Enemy* (2017), Peter Block calls out most social transformations as "thinly veiled versions of how we try to get other people to change" (p. xii). Human and environmental health depend on us changing food systems, including what we eat. Also, as people, we do not like to be told what to do.

As a budding researcher, I see participatory forms of governance with access to knowledge – and with authority to shape system trajectories – as essential for linking research to action. This linkage has the potential to redistribute the power of knowledge to the people that fund much of our work in the first place. It also risks remaking public health, established institutions, and democracy. What are the possibilities? My learning journey continues.

Conclusion

This thesis addresses pulses and power, examining "who can do what?" for healthy and sustainable diets in Sweden. Increasing grain legume production and consumption is a powerful lever to achieve multiple health and environmental goals. In this thesis, I advance the understanding of actions with the potential to support food system transformations in Sweden, link them to actor groups using three types of influence, and develop a novel method to assess types of actor power in dietary shifts. Using leverage points, the MLP and structuration theory, I advance the use of mixed methods in a food system case study and highlight opportunities for practice and policy to use the study findings. Connecting to a larger multistakeholder dialogue process, I adapt the influence analysis to evaluate actor group alignment at a global level, which aided participants in linking cross-sector actions to actor groups. Results show the many ways actors can use their position to influence change, the importance of building *power with*, and the possibilities for collaborative dialogues moving towards wider system change. In summary, this thesis adds to the toolbox of methods for social-ecological research, building towards more concrete linkage between actors and responsibility for change in food system transformations.

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References

Abson, D. J., Fischer, J., Leventon, J., Newig, J., Schomerus, T., Vilsmaier, U., von Wehrden, H., Abernethy, P., Ives, C. D., Jager, N. W., & Lang, D. J. (2017). Leverage points for sustainability transformation. *Ambio*, *46*(1), 30–39. https://doi.org/10.1007/s13280-016-0800-y

Afshin, A., Micha, R., Khatibzadeh, S., & Mozaffarian, D. (2014). Consumption of nuts and legumes and risk of incident ischemic heart disease, stroke, and diabetes: A systematic review and meta-analysis. *The American Journal of Clinical Nutrition*, *100*(1), 278–288. https://doi.org/10.3945/ajcn.113.076901

Afshin, A., Sur, P. J., Fay, K. A., Cornaby, L., Ferrara, G., Salama, J. S., Mullany, E. C., Abate, K. H., Abbafati, C., Abebe, Z., Afarideh, M., Aggarwal, A., Agrawal, S., Akinyemiju, T., Alahdab, F., Bacha, U., Bachman, V. F., Badali, H., Badawi, A., … Murray, C. J. L. (2019). Health effects of dietary risks in 195 countries, 1990–2017: A systematic analysis for the Global Burden of Disease Study 2017. *The Lancet*, *393*(10184), 1958–1972. https://doi.org/10.1016/S0140-6736(19)30041-8

Amcoff, E., Edberg, A., Enghardt Barbieri, H., Lindroos, A. K., Nälsén, C., Pearson, M., & Warensjö Lemming, E. (2012). Riksmaten—Vuxna 2010-11 Livsmedels- och näringsintag bland vuxna i Sverige. *Livsmedelsverket*. http://www.slv.se/upload/dokument/rapporter/mat_naring/2012/riksmaten_2010_2011.pdf

Andréasson Sjögren, A., Heimdahl, J., & Leino, M. (2020). *Svensk trädgårdshistoria: Förhistoria och medeltid*. Kungl. Vitterhetsakademien.

Apffelstaedt, K., Schrage, S., & Gilbert, D. U. (2024). Multi-stakeholder Initiatives and Legitimacy: A Deliberative Systems Perspective. *Business Ethics Quarterly*, *34*(3), 375–408. https://doi.org/10.1017/beq.2023.12

Arla Foods. (2026, February 25). *Arla gör sin största investering någonsin – nytt ostmejeri i Götene*. Arla. https://www.arla.se/om-arla/nyheter-press/2026/pressrelease/arla-gor-sin-storsta-investering-nagonsin-nytt-ostmejeri-i-gotene-4260596/

Auer, J., Alminger, M., Marinea, M., Johansson, M., Zamaratskaia, G., Högberg, A., & Langton, M. (2024). Assessing the digestibility and estimated bioavailability/ bioaccessibility of plant-based proteins and

minerals from soy, pea, and faba bean ingredients. *LWT*, *197*, 115893. https://doi.org/10.1016/j.lwt.2024.115893

Avelino, F. (2017). Power in Sustainability Transitions: Analysing power and (dis)empowerment in transformative change towards sustainability: Power in Sustainability Transitions. *Environmental Policy and Governance*, *27*(6), 505–520. https://doi.org/10.1002/eet.1777

Avelino, F. (2021). Theories of power and social change. Power contestations and their implications for research on social change and innovation. *Journal of Political Power*, *14*(3), 425–448. https://doi.org/10.1080/2158379X.2021.1875307

Avelino, F., Wijsman, K., Van Steenbergen, F., Jhagroe, S., Wittmayer, J., Akerboom, S., Bogner, K., Jansen, E. F., Frantzeskaki, N., & Kalfagianni, A. (2024). Just Sustainability Transitions: Politics, Power, and Prefiguration in Transformative Change Toward Justice and Sustainability. *Annual Review of Environment and Resources*, *49*(1), 519–547. https://doi.org/10.1146/annurev-environ-112321-081722

Bair, J. (2008). 1. Global Commodity Chains: Genealogy and Review. In J. Bair (Ed.), *Frontiers of Commodity Chain Research* (pp. 1–34). Stanford University Press. https://doi.org/10.1515/9780804779760-003

Barnes, M. L., Bodin, Ö., Guerrero, A. M., McAllister, R. R. J., Alexander, S. M., & Robins, G. (2017). The social structural foundations of adaptation and transformation in social-ecological systems. *Ecology and Society*, *22*(4), art16. https://doi.org/10.5751/ES-09769-220416

Barnes, M. L., Bodin, Ö., & Prell, C. (2025). Social structural processes and environmental problem solving. In *Handbook of Social Networks and the Environment*. https://doi.org/10.4337/9781035318759.00011

Barnes, M. L., Wang, P., Cinner, J. E., Graham, N. A. J., Guerrero, A. M., Jasny, L., Lau, J., Sutcliffe, S. R., & Zamborain-Mason, J. (2020). Social determinants of adaptive and transformative responses to climate change. *Nature Climate Change*, *10*(9), 823–828. https://doi.org/10.1038/s41558-020-0871-4

Baudish, I., Sahlin, K. R., Béné, C., Oosterveer, P., Prins, H., & Pereira, L. (2024). Power & protein—Closing the 'justice gap' for food system transformation. *Environmental Research Letters*, *19*(8), 084058. https://doi.org/10.1088/1748-9326/ad3d6f

Béné, C. (2022). Why the Great Food Transformation may not happen – A deep-dive into our food systems' political economy, controversies and politics of evidence. *World Development*, *154*, 105881. https://doi.org/10.1016/j.worlddev.2022.105881

Berardo, R., & Scholz, J. T. (2010). Self-Organizing Policy Networks: Risk, Partner Selection, and Cooperation in Estuaries. *American Journal of Political Science*, *54*(3), 632–649. https://doi.org/10.1111/j.1540-5907.2010.00451.x

Biely, K. (2022). *The Behavioral Perspective, Working paper 1*. https://doi.org/10.4233/UUID:0F0A5234-EC1F-44B1-88D5-49D703814C2C

Billen, G., Aguilera, E., Einarsson, R., Garnier, J., Gingrich, S., Grizzetti, B., Lassaletta, L., Le Noë, J., & Sanz-Cobena, A. (2021). Reshaping the European agro-food system and closing its nitrogen cycle: The potential of combining dietary change, agroecology, and circularity. *One Earth*, *4*(6), 839–850. https://doi.org/10.1016/j.oneear.2021.05.008

Bjurström, L., & Lindgren, T. (2016). *Proteinskiftet* (No. 8; Insikter). macklean. https://static1.squarespace.com/static/5d78e1040fcfe81e978a7dec/t/5e96ded3d84b1b6132625c01/1586945850633/macklean-insikter-8---proteinskiftet.pdf

Blom, I., & Quetel, A.-K. (2024). *Medborgarpanel om hållbar livsmedelskonsumtion* (L 2024 nr 1). Livsmedelsverket. https://www.livsmedelsverket.se/globalassets/publikationsdatabas/rapporter/2024/l-2024-nr-01-medborgarpanel-om-hallbar-livsmedelskonsumtion-samt-slutrapport.pdf

Blomhoff, R., Andersen, R., Arnesen, E. K., Christensen, J. J., Eneroth, H., Erkkola, M., Gudanavicine, I., Halldórsson, Þ. I., Høyer-Lund, A., Lemming, E. W., Meltzer, H. M., Pitsi, T., Schwab, U., Siksna, I., Þórsdóttir, I., & Trolle, E. (2023). Nordic Nutrition Recommendations 2023. *Nordic Council of Ministers*. https://pub.norden.org/nord2023-003

Bodin, Ö. (2017). Collaborative environmental governance: Achieving collective action in social-ecological systems. *Science*, *357*(6352), eaan1114. https://doi.org/10.1126/science.aan1114

Bodin, Ö., Baird, J., Schultz, L., Plummer, R., & Armitage, D. (2020). The impacts of trust, cost and risk on collaboration in environmental governance. *People and Nature*, *2*(3), 734–749. https://doi.org/10.1002/pan3.10097

Bodin, Ö., Mancilla García, M., & Robins, G. (2020). Reconciling Conflict and Cooperation in Environmental Governance: A Social Network Perspective. *Annual Review of Environment and Resources*, *45*(1), 471–495. https://doi.org/10.1146/annurev-environ-011020-064352

Boonstra, W. J. (2016). Conceptualizing power to study social-ecological interactions. *Ecology and Society*, *21*(1). http://dx.doi.org/10.5751/ES-07966-210121

Bornemann, B., & Weiland, S. (2019). Empowering People—Democratising the Food System? Exploring the Democratic Potential of Food-Related Empowerment Forms. *Politics and Governance*, *7*(4), 105–118. https://doi.org/10.17645/pag.v7i4.2190

Brock, S., Baker, L., Jekums, A., Ahmed, F., Fernandez, M., Montenegro De Wit, M., Rosado-May, F. J., Méndez, V. E., Anderson, C. R., DeClerck, F., Anderson, M. D., Bezner Kerr, R., Hoare, B., Wittman, H., Peeters, A., Gubbels, P., Stancu, C., Bellon, S., Lundgren, J. G., …

Rogé, P. (2024). Knowledge democratization approaches for food systems transformation. *Nature Food*, *5*(5), 342–345. https://doi.org/10.1038/s43016-024-00966-3

Brouwer, I. D., van Liere, M. J., de Brauw, A., Dominguez-Salas, P., Herforth, A., Kennedy, G., Lachat, C., Omosa, E. B., Talsma, E. F., Vandevijvere, S., Fanzo, J., & Ruel, M. (2021). Reverse thinking: Taking a healthy diet perspective towards food systems transformations. *Food Security*. https://doi.org/10.1007/s12571-021-01204-5

Brown, K., & Westaway, E. (2011). Agency, Capacity, and Resilience to Environmental Change: Lessons from Human Development, Well-Being, and Disasters. *Annual Review of Environment and Resources*, *36*(1), 321–342. https://doi.org/10.1146/annurev-environ-052610-092905

Bryngelsson, S., Moshtaghian, H., Bianchi, M., & Hallström, E. (2022). Nutritional assessment of plant-based meat analogues on the Swedish market. *International Journal of Food Sciences and Nutrition*, 1–13. https://doi.org/10.1080/09637486.2022.2078286

Bucher, T., Collins, C., Rollo, M. E., McCaffrey, T. A., De Vlieger, N., Van der Bend, D., Truby, H., & Perez-Cueto, F. J. A. (2016). Nudging consumers towards healthier choices: A systematic review of positional influences on food choice. *British Journal of Nutrition*, *115*(12), 2252–2263. https://doi.org/10.1017/S0007114516001653

Bunge, A. C., Mazac, R., Clark, M., Wood, A., & Gordon, L. (2024). Sustainability benefits of transitioning from current diets to plant-based alternatives or whole-food diets in Sweden. *Nature Communications*, *15*(1), 951. https://doi.org/10.1038/s41467-024-45328-6

Carton, N., Swiergiel, W., Tidåker, P., Röös, E., & Carlsson, G. (2022). On-farm experiments on cultivation of grain legumes for food – outcomes from a farmer–researcher collaboration. *Renewable Agriculture and Food Systems*, 1–11. https://doi.org/10.1017/S1742170522000102

Cederberg, C., Persson, U. M., Schmidt, S., Hedenus, F., & Wood, R. (2019). Beyond the borders – burdens of Swedish food consumption due to agrochemicals, greenhouse gases and land-use change. *Journal of Cleaner Production*, *214*, 644–652. https://doi.org/10.1016/j.jclepro.2018.12.313

Chambers, J. M., Wyborn, C., Klenk, N. L., Ryan, M., Serban, A., Bennett, N. J., Brennan, R., Charli-Joseph, L., Fernández-Giménez, M. E., Galvin, K. A., Goldstein, B. E., Haller, T., Hill, R., Munera, C., Nel, J. L., Österblom, H., Reid, R. S., Riechers, M., Spierenburg, M., … Rondeau, R. (2022). Co-productive agility and four collaborative pathways to sustainability transformations. *Global Environmental Change*, *72*, 102422. https://doi.org/10.1016/j.gloenvcha.2021.102422

Chambers, J. M., Wyborn, C., Ryan, M. E., Reid, R. S., Riechers, M., Serban, A., Bennett, N. J., Cvitanovic, C., Fernández-Giménez, M. E., Galvin,

K. A., Goldstein, B. E., Klenk, N. L., Tengö, M., Brennan, R., Cockburn, J. J., Hill, R., Munera, C., Nel, J. L., Österblom, H., … Pickering, T. (2021). Six modes of co-production for sustainability. *Nature Sustainability*. https://doi.org/10.1038/s41893-021-00755-x

Chan, K. M. A., Boyd, D. R., Gould, R. K., Jetzkowitz, J., Liu, J., Muraca, B., Naidoo, R., Olmsted, P., Satterfield, T., Selomane, O., Singh, G. G., Sumaila, R., Ngo, H. T., Boedhihartono, A. K., Agard, J., Aguiar, A. P. D., Armenteras, D., Balint, L., Barrington-Leigh, C., … Brondízio, E. S. (2020). Levers and leverage points for pathways to sustainability. *People and Nature*, *2*(3), 693–717. https://doi.org/10.1002/pan3.10124

Clapp, J. (2022). Concentration and crises: Exploring the deep roots of vulnerability in the global industrial food system. *The Journal of Peasant Studies*, 1–25. https://doi.org/10.1080/03066150.2022.2129013

Clapp, J., Vriezen, R., Laila, A., Conti, C., Gordon, L., Hicks, C., & Rao, N. (2025). Corporate concentration and power matter for agency in food systems. *Food Policy*, *134*, 102897. https://doi.org/10.1016/j.foodpol.2025.102897

Collier, E. S., Oberrauter, L.-M., Normann, A., Norman, C., Svensson, M., Niimi, J., & Bergman, P. (2021). Identifying barriers to decreasing meat consumption and increasing acceptance of meat substitutes among Swedish consumers. *Appetite*, *167*, 105643. https://doi.org/10.1016/j.appet.2021.105643

Constantino, S. M., Sparkman, G., Kraft-Todd, G. T., Bicchieri, C., Centola, D., Shell-Duncan, B., Vogt, S., & Weber, E. U. (2022). Scaling Up Change: A Critical Review and Practical Guide to Harnessing Social Norms for Climate Action. *Psychological Science in the Public Interest*, *23*(2), 50–97. https://doi.org/10.1177/15291006221105279

Conti, C., Hall, A., Moallemi, E. A., Laila, A., Bene, C., Fanzo, J., Gibson, M. F., Gordon, L., Hicks, C., Kok, K., Rao, N., Laxminarayan, R., & Mason-D'Croz, D. (2025). Top-down vs bottom-up processes: A systematic review clarifying roles and patterns of interactions in food system transformation. *Global Food Security*, *44*, 100833. https://doi.org/10.1016/j.gfs.2025.100833

Cusworth, G., Garnett, T., & Lorimer, J. (2021). Legume dreams: The contested futures of sustainable plant-based food systems in Europe. *Global Environmental Change*, *69*, 102321. https://doi.org/10.1016/j.gloenvcha.2021.102321

Dallas, M. P., Ponte, S., & Sturgeon, T. J. (2019). Power in global value chains. *Review of International Political Economy*, *26*(4), 666–694. https://doi.org/10.1080/09692290.2019.1608284

Desiderio, E., & Östergren, K. (2025). Beyond the fields: Unravelling the social consequences of green pea protein production from a Swedish perspective. *Cleaner and Responsible Consumption, 19,* 100361. https://doi.org/10.1016/j.clrc.2025.100361

Desiderio, E., Shanmugam, K., & Östergren, K. (2023). Plant based meat alternative, from cradle to company-gate: A case study uncovering the environmental impact of the Swedish pea protein value chain. *Journal of Cleaner Production*, *418*, 138173. https://doi.org/10.1016/j.jclepro.2023.138173

Dockès, A.-C., Tisenkopfs, T., & Bock, B. (2011). *WP1: Reflection paper on AKIS* (IN-SIGHT Project). Standing Committee for Agricultural Research. https://edepot.wur.nl/193703

Dorninger, C., Abson, D. J., Apetrei, C. I., Derwort, P., Ives, C. D., Klaniecki, K., Lam, D. P. M., Langsenlehner, M., Riechers, M., Spittler, N., & von Wehrden, H. (2020). Leverage points for sustainability transformation: A review on interventions in food and energy systems. *Ecological Economics*, *171*, 106570. https://doi.org/10.1016/j.ecolecon.2019.106570

Drechsel, P., Madhuwanthi, P., Nisansala, D., Ramamoorthi, D., & Bandara, T. (2025). On the feasibility of an agricultural revolution: Sri Lanka's ban of chemical fertilizers in 2021. *Food Security*, *17*(3), 585–602. https://doi.org/10.1007/s12571-025-01528-6

Duarte, M., Vasconcelos, M., & Pinto, E. (2020). Pulse Consumption among Portuguese Adults: Potential Drivers and Barriers towards a Sustainable Diet. *Nutrients*, *12*(11), 3336. https://doi.org/10.3390/nu12113336

Duncan, J., DeClerck, F., Báldi, A., Treyer, S., Aschemann-Witzel, J., Cuhls, K., Ahrné, L., Bisoffi, S., Grando, S., Guobys, L., Kohl, J., Hansen, H. O., Hudson, R. L., Lutzeyer, H.-J., Nielsen, V. H., Ruiz, B., Saggau, E., Valceschini, E., Siebielec, G., & Brunori, G. (2022). Democratic directionality for transformative food systems research. *Nature Food*, *3*, 183–186. https://doi.org/tttps://doi.org/10.1038/s43016-022-00479-x

Einarsson, R., & Röös, E. (2026). *Räcker maten? En analys av Sveriges näringsmässiga försörjningsgrad* (PLATE). Stockholm Resilience Centre, Stockholm University. https://www.plateresearch.org/download/18.73b563d19ce5e82bb965541/1773675927734/PLATE%20rapport%20Ra%CC%88cker%20maten.pdf

EU SCAR. (2012). Agricultural knowledge and innovation systems in transition: A reflection paper. *European Commission*. https://data.europa.eu/doi/10.2777/34991

EU SCAR AKIS. (2019). Preparing for future AKIS in Europe. *European Commission*. https://scar-europe.org/index.php/akis-documents

European Commission. (2018). *Report from the Commission to the Council and the European Parliament on the development of plant proteins in the European Union* (COM(2018) 757 final). https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52018DC0757&from=EN

European Commission. (2023a). *AKIS: Boosting knowledge and innovation flows across Europe*. https://eu-cap-network.ec.europa.eu/support/innovation-knowledge-exchange-eip-agri/akis_en

European Commission. (2023b). *Approved 28 CAP strategic plans 2023-2027: Summary overview for 27 member states*. DG Agriculture and Rural Development. https://agriculture.ec.europa.eu/cap-my-country/cap-strategic-plans-country_en

European Commission. (2024a). *CAP Strategic Plans and protein crops*. DG Agriculture and Rural Development. https://agriculture.ec.europa.eu/document/download/3d9d53d8-04b5-4130-8fbd-fba514168688_en?filename=cap-sprs-protein-leguminous-crops_en.pdf

European Commission. (2024b). *Strategic Dialogue on the Future of EU Agriculture*. https://agriculture.ec.europa.eu/common-agricultural-policy/cap-overview/committees-and-expert-groups/strategic-dialogue-future-eu-agriculture_en

Eurostat. (2022). *Farms and Farmland in the European Union—Statistics* [Agricultural census data]. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Farms_and_farmland_in_the_European_Union_-_statistics#Source_data_for_tables_and_graphs, Accessed 7 April 2026.

Fabinyi, M., Evans, L., & Foale, S. J. (2014). Social-ecological systems, social diversity, and power: Insights from anthropology and political ecology. *Ecology and Society*, *19*(4), art28. https://doi.org/10.5751/ES-07029-190428

FAO. (2020). *FAOSTAT* [Dataset]. FAOSTAT. https://www.fao.org/faostat/en/#home, Accessed 22 May 2023.

FAO, IFAD, UNICEF, WFP, & WHO. (2025). *The State of Food Security and Nutrition in the World 2025—Addressing high price inflation for food security and nutrition*. https://doi.org/10.4060/cd6008en

Ferreira, H., Pinto, E., & Vasconcelos, M. W. (2021). Legumes as a Cornerstone of the Transition Toward More Sustainable Agri-Food Systems and Diets in Europe. *Frontiers in Sustainable Food Systems*, *5*, 694121. https://doi.org/10.3389/fsufs.2021.694121

Ferreira, H., Vasconcelos, M., Gil, A. M., & Pinto, E. (2021). Benefits of pulse consumption on metabolism and health: A systematic review of randomized controlled trials. *Critical Reviews in Food Science and Nutrition*, *61*(1), 85–96. https://doi.org/10.1080/10408398.2020.1716680

Fischer, J., & Riechers, M. (2019). A leverage points perspective on sustainability. *People and Nature*, *1*(1), 115–120. https://doi.org/10.1002/pan3.13

Folkhälsomyndigheten. (2025). *Folkhälsan i Sverige – årsrapport 2025*. https://www.folkhalsomyndigheten.se/publikationer-och-material/publikationsarkiv/f/folkhalsan-i-sverige-arsrapport-2025/

Folkhälsomyndigheten, & Livsmedelsverket. (2024a). *En hållbar och hälsosam livsmedelskonsumtion* [Återredovisning av regeringsuppdrag]. Folkhälsomyndigheten. http://www.folkhalsomyndigheten.se/publicerat-material/

Folkhälsomyndigheten, & Livsmedelsverket. (2024b). *En hållbar och hälsosam livsmedelskonsumtion, bilaga 2*. Folkhälsomyndigheten. http://www.folkhalsomyndigheten.se/publicerat-material/

Frankow-Lindberg, B., & Bergkvist, G. (2013). Sweden. In *Agronomic Case Studies in Legume Futures*. www.legumefutures.de. http://www.legumefutures.de/images/Legume_Futures_Report_1.2.pdf

Fritz, L., & Meinherz, F. (2020). Tracing power in transdisciplinary sustainability research: An exploration. *GAIA - Ecological Perspectives for Science and Society*, *29*(1), 41–51. https://doi.org/10.14512/gaia.29.1.9

Gastaldello, A., Giampieri, F., De Giuseppe, R., Grosso, G., Baroni, L., & Battino, M. (2022). The rise of processed meat alternatives: A narrative review of the manufacturing, composition, nutritional profile and health effects of newer sources of protein, and their place in healthier diets. *Trends in Food Science & Technology*, *127*, 263–271. https://doi.org/10.1016/j.tifs.2022.07.005

Gaventa, J. (2006). Finding the Spaces for Change: A Power Analysis. *IDS Bulletin*, *37*(6), 23–33. https://doi.org/10.1111/j.1759-5436.2006.tb00320.x

Geels, F. W. (2004). From sectoral systems of innovation to socio-technical systems: Insights about dynamics and change from sociology and institutional theory. *Research Policy*, *33*(6), 897–920. https://doi.org/10.1016/j.respol.2004.01.015

Geels, F. W. (2019). Socio-technical transitions to sustainability: A review of criticisms and elaborations of the Multi-Level Perspective. *Current Opinion in Environmental Sustainability*, *39*, 187–201. https://doi.org/10.1016/j.cosust.2019.06.009

Geels, F. W., Kern, F., & Clark, W. C. (2023). Sustainability transitions in consumption-production systems. *Proceedings of the National Academy of Sciences*, *120*(47), e2310070120. https://doi.org/10.1073/pnas.2310070120

Geels, F. W., & Schot, J. (2007). Typology of sociotechnical transition pathways. *Research Policy*, *36*(3), 399–417. https://doi.org/10.1016/j.respol.2007.01.003

Gereffi, G., Humphrey, J., & Sturgeon, T. (2005). The governance of global value chains. *Review of International Political Economy*, *12*(1), 78–104. https://doi.org/10.1080/09692290500049805

Giddens, A. (1984). *The Constitution of Society*. University of California Press.

Gordon, L. J., Holmgren, K. E., Bengtsson, J., Persson, U. M., Peterson, G. D., Röös, E., Wood, A., Avlstad, R., Basnet, S., Bunge, A. C., Jonell,

M., & Fetzer, I. (2022). *Food as Industry, Food Tech or Culture, or even Food Forgotten? A report on scenario skeletons of Swedish food futures* (No. 1). Mistra Food Futures Report. https://mistrafood-futures.se/content/uploads/2022/11/mistra-food-futures-report-1-web.pdf

Hainzelin, E., Caron, P., Place, F., Alpha, A., Dury, S., Echeverria, R., & Harding, A. (2023). How Could Science–Policy Interfaces Boost Food System Transformation? In J. Von Braun, K. Afsana, L. O. Fresco, & M. H. A. Hassan (Eds.), *Science and Innovations for Food Systems Transformation* (pp. 877–891). Springer International Publishing. https://doi.org/10.1007/978-3-031-15703-5_47

Hamann, K., Vasconcelos, M., Lörich, N., Odee, D., Vickers, R., Blazon, N., Trstenjak, M., Toma, L., Maaβ, H., Kolmans, A., Tran, F., Bienkowski, D., & Iannetta, P. (2019). *A map of value chains for legumes used as food* (Technical Report 4.1; p. 61). Transition paths to sustainable legume-based systems in Europe. www.trueproject.eu

Hebinck, A., Diercks, G., Von Wirth, T., Beers, P. J., Barsties, L., Buchel, S., Greer, R., Van Steenbergen, F., & Loorbach, D. (2022). An actionable understanding of societal transitions: The X-curve framework. *Sustainability Science*, *17*(3), 1009–1021. https://doi.org/10.1007/s11625-021-01084-w

Hendrickson, M., Wilkinson, J., Heffernan, W. D., & Gronski, R. (2008). The Global Food System and Nodes of Power. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.1337273

Hendriks, C. M. (2009). Deliberative governance in the context of power. *Policy and Society*, *28*(3), 173–184. https://doi.org/10.1016/j.polsoc.2009.08.004

Henn, K., Goddyn, H., Bøye Olsen, S., & Bredie, W. L. P. (2021). Identifying behavioral and attitudinal barriers and drivers to promote consumption of pulses: A quantitative survey across five European countries. *Food Quality and Preference*, 104455. https://doi.org/10.1016/j.foodqual.2021.104455

Henn, K., Reinbach, H. C., Olsen, S. B., Aaslyng, M. D., Laugesen, S. M. B., & Bredie, W. L. P. (2023). Health versus environmental benefits: Does additional information influence consumer acceptance of pulse-based spreads? *Journal of Food Science*, 1750-3841.16471. https://doi.org/10.1111/1750-3841.16471

Herrfahrdt-Pähle, E., Schlüter, M., Olsson, P., Folke, C., Gelcich, S., & Pahl-Wostl, C. (2020). Sustainability transformations: Socio-political shocks as opportunities for governance transitions. *Global Environmental Change*, *63*, 102097. https://doi.org/10.1016/j.gloenvcha.2020.102097

Hileman, J., Bastos, M. T. A., & Lubell, M. (2018). Robustness and the Paradox of Bridging Organizations: The Exit Problem in Regional Water

Governance Networks in Central America. *Society & Natural Resources*, *31*(6), 683–697. https://doi.org/10.1080/08941920.2017.1423436

Hileman, J., Kallstenius, I., Häyhä, T., Palm, C., & Cornell, S. (2020). Keystone actors do not act alone: A business ecosystem perspective on sustainability in the global clothing industry. *PLoS ONE*, *15*(10), 1–17. https://doi.org/10.1371/journal.pone.0241453

Hileman, J., & Lubell, M. (2018). The network structure of multilevel water resources governance in Central America. *Ecology and Society*, *23*(2), art48. https://doi.org/10.5751/ES-10282-230248

HLPE. (2017). *Nutrition and food systems. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security* (No. 12; p. 152). Committee on World Food Security. https://www.fao.org/fsnforum/resources/policy-documents/nutrition-and-food-systems-report-high-level-panel-experts-food-security

HLPE. (2025). *Building Resilient Food Systems*. FAO. https://www.fao.org/cfs/cfs-hlpe/publications/hlpe-20

Höglund, E., Rad, M. N., Olsson, M., Sonesson, U., & Östergren, K. (2025). *Sustainable supply chains from farm to table* (No. 26). Mistra Food Futures. https://mistrafoodfutures.se/rapporter/

Huttunen, S., Turunen, A., & Kaljonen, M. (2022). Participation for just governance of food-system transition. *Sustainability: Science, Practice and Policy*, *18*(1), 500–514. https://doi.org/10.1080/15487733.2022.2088187

Iannetta, P. P. M., Hawes, C., Begg, G. S., Maaß, H., Ntatsi, G., Savvas, D., Vasconcelos, M., Hamann, K., Williams, M., Styles, D., Toma, L., Shrestha, S., Balázs, B., Kelemen, E., Debeljak, M., Trajanov, A., Vickers, R., & Rees, R. M. (2021). A Multifunctional Solution for Wicked Problems: Value-Chain Wide Facilitation of Legumes Cultivated at Bioregional Scales Is Necessary to Address the Climate-Biodiversity-Nutrition Nexus. *Frontiers in Sustainable Food Systems*, *5*, 692137. https://doi.org/10.3389/fsufs.2021.692137

IPCC. (2022). Climate Change 2022: Mitigation of Climate change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. *Cambridge University Press*. https://doi.org/10.1017/9781009157926

IPES-Food & ETC Group. (2021). *A Long Food Movement: Transforming Food Systems by 2045*. https://www.ipes-food.org/_img/upload/files/LongFoodMovementEN.pdf

Jaime, P. C., & Braga, M. B. L. (2026). Cooking, gender, and ultra-processed foods: Toward a public valorization of culinary knowledge. *World Nutrition*, *17*(1), 125–129. https://doi.org/10.26596/wn.2026171125-129

Jensen, E. S., Carlsson, G., & Hauggaard-Nielsen, H. (2020). Intercropping of grain legumes and cereals improves the use of soil N resources and

reduces the requirement for synthetic fertilizer N: A global-scale analysis. *Agronomy for Sustainable Development*, *40*(1), 5. https://doi.org/10.1007/s13593-020-0607-x

Jericó-Daminello, C., Schröter, B., Mancilla Garcia, M., & Albert, C. (2021). Exploring perceptions of stakeholder roles in ecosystem services coproduction. *Ecosystem Services*, *51*, 101353. https://doi.org/10.1016/j.ecoser.2021.101353

Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed Methods Research: A Research Paradigm Whose Time Has Come. *Educational Researcher*, *33*(7), 14–26. https://doi.org/10.3102/0013189X033007014

Jordbruksverket. (2022). Ökad odling av baljväxter till livsmedel och foder (2022:07). *Jordbruksverket*, 57. https://webbutiken.jordbruksverket.se/sv/artiklar/okad-odling-av-baljvaxter-till-livsmedel-och-foder-mojligheter-och-utmaningar.html

Kahane, A. (2017). *Collaborating with the Enemy*. Berrett-Koehler Publishers.

Kaljonen, M., Tribaldos, T., Kortetmäki, T., Niemi, J., Huttunen, S., Paalanen, L., Salminen, J., Aro, R., Burlandy, L., Heikkinen, M., Huan-Niemi, E., Härkänen, T., Irz, X., Karttunen, K., Knuuttila, M., Kyttä, V., Lehtonen, H., Lonkila, A., Lähteenmäki-Uutela, A., … Wejberg, H. (2025). Deliberating justice in food systems transformation pathways: A transdisciplinary approach applied in Finland. *Environmental Research: Food Systems*, *2*(4), 043003. https://doi.org/10.1088/2976-601X/ae1dfa

Karlsson, J., Lopez-Sanchez, P., Marques, T. M., Hyötyläinen, T., Castro-Alves, V., Krona, A., & Ström, A. (2024). Effect of heating of pea fibres on their swelling, rheological properties and in vitro colon fermentation. *Food Hydrocolloids*, *147*, 109306. https://doi.org/10.1016/j.foodhyd.2023.109306

Karlsson, J. O., & Röös, E. (2019). Resource-efficient use of land and animals—Environmental impacts of food systems based on organic cropping and avoided food-feed competition. *Land Use Policy*, *85*, 63–72. https://doi.org/10.1016/j.landusepol.2019.03.035

Klerkx, L., & Begemann, S. (2020). Supporting food systems transformation: The what, why, who, where and how of mission-oriented agricultural innovation systems. *Agricultural Systems*, *184*, 102901. https://doi.org/10.1016/j.agsy.2020.102901

Kogut, B. (1985). Designing global strategies: Comparative and competitive value-added chains. *Sloan Management Review*, *26*(4), 15–28.

Kok, K. P. W., & Klerkx, L. (2023). Addressing the politics of mission-oriented agricultural innovation systems. *Agricultural Systems*, *211*, 103747. https://doi.org/10.1016/j.agsy.2023.103747

Koole, B. (2022). Veganism and plant-based protein crops: Contentious visioning almost obstructing a transition. *Environmental Innovation*

and Societal Transitions, *42*, 88–98. https://doi.org/10.1016/j.eist.2021.12.003

Kullgren, P. (2026). *Brist på kor och konsekvenser för livsmedelsberedskapen* (LI2026/00226). Regeringkansliet, Landsbygds- och infrastrukturdepartementet. https://data.riksdagen.se/fil/1AC3254B-8CC4-4409-964E-70ED49A91329

Kungl, G. (2024). Challenges of the current discourse on incumbent firms in sustainability transitions. *Energy Research & Social Science*, *108*, 103367. https://doi.org/10.1016/j.erss.2023.103367

Laakso, S., Aro, R., Heiskanen, E., & Kaljonen, M. (2021). Reconfigurations in sustainability transitions: A systematic and critical review. *Sustainability: Science, Practice and Policy*, *17*(1), 15–31. https://doi.org/10.1080/15487733.2020.1836921

Lam, D. P. M., Martín-López, B., Horcea-Milcu, A. I., & Lang, D. J. (2021). A leverage points perspective on social networks to understand sustainability transformations: Evidence from Southern Transylvania. *Sustainability Science*, *16*(3), 809–826. https://doi.org/10.1007/s11625-020-00881-z

Lam, D. P. M., Martín-López, B., Wiek, A., Bennett, E. M., Frantzeskaki, N., Horcea-Milcu, A. I., & Lang, D. J. (2020). Scaling the impact of sustainability initiatives: A typology of amplification processes. *Urban Transformations*, *2*(1), 3. https://doi.org/10.1186/s42854-020-00007-9

Landsbygdsnätverket. (2026). *Agricultural Knowledge and Innovation Systems*. Mötesplats 2026. https://www.landsbygdsnatverket.se/hallbaragronanaringar/meromakis.4.7042d9df19bd95c496abcd3.html

Lantmännen. (2025). *Miljardinvestering i proteinanläggning—Ökat behov av svenska ärter*. https://www.lantmannenlantbrukmaskin.se/om-oss/press-och-nyheter/nyheter/miljardinvestering-i-proteinanlaggning---okat-behov-av-svenska-arter/

Lassen, A. D., Christensen, L. M., & Trolle, E. (2020). Development of a Danish Adapted Healthy Plant-Based Diet Based on the EAT-Lancet Reference Diet. *Nutrients*, *12*(3), Article 3. https://doi.org/10.3390/nu12030738

Leavy, P. (2023). *Research design: Quantitative, qualitative, mixed methods, arts-based, and community-based participatory research approaches* (2nd ed.). Guilford Press.

Leino, M. (2022). Ärtodling i Norden. In *Nordiska ärter: 50 traditionella sorter*. Stibo Complete.

Lister, R. (2021). *Poverty* (2nd ed.). Polity Press.

Livsmedelsverket. (2025). *Livsmedelsverkets generella kostråd för den vuxna befolkningen* (Nos. 2025–04; Livsmedelsverkets rapportserie). https://www.livsmedelsverket.se/matvanor-halsa--miljo/kostrad/naringsrekommendationer/#Officiella_n%C3%A4ringsrekommendationerna_i_Sverige

Livsmedelsverket, & Jordbruksverket. (2025). *Livsmedelsförsörjningen i siffror* (No. NIL2025). https://www.livsmedelsverket.se/4a813d/globalassets/publikationsdatabas/rapporter/2025/2025---livsmedelsforsorjningen-i-siffror.pdf

Lukes, S. (2021). *Power: A radical view* (3rd ed.). Bloomsbury Academic.

Lundberg, E., Jonell, M., & Mark-Herbert, C. (2026). Impact of food retail market power on small food producers in Sweden: Challenges and opportunities. *Cleaner Food Systems*, *3*, 100012. https://doi.org/10.1016/j.clfs.2026.100012

Magrini, M.-B., Cabanac, G., Lascialfari, M., Plumecocq, G., Amiot, M.-J., Anton, M., Arvisenet, G., Baranger, A., Bedoussac, L., Chardigny, J.-M., Duc, G., Jeuffroy, M.-H., Journet, E.-P., Juin, H., Larré, C., Leiser, H., Micard, V., Millot, D., Pilet-Nayel, M.-L., … Wery, J. (2019). Peer-Reviewed Literature on Grain Legume Species in the WoS (1980–2018): A Comparative Analysis of Soybean and Pulses. *Sustainability*, *11*(23), 6833. https://doi.org/10.3390/su11236833

Mancilla García, M., & Bodin, Ö. (2019). Networked participation. In F. Nunan (Ed.), *Governing Renewable Natural Resources* (1st ed., pp. 44–64). Routledge. https://doi.org/10.4324/9780429053009-3

Mancilla García, M., & Bodin, Ö. (2021). Uncovering Relationships between Being Influential, Participating in Multiple Forums, and having Many Social Ties in Water Governance in Brazil. *Human Ecology Review*, *26*(2), 17–37. https://doi.org/10.22459/HER.26.02.2020.02

Manevska-Tasevska, G., Huang, V. W., Chen, Z., Jäck, O., Adam, N., Ha, T. M., Weih, M., & Hansson, H. (2024). Economic outcomes from adopting cereal-legume intercropping practices in Sweden. *Agricultural Systems*, *220*, 104064. https://doi.org/10.1016/j.agsy.2024.104064

Maniatakou, S., Olsson, P., & Søgaard Jørgensen, P. (2025). The role and capacities of large-scale actor coalitions in shaping sustainability transformations. *Global Sustainability*, *8*(e28), 1–19. https://doi.org/10.1017/sus.2025.10010

Mattioni, D., Milbourne, P., & Sonnino, R. (2022). Destabilizing the food regime "from within": Tools and strategies used by urban food policy actors. *Environmental Innovation and Societal Transitions*, *44*, 48–59. https://doi.org/10.1016/j.eist.2022.05.007

Mayer Labba, I.-C., Steinhausen, H., Almius, L., Bach Knudsen, K. E., & Sandberg, A.-S. (2022). Nutritional Composition and Estimated Iron and Zinc Bioavailability of Meat Substitutes Available on the Swedish Market. *Nutrients*, *14*(19), 3903. https://doi.org/10.3390/nu14193903

Mazzucato, M. (2018). Mission-oriented innovation policies: Challenges and opportunities. *Industrial and Corporate Change*, *27*(5), 803–815. https://doi.org/10.1093/icc/dty034

McAllister, R. R. J., Robinson, C. J., Brown, A., Maclean, K., Perry, S., & Liu, S. (2017). Balancing collaboration with coordination: Contesting eradication in the Australian plant pest and disease biosecurity system. *International Journal of the Commons*, *11*(1), 330. https://doi.org/10.18352/ijc.701

McAllister, R. R. J., Robinson, C. J., Maclean, K., Guerrero, A. M., Collins, K., Taylor, B. M., & De Barro, P. J. (2015). From local to central: A network analysis of who manages plant pest and disease outbreaks across scales. *Ecology and Society*, *20*(1), art67. https://doi.org/10.5751/ES-07469-200167

Meadows, D. (1999). *Leverage Points: Places to Intervene in a System*. The Sustainability Institute. http://www.donellameadows.org/wp-content/userfiles/Leverage_Points.pdf

Meadows, D. (2008). *Thinking in Systems*. Chelsea Green Publishing.

Mena, S., & Palazzo, G. (2012). Input and Output Legitimacy of Multi-Stakeholder Initiatives. *Business Ethics Quarterly*, *22*(3), 527–556. https://doi.org/10.5840/beq201222333

Mjöberg, M., Lissner, L., & Hunsberger, M. (2023). Supermarket promotions in Western Sweden are incompatible with Nordic dietary recommendations and differ by area-level socioeconomic index. *BMC Public Health*, *23*(1), 795. https://doi.org/10.1186/s12889-023-15729-1

Moberg, E., Karlsson Potter, H., Wood, A., Hansson, P.-A., & Röös, E. (2020). Benchmarking the Swedish Diet Relative to Global and National Environmental Targets—Identification of Indicator Limitations and Data Gaps. *Sustainability*, *12*(4), Article 4. https://doi.org/10.3390/su12041407

Moore, M.-L., Hermanus, L., Drimie, S., Rose, L., Mbaligontsi, M., Musarurwa, H., Ogutu, M., Oyowe, K., & Olsson, P. (2023). Disrupting the opportunity narrative: Navigating transformation in times of uncertainty and crisis. *Sustainability Science*, *18*(4), 1649–1665. https://doi.org/10.1007/s11625-023-01340-1

Moore, M.-L., Riddell, D., & Vocisano, D. (2015). Scaling Out, Scaling Up, Scaling Deep: Strategies of Non-profits in Advancing Systemic Social Innovation. *Journal of Corporate Citizenship*, *2015*(58), 67–84. https://doi.org/10.9774/GLEAF.4700.2015.ju.00009

Morel, K., Revoyron, E., San Cristobal, M., & Baret, P. V. (2020). Innovating within or outside dominant food systems? Different challenges for contrasting crop diversification strategies in Europe. *PLOS ONE*, *15*(3), e0229910. https://doi.org/10.1371/journal.pone.0229910

Morrison, T. H., Adger, W. N., Agrawal, A., Brown, K., Hornsey, M. J., Hughes, T. P., Jain, M., Lemos, M. C., McHugh, L. H., O'Neill, S., & Van Berkel, D. (2022). Radical interventions for climate-impacted systems. *Nature Climate Change*, *12*(12), 1100–1106. https://doi.org/10.1038/s41558-022-01542-y

Morrison, T. H., Adger, W. N., Brown, K., Lemos, M. C., Huitema, D., Phelps, J., Evans, L., Cohen, P., Song, A. M., Turner, R., Quinn, T., & Hughes, T. P. (2019). The black box of power in polycentric environmental governance. *Global Environmental Change*, *57*, 101934. https://doi.org/10.1016/j.gloenvcha.2019.101934

Murphy-Bokern, D., & Font, M. C. (2022). *A Delphi study of production constraints and opportunities for legumes grown in Europe* (Legume Translated Report 5; p. 129). www.legumehub.eu

Newman, M. (2018). *Networks*. Oxford Scholarship. https://doi-org.ezp.sub.su.se/10.1093/oso/9780198805090.001.0001

Nordin, M., Hammarlund, C., & Bergh, A. (2025). A study of job polarization in Sweden from an urban-rural perspective. *Journal for Labour Market Research*, *59*(1), 10. https://doi.org/10.1186/s12651-025-00397-y

Nordisk Råvara. 2026. Våra odlare. https://nordiskravara.se/karta.

Norheim, B. (1989). *Gröna Bordet*. Skandinaviska bokförl.

Norström, A. V., Cvitanovic, C., Löf, M. F., West, S., Wyborn, C., Balvanera, P., Bednarek, A. T., Bennett, E. M., Biggs, R., de Bremond, A., Campbell, B. M., Canadell, J. G., Carpenter, S. R., Folke, C., Fulton, E. A., Gaffney, O., Gelcich, S., Jouffray, J.-B., Leach, M., … Österblom, H. (2020). Principles for knowledge co-production in sustainability research. *Nature Sustainability*, *3*(3), 182–190. https://doi.org/10.1038/s41893-019-0448-2

O'Brien, K., Garibaldi, L., & Agrawal, A. (2025). *IPBES Transformative Change Assessment: Full report* (Version v2). Zenodo. https://doi.org/10.5281/ZENODO.11382215

Olsson, P., Folke, C., & Hahn, T. (2004). Social-Ecological Transformation for Ecosystem Management: The Development of Adaptive Co-management of a Wetland Landscape in Southern Sweden. *Ecology and Society*, *9*(4), art2. https://doi.org/10.5751/ES-00683-090402

Olsson, P., Galaz, V., & Boonstra, W. J. (2014). Sustainability transformations: A resilience perspective. *Ecology and Society*, *19*(4), art1. https://doi.org/10.5751/ES-06799-190401

Olsson, P., Gunderson, L. H., Carpenter, S. R., Ryan, P., Lebel, L., Folke, C., & Holling, C. S. (2006). Shooting the Rapids: Navigating Transitions to Adaptive Governance of Social-Ecological Systems. *Ecology and Society*, *11*(1), art18. https://doi.org/10.5751/ES-01595-110118

Osborne, M. P. (1994). *Magic Tree House: Pirates past noon*. Random House.

Österblom, H., Bebbington, J., Blasiak, R., Sobkowiak, M., & Folke, C. (2022). Transnational Corporations, Biosphere Stewardship, and Sustainable Futures. *Annual Review of Environment and Resources*, *47*(1), null. https://doi.org/10.1146/annurev-environ-120120-052845

Österblom, H., & Bodin, Ö. (2012). Global Cooperation among Diverse Organizations to Reduce Illegal Fishing in the Southern Ocean. *Conservation Biology*, *26*(4), 638–648. https://doi.org/10.1111/j.1523-1739.2012.01850.x

Österblom, H., Jouffray, J.-B., Folke, C., Crona, B., Troell, M., Merrie, A., & Rockström, J. (2015). Transnational Corporations as 'Keystone Actors' in Marine Ecosystems. *PLoS ONE*, *10*(5), 1–15. https://doi.org/10.1371/journal.pone.0127533

Ostrom, E. (2010). Beyond Markets and States: Polycentric Governance of Complex Economic Systems. *Transnational Corporations Review*, *2*(2), 1–12. https://doi.org/10.1080/19186444.2010.11658229

Parsons, T. (1954). *Essays in Sociological Theory* (2nd ed.). Free Press.

Partzsch, L. (2017). 'Power with' and 'power to' in environmental politics and the transition to sustainability. *Environmental Politics*, *26*(2), 193–211. https://doi.org/10.1080/09644016.2016.1256961

Patay, D., Rippin, H., Ares, G., Reeve, E., Hargous, C. V., Farrell, P., Reeve, B., Vivero-Pol, J.-L., & Thow, A. M. (2025). From Ministries of Food to National Food System Committees: A Global Mapping and Typology of Multisectoral Food System Governance Institutions. *Sustainable Development*, 1–21. https://doi.org/10.1002/sd.70320

Pia, C. (2020). *Agro-ecological diversification in meat and dairy farms*. Sveriges lantbruksuniversitet.

R Core Team. (2023). *R* (Version 4.3.1) [Computer software]. https://www.r-project.org

Rajão, R., Soares-Filho, B., Nunes, F., Börner, J., Machado, L., Assis, D., Oliveira, A., Pinto, L., Ribeiro, V., Rausch, L., Gibbs, H., & Figueira, D. (2020). The rotten apples of Brazil's agribusiness. *Science*, *369*(6501), 246–248. https://doi.org/10.1126/science.aba6646

Ran, Y., Nilsson Lewis, A., Dawkins, E., Grah, R., Vanhuyse, F., Engström, E., & Lambe, F. (2022). Information as an enabler of sustainable food choices: A behavioural approach to understanding consumer decision-making. *Sustainable Production and Consumption*, *31*, 642–656. https://doi.org/10.1016/j.spc.2022.03.026

Rao, N., Marzi, E., Baudish, I., Laila, A., Conti, C., & Hicks, C. C. (2025). Citizen voice and state response in the context of food system transformations. *Food Policy*, *134*, 102879. https://doi.org/10.1016/j.foodpol.2025.102879

Reckling, M., Bergkvist, G., Watson, C. A., Stoddard, F. L., & Bachinger, J. (2020). Re-designing organic grain legume cropping systems using systems agronomy. *European Journal of Agronomy*, *112*, 125951. https://doi.org/10.1016/j.eja.2019.125951

Regeringskansliet. (2025). *Livsmedelsstrategi 2.0* (LI2025.01). Landsbygds- och infrastrukturdepartementet. https://www.regeringen.se/rattsligadokument/departementsserien-och-promemorior/2025/03/livsmedelsstrategin-2.0

Regulation (EU) 2021/2115 of the European Parliament and of the Council, Pub. L. No. 2021/2115 (2021). https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:02021R2115-20260318

Reyes-García, V., Krug, R. M., Agrawal, A., Benessaiah, K., Bonilla-Moheno, M., Claudet, J., Forsyth, T., Garibaldi, L. A., Gemmill-Herren, B., Guibal, C., Goldstein, B. E., Gosnell, H., Guo, X., Huntjens, P., Ifejika Speranza, C., Leventon, J., Lima, L. S. D., Magris, R. A., Miwa, K., … Zinngrebe, Y. (2026). Actions and actors driving transformative change for global sustainability. *Nature Sustainability*. https://doi.org/10.1038/s41893-026-01783-1

Rip, A., & Kemp, R. (1998). Technological change. In *Human choice and climate change: Vol. II, resources and technology* (pp. 327–399). Battelle Press.

Rockström, J., Thilsted, S. H., Willett, W. C., Gordon, L. J., Herrero, M., Hicks, C. C., Mason-D'Croz, D., Rao, N., Springmann, M., Wright, E. C., Agustina, R., Bajaj, S., Bunge, A. C., Carducci, B., Conti, C., Covic, N., Fanzo, J., Forouhi, N. G., Gibson, M. F., … DeClerck, F. (2025). The EAT–Lancet Commission on healthy, sustainable, and just food systems. *The Lancet*, *406*(10512), 1625–1700. https://doi.org/10.1016/S0140-6736(25)01201-2

Rodriguez, C., Carlsson, G., Englund, J.-E., Flöhr, A., Pelzer, E., Jeuffroy, M.-H., Makowski, D., & Jensen, E. S. (2020). Grain legume-cereal intercropping enhances the use of soil-derived and biologically fixed nitrogen in temperate agroecosystems. A meta-analysis. *European Journal of Agronomy*, *118*, 126077. https://doi.org/10.1016/j.eja.2020.126077

Rölfer, L., Abson, D. J., Costa, M. M., Rosendo, S., Smith, T. F., & Celliers, L. (2022). Leveraging Governance Performance to Enhance Climate Resilience. *Earth's Future*, *10*(10). https://doi.org/10.1029/2022EF003012

Rölfer, L., Isaac, R., Lopez-Rodriguez, M., Martin-Lopez, B., Krause, G., & Celliers, L. (2025). Networks of influence: Linking capitals and agency to understand actors' roles in sustainability interventions. *OneEarth*. https://doi.org/10.1016/j.oneear.2025.101495

Röös, E., Carlsson, G., Ferawati, F., Hefni, M., Stephan, A., Tidåker, P., & Witthöft, C. (2020). Less meat, more legumes: Prospects and challenges in the transition toward sustainable diets in Sweden. *Renewable Agriculture and Food Systems*, *35*(2), 192–205. https://doi.org/10.1017/S1742170518000443

Röös, E., de Groote, A., & Stephan, A. (2022). Meat tastes good, legumes are healthy and meat substitutes are still strange—The practice of protein consumption among Swedish consumers. *Appetite*, *174*. https://doi.org/10.1016/j.appet.2022.106002

Röös, E., Patel, M., Spångberg, J., Carlsson, G., & Rydhmer, L. (2016). Limiting livestock production to pasture and by-products in a search for sustainable diets. *Food Policy*, *58*, 1–13. https://doi.org/10.1016/j.foodpol.2015.10.008

Rosenfeld, D. L., Bartolotto, C., & Tomiyama, A. J. (2022). Promoting plant-based food choices: Findings from a field experiment with over 150,000 consumer decisions. *Journal of Environmental Psychology*, *81*, 101825. https://doi.org/10.1016/j.jenvp.2022.101825

Saldaña, J. (2021). *The coding manual for qualitative researchers* (4th ed.). SAGE Publications Ltd.

Sarigil, Z. (2015). Showing the path to path dependence: The habitual path. *European Political Science Review*, *7*(2), 221–242. https://doi.org/10.1017/S1755773914000198

SCB. (2021). *En fråga om tid: En studie av tidsanvändningen bland kvinnor och män 2021* (No. TID2021). Statistika centralbyrån. https://www.scb.se/contentas-sets/4e98132b0b784a01b6e4762e909a6fa2/le0103_2021a01_br_lebr2202.pdf

Scheuermann, M., Hileman, J., J Gordon, L., & Schultz, L. (2025). Who can change what? Self-perceived, attributed and structural influence among actors in the Swedish grain legume system. *Environmental Research: Food Systems*, *2*(4), 045004. https://doi.org/10.1088/2976-601X/ae07e4

Scheuermann, M., Wood, A., Gordon, L. J., Röös, E., & Schultz, L. (2024). Leverage points for increased grain legume consumption: A Swedish case study. *Renewable Agriculture and Food Systems*, *39*(e27), 1–14. https://doi.org/10.1017/S1742170524000267

Schwarz, G., Prazan, J., Landert, J., Miller, D., Vanni, F., Carolus, J., Weisshaidinger, R., Bartel-Kratochvil, R., Mayer, A., Frick, R., Hrabalová, A., Quero, A. L., Iragui, U., Massa, C. A., Helin, J., Huismann, D., Guisepelli, E., Fleury, P., Vincent, A., … Smith, P. (2021). *Report on Key Barriers of AEFS in Europe and Co-constructed Strategies to Address Them* (3.4; Understanding & Improving the Sustainability of Agro-Ecological Farming Systems in the EU). UNISECO. https://uniseco-project.eu/resources

Scoones, I., Stirling, A., Abrol, D., Atela, J., Charli-Joseph, L., Eakin, H., Ely, A., Olsson, P., Pereira, L., Priya, R., van Zwanenberg, P., & Yang, L. (2020). Transformations to sustainability: Combining structural, systemic and enabling approaches. *Current Opinion in Environmental Sustainability*, *42*, 65–75. https://doi.org/10.1016/j.cosust.2019.12.004

Singh, B. K., Fraser, E. D. G., Arnold, T., Biermayr-Jenzano, P., Broerse, J. E. W., Brunori, G., Caron, P., De Schutter, O., Fabbri, K., Fan, S., Fanzo, J., Gajdzinska, M., Gurinovic, M., Hugas, M., McGlade, J., Nellemann, C., Njuki, J., Tuomisto, H. L., Tutundjian, S., … Webb, P. (2022). Food systems transformation requires science–policy–society interfaces that integrate existing global networks and new knowledge hubs. *Nature Food*, *4*(1), 1–3. https://doi.org/10.1038/s43016-022-00664-y

Singh, B., Singh, J. P., Shevkani, K., Singh, N., & Kaur, A. (2017). Bioactive constituents in pulses and their health benefits. *Journal of Food Science and Technology*, *54*(4), 858–870. https://doi.org/10.1007/s13197-016-2391-9

Skrindo Knudsen, A. K., Baravelli, C. M., Madsen, C., Clarsen, B., TopeAmobonye, A. E., Brauer, M., Bølling, A. K., Dadras, O., Haile, D., Havmoeller, R. J., Høyer-Lund, A., Jain, N., Johansson, L., Jürisson, M., Kauppila, J. H., Kisa, A., Kivimäki, M., Kuitunen, I., Nauman, J., … Blomhoff, R. (2026). The burden of dietary risk factors in the Nordic and Baltic countries: A systematic analysis for the Global Burden of Disease Study 2023. *The Lancet Regional Health - Europe*, *61*, 101543. https://doi.org/10.1016/j.lanepe.2025.101543

Slater, S., Baker, P., & Lawrence, M. (2022). An analysis of the transformative potential of major food system report recommendations. *Global Food Security*, *32*, 100610. https://doi.org/10.1016/j.gfs.2022.100610

SLU. (2018). *New Legume Foods*. http://blogg.slu.se/new-legume-foods/files/2018/09/1-Projektpresentation-New-Legume-Foods.pdf

SLU Grogrund. (2025). *SLU Grogrunds årsrapport 2024*. www.slu.se/grogrund

Smith, A., & Stirling, A. (2010). The Politics of Social-ecological Resilience and Sustainable Socio-technical Transitions. *Ecology and Society*, *15*(1), art11. https://doi.org/10.5751/ES-03218-150111

Spaargaren, G. (2003). Sustainable Consumption: A Theoretical and Environmental Policy Perspective. *Society & Natural Resources*, *16*(8), 687–701. https://doi.org/10.1080/08941920309192

Spendrup, S., & Fernqvist, F. (2019). Innovation in agri-food systems—A systematic mapping of the literature. *International Journal of Food System Dynamics*, *10*(5), 402–427. http://dx.doi.org/10.18461/ijfsd.v10i5.28

Spendrup, S., & Hovmalm, H. P. (2022). Consumer attitudes and beliefs towards plant-based food in different degrees of processing – The case of Sweden. *Food Quality and Preference*, *102*, 104673. https://doi.org/10.1016/j.foodqual.2022.104673

Steffen, W., Rockström, J., Richardson, K., Lentond, T. M., Folke, C., Liverman, D., Summerhayes, C. P., Barnosky, A. D., Cornell, S. E., Crucifix, M., Donges, J. F., Fetzer, I., Lade, S. J., Scheffer, M., Winkelmann, R., & Schellnhuber, H. J. (2018). Trajectories of the Earth System in the Anthropocene. *Proceedings of the National Academy of Sciences of the United States of America*, *115*(33), 8252–8259. http://www.jstor.org/stable/26530225

Steib, C. A., Johansson, I., Hefni, M. E., & Witthöft, C. M. (2020). Diet and nutrient status of legume consumers in Sweden: A descriptive cross-sectional study. *Nutrition Journal*, *19*(1), 27. (32245471). https://doi.org/10.1186/s12937-020-00544-w

Strandberg, L.-A., & Lind, S. (2025). *Sveriges utrikeshandel med jordbruksvaror och livsmedel 2022-2024* (25:9). Jordbruksverket.

Sweden Foodtech, & House of Innovation. (2024). *A basic guide to food system transformation*. Sweden Foodtech, Stockholm School of Economics. https://www.hhs.se/contentassets/6eaec5c19e20464c8c121797ad8ba5a1/food-sector-transformation_240522_v2.pdf

Tidåker, P., Karlsson Potter, H., Carlsson, G., & Röös, E. (2021). Towards sustainable consumption of legumes: How origin, processing and transport affect the environmental impact of pulses. *Sustainable Production and Consumption*, *27*, 496–508. https://doi.org/10.1016/j.spc.2021.01.017

Torheim, L. E., & Fadnes, L. T. (2024). Legumes and pulses—A scoping review for Nordic Nutrition Recommendations 2023. *Food & Nutrition Research*, *68*. https://doi.org/10.29219/fnr.v68.10484

Tracy, S. J. (2013). *Qualitative Research Methods*. Wiley-Blackwell.

Vallet, A., Locatelli, B., Barnaud, C., Makowski, D., Quispe Conde, Y., & Levrel, H. (2020). Power asymmetries in social networks of ecosystem services governance. *Environmental Science & Policy*, *114*, 329–340. https://doi.org/10.1016/j.envsci.2020.08.020

Van Den Akker, A., Gilmore, A. B., Fabbri, A., Knai, C., & Rutter, H. (2024). Aligning rhetoric with reality: A qualitative analysis of multistakeholder initiatives in the global food system. *Health Promotion International*, *39*(6), daae165. https://doi.org/10.1093/heapro/daae165

Watson, C. A., Reckling, M., Preissel, S., Bachinger, J., Bergkvist, G., Kuhlman, T., Lindström, K., Nemecek, T., Topp, C. F. E., Vanhatalo, A., Zander, P., Murphy-Bokern, D., & Stoddard, F. L. (2017). Grain Legume Production and Use in European Agricultural Systems. In *Advances in Agronomy* (Vol. 144, pp. 235–303). Elsevier. https://doi.org/10.1016/bs.agron.2017.03.003

Westley, F. R., Tjornbo, O., Schultz, L., Olsson, P., Folke, C., Crona, B., & Bodin, Ö. (2013). A Theory of Transformative Agency in Linked Social-Ecological Systems. *Ecology and Society*, *18*(3), art27. https://doi.org/10.5751/ES-05072-180327

Westling, M., Wennström, S., & Öström, Å. (2022). Public meals as a platform for culinary action? Tweens' and teens' acceptance of a new plant-based food. *International Journal of Gastronomy and Food Science*, *27*, 100485. https://doi.org/10.1016/j.ijgfs.2022.100485

Willett, W., Rockström, J., Loken, B., Springmann, M., Lang, T., Vermeulen, S., Garnett, T., Tilman, D., DeClerck, F., Wood, A., Jonell, M., Clark, M., Gordon, L. J., Fanzo, J., Hawkes, C., Zurayk, R., Rivera, J. A., De Vries, W., Majele Sibanda, L., … Murray, C. J. L. (2019). Food in the Anthropocene: The EAT–Lancet Commission on healthy diets from sustainable food systems. *The Lancet*, *393*(10170), 447–492. https://doi.org/10.1016/S0140-6736(18)31788-4

Williams, T. G., Bui, S., Conti, C., Debonne, N., Levers, C., Swart, R., & Verburg, P. H. (2023). Synthesising the diversity of European agri-food networks: A meta-study of actors and power-laden interactions. *Global Environmental Change*, *83*, 102746. https://doi.org/10.1016/j.gloenvcha.2023.102746

Wittmayer, J. M., Avelino, F., Van Steenbergen, F., & Loorbach, D. (2017). Actor roles in transition: Insights from sociological perspectives. *Environmental Innovation and Societal Transitions*, *24*, 45–56. https://doi.org/10.1016/j.eist.2016.10.003

Wood, A., Gordon, L. J., Röös, E., Karlsson, J. O., Häyhä, T., Bignet, V., Rydenstam, T., Hård af Segerstad, L., & Bruckner, M. (2019, March). *Nordic food systems for improved health and sustainability: Baseline assessment to inform transformation*. https://www.stockholmresilience.org/download/18.8620dc61698d96b1904a2/1554132043883/SRC_Report%20Nordic%20Food%20Systems.pdf

Wood, A., Halloran, A., & Gordon, L. (2020). *Eight opportunities for Nordic collaboration on food system challenges* (Insight paper 2; Nordic Food Transformation, p. 22). Stockholm Resilience Centre. https://www.stockholmresilience.org/publications/publications/2021-03-01-nordic-food-system--transformation-series-insight-paper-3.html

Wood, A., Halloran, A., & Gordon, L. (2021). *Addressing the barriers to food system transformation in the Nordic countries* (Insight Paper 3; Nordic Food Transformation, p. 15). Stockholm Resilience Centre. https://www.stockholmresilience.org/publications/publications/2021-03-01-nordic-food-system--transformation-series-insight-paper-3.html

Wood, A., Queiroz, C., Deutsch, L., González-Mon, B., Jonell, M., Pereira, L., Sinare, H., Svedin, U., & Wassénius, E. (2023). Reframing the local–global food systems debate through a resilience lens. *Nature Food*. https://doi.org/10.1038/s43016-022-00662-0

Yin, R. K. (2018). *Case study research and applications: Design and methods*. SAGE Publications Ltd.

Zurek, M., Wirths, J., Hebinck, A., Crawford, S., Lidder, P., Prasad, P. V. V., Tittonell, P., Herrero, M., & Compton, J. (2023). Principles for guiding research and innovation toward sustainable and equitable agrifood systems. *Frontiers in Sustainable Food Systems*, *7*, 1059063. https://doi.org/10.3389/fsufs.2023.1059063