Master's Thesis

Lucie Jeandrain
5147656

July 2022

Enhancing multi-level collaborations to upscale short food supply chains in Utrecht

Utrecht University

© Marisa Morton

Acknowledgments

Abstract

The global food system is in dire need of reform. How we produce and consume food contributes to some of society's most pressing challenges. As a reaction, short food supply chains (SFSCs) have developed in Europe, supported by the idea of producing and consuming food in a way that respects both the environment and the different actors in the food chain. Utrecht, the fourth biggest city in the Netherlands, is also following that trend, and many initiatives that seek to offer fresh and local food to citizens have arisen. Nevertheless, this alternative system remains relatively small compared to the conventional value chains. This thesis examines how SFSCs of Utrecht can be upscaled through the creation of meaningful collaborations while still respecting the primary identity of SFSCs i.e., small and local. The acceleration mechanisms of Gorissen, Spira, Meynaerts, Valkeringa, & Frantzeskaki (2018) are adapted and then combined in a novel conceptual framework with the concepts of transformative alliances and actors of Haan & Rotmans (2018) and the different collaboration levels offered by Mittal, White, & Krejci (2017). This framework highlights the way different types of actors are creating transformative alliances to foster system change. These theories are then visualised using social network concepts which allowed for a thorough overview of the different actors collaborating to strengthen SFSCs in Utrecht. Based on these observations, recommendations on how to strengthen SFSCs are formulated. These are mainly focused on connectors and topplers who appeared to be critical actors in unifying, assembling, and giving relevance to SFSCs and later upscale SFSCs.

The results help to further define how upscaling processes occur within a local context. The research offers a new narrative on how alternative markets such as SFSCs are being developed by creating meaningful collaborations between diverse actors. Moreover, the methodology suggests a novel and concrete way to visualise how actors are coming together to challenge and modify the conventional systems. It is believed that these findings could be applied in similar regions where SFSCs evolve to then further develop the conceptual framework created.

Table of Content

List of Tables

List of Figures

Abbreviations

L2L	Local2Local
LFS	Local Food System
MLP	Multi-Level Perspective
SFSC	Short Food Supply Chain

1. Introduction

The current state of the global food system is causing some of society's most pressing issues. Today's food system is responsible for around a third of greenhouse gas emissions (Crippa, et al., 2021), highlighting the dysfunctionality of the current industrial agriculture model (Campbell & MacRae, 2013). A substantial proportion of land used for agriculture (Foley, et al., 2005), combined with the intensification of agricultural practices, makes the industry responsible for significant biodiversity losses (Newbold, Hudson, Hill, et al., 2015; Rotz & Fraser, 2015). Moreover, the globalised and extended supply chains that characterised the food sector have contributed to a lack of agency for farmers and consumers due to an intense concentration of power among private interests and policy elites (Clapp, 2021). The global industrial and agricultural system fails to feed a continuously growing global population while respecting the limits of the planetary boundaries as introduced by Rockström and colleagues (2009). In response to these challenges, the IPCC released a report in 2019 stating that the world needs to take unprecedented action to mitigate a destabilised climate system and eradicate hunger and poverty (IPCC, 2019). Systematic changes, however, imply drastic changes in the currently established practices, the commonly shared set of values and the social constructs structuring our conventional system (Frantzeskaki & de Haan, 2009).

Alternatives have risen to produce and consume food while respecting both the environment and actors within the supply chain. Local food initiatives supporting the idea of re-localising food production and shortening supply chains have risen in popularity in the local landscape of agriculture (Sonnino & Marsden, 2006). They are often referred to as short food supply chains (SFSCs) (Marsden, Banks, & Bristow, 2012). These are seen as positive drivers toward more sustainable food consumption by impacting society, the local economy, and the environment beneficially (Enthoven & Van den Broeck, 2021; Jarzebowski, 2020; Kneafsey, et al., 2013; Lamine, 2014; Renting, Marsden, & Banks, 2003). To better incorporate the overarching positive impacts of SFSCs, a European Union-funded initiative that supports SFSCs in Europe, has offered the following definition of SFSCs:

"SFSCs are co-operative systems that include very few intermediaries, increasing sustainability, transparency, social relations and fairer prices for farmers and consumers. Such supply chains usually involve local producers working together to promote local food which, in many cases, only travels a short distance, so farmers and consumers can communicate with each other" (Smartchain, nd.)

Within transition studies, systematic changes are induced through regime changes (Geels F., 2002). The current food system is typified by large-scale actors who are part of complex, global supply chains. SFSCs actors work as niche players within the current food system and are developing novel business models and practices that challenge the current regime. Sustainability initiatives, such as SFSCs, are acknowledged as crucial for system transformation. Combined and matured, these initiatives could shift the dominant regimes into more sustainable ones, leading to systematic changes (Lam, et al., 2020). Amplification processes are therefore needed to ensure the increase of impact of those initiatives (Gorissen, Spira, Meynaerts, Valkeringa, & Frantzeskaki, 2018). Within SFSCs, "amplification" implies the practices shifting from a sole activist core to a broader audience (Staggenborg & Ogrodnik, 2015). In contrast to the conventional competition-driven scaling up of business activities, the scaling up of SFSCs aims to create transparent and strategic partnerships in

which all supply chain actors collaborate and provide local food to a broader range of consumers (Clark & Inwood, 2016). Within this report, scaling-up is therefore defined according to Hermans, Roep, & Klerkx (2016) as the way different types of actors come together around a similar vision, creating momentum, and pushing for institutionalised actors to make space for the initiative.

Barriers are often faced when scaling up SFSC initiatives. These are mainly economic and educational: the low financial resources and the high risks perceived by banks and financial institutions make it difficult for SFSC actors to develop. The lack of shared specialised knowledge and skills due to little collaboration between small entities increases the isolation of SFSC actors and their inefficiency (Jarzebowski, 2020; Lutz, Smetschka, & Grima, 2017). Encouraging collaboration amongst SFSC actors could help overcome these barriers, as the benefits of collaboration include the improvement of product ranges, the sharing of resources, the maintenance of infrastructure, increased negotiation power, reduced competition, and mutual support (EIP-AGRI, 2015; Fobbe, 2020; Jarzebowski, 2020; Smetschka, & Grima, 2017).

European cities have seen SFSC initiatives spread, supported by the idea of supporting the local economy, reconnecting consumers to the food they eat, as well as enhancing sustainable development in cities (Schmutz, Kneafsey , Sarrouy Kay, Doernberg, & Zasada, 2018; Buchan, Cloutier, & Friedman, 2019). Utrecht, the fourth biggest city in the Netherlands, is a good example of this trend. The city has witnessed a significant spread of SFSC initiatives, leading to an increasing number of actors participating in SFSC activities (Haenen, Renting, Dubbeling, & Hoekstra, 2018). The widespread adoption of SFSCs in Utrecht leads to a push for upscaling SFSCs by enhancing closer collaborations amongst different actors (Local2Local, nd.). An example of how these actors are organising each other to upscale SFSCs is the roll-out strategy (*"uitrolstrategie"* in Dutch), coordinated by Amped and Local2Local. Based on the GAIN Transition Model (Appendix 1), the strategy is structured in four phases: inspire, activate, convert, and execute. The strategy is currently in between the inspire and activate phase, which involves identifying partners and creating action plans. The goal of the activation phase is to create meaningful collaborations between stakeholders to ensure the upscaling of SFSC initiatives of Utrecht (Amped Concepts, 2021).

Currently, activities of SFSCs in Utrecht take place at different levels and lack overall coordination (Amped Concepts, 2021). Moreover, the upscaling of local food initiatives is not well illustrated within the current literature. This research aims at filling this gap by investigating the innovation phase of SFSCs in Utrecht and how actors are currently working together to foster the strengthening of SFSCs. Furthermore, this research aims to understand better how scaling up occurs within a local setting and further explore how collaborations enhance these processes. This, therefore, leads to the following research question and its sub-questions:

"How can collaboration between SFSC actors in Utrecht be enhanced to foster the upscaling of the local food system of Utrecht?
1. *Who are the different actors composing the SFSCs of Utrecht?*
2. *How are SFSC actors connected?*
3. *Which type of alliance exists in the system?*

4. How can the Utrecht SFSCs strengthen existing alliances and create new ones?"

To answer these questions, an actor network has been created to map the links between actors and identify the different types of alliances already existing that could be enhanced between actors of the local food system of Utrecht. The concepts of transformative actors and collaborations defined by Haan and Rotmans (2018) are used to classify the different parties and their respective roles. This classification is then used to identify the different alliance actors form or could form to enhance the overall upscaling of SFSCs in the city of Utrecht, according to the acceleration framework of Gorissen et al. (2018). To assess the quality of the overall alliances, the specific links connecting one actor to another are categorised through the framework of Mittal et al. (2017), which provides a typology for the different types of collaboration existing amongst regional food actors. This research's results highlight how collaborations between different actors participate in scaling up niche regimes such as SFSCs of Utrecht.

This report first introduces the theoretical and conceptual framework used for this research. The methodology used to gather and structure the data of this research is then further explained, followed by an extensive overview of the results. Finally, the way upscaling of SFSC is applied within a local context is discussed as well as the overall conclusion of this research.

2. Theoretical Framework

2.1 Local food systems and short food supply chains

Local food systems (LFS) present as one of the ways to tackle the challenges faced in our current food system (Forssell & Lankoski, 2015). LFS are commonly described as systems in which "foods are produced, processed and retailed within a defined geographical area" (Kneafsey, et al., 2013, p. 23). A multiplicity of configurations represents them, but all share a common goal: decreasing the geographic and social distance between food producers and consumers (Hedberg & Zimmerer, 2020). These food supply chains, therefore, are organised in different ways that scholars and institutions analysed under the name of Short Food Supply Chain (SFSC) (EAFRD, 2013; Enthoven & Broeck, 2021; Jarzebowski, 2020; Kneafsey, et al., 2013; Marsden, Banks, & Bristow, 2012; Matson & Thayer, 2013). SFSCs are often defined by a reduced number of intermediaries between producers and consumers (Marsden, Banks, & Bristow, 2012). However, this definition can be seen as too reductive as it leaves out the actual impact that SFSCs and their actors have on our society (Smartchain, nd.).

It is assumed that SFSCs emit fewer greenhouse gases than their industrialised counterparts. While this statement is still being debated amongst scholars (Garnett, 2013; Schönhart, et al., 2009), SFSCs are nevertheless being acknowledged as positively enhancing more sustainable food consumption (Renting, Marsden, & Banks, 2003; Jarzebowski, 2020). On a social level, SFSCs are acknowledged as positively fostering connections between consumers and producers, strengthening the feeling of community amongst one local area, and improving diets (Cone Myhre, 2000; Enthoven & Van den Broeck, 2021; Kneafsey, et al., 2013). From an economic perspective, local food consumption ultimately contributes to rural areas' economic development. Farmers and consumers have a better agency over the food they offer and consume through a shorter food chain. Lastly, producing food on a local level often comes with lower pesticides use and better agricultural practices which positively impact soils, water use and biodiversity (Kneafsey, et al., 2013).

The multitude of initiatives within SFSCs is quite broad and takes multiple forms. An extended classification provided by Kneafsey and colleagues (2013) offers a broad overview of the different initiatives present in SFSC systems, as shown in Table 1.

Table 1 - Classification of SFSC initiatives, retrieved from Kneafsey et al. (2013)

Short Food Supply Chain	Sub-classification	Example by Kneafsey et al. (2013)
Face-to-Face	*On Farm Sales*	- Community Supported Agriculture - Farm Shops - Farm based hospitality - Roadside sales - Pick-Your-Own
	Off Farm Sales – Commercial Sector	- Farmers' markets and other markets - Farmer owned retail outlet - Food Festivals / tourism events - Sales directly to consumer co-operatives / buying groups

Spatial Proximity	Off Farm Sales – Commercial Sector	- Sales to retailers who source from local farmers and who make clear the identity of the farmers. - Sales to Horeca (i.e., *Hotels, Restaurants, Cafés*) as long as the identity of the farmer is made clear to end consumers.
	Off Farm Sales – Catering Sector	- Sales to hospitals, schools, universities, etc.
	Farm Direct Deliveries	- Delivery Schemes (e.g. Vegetable box)

The actors participating in SFSCs activities in Utrecht are as numerous as the different initiatives offered through the SFSCs ecosystem, such as community gardens, urban farms, food banks, food-boxes businesses, or cooperatives (Haenen, Renting, Dubbeling, & Hoekstra, 2018). According to the classification above, they represent a combination of feeding the city with local-grown products or offering other services linked with education, inclusion, and reconnection to the food citizens consume (Haenen, et al., 2018).

2.2 Acceleration of system changes

System changes and transition theories have been significantly developed among scholars over the last decade (Lam, et al., 2020). The widely used regime theory suggested by the Multi-Level Perspective (MLP) framework highlights how regimes are locked by reproducing a set of activities that reinforce them and the system itself. Niches can be found within these regimes. They are defined as where novelties emerge and, if favourable conditions, can evolve and modify the regime and the overall system (Geels, 2002). In the case of SFSCs, the locked regime can be identified as the conventional food system, where large-scale actors rule complex and global supply chains and food is being intensively produced and sold in big distribution centres. SFSC actors and initiatives have arisen as a reaction to the deficiencies of this current regime (i.e., soil depletion and the power imbalance between producers and retailers). They represent niche players as they are developing novel business models and practices that could potentially challenge the current regime and contribute to redesigning the way food is produced and consumed.

However, the MLP framework has also received critiques linked to its "ambivalent and simplified conceptualisations of the levels and their respective role in transition" (Svenson & Nikoleris, 2018, p. 462). To develop and specify the MLP framework, theories around scale dynamics (Hermans, Roep, & Klerkx, 2016), acceleration mechanisms (Gorissen, Spira, Meynaerts, Valkeringa, & Frantzeskaki, 2018), transition management (Rotmans and Loorbach, 2008), and strategic niche management (Naber et al. 2017) have arisen.

Looking at ways in which small-scale initiatives are influencing the overall sustainability transition, the case study provided by Gorissen et al. (2018) offers a conceptual framework for analysing the mechanisms of acceleration dynamics. "Acceleration" is defined by Rotmans and colleagues (2001) as the phase in transition theory where "collective learning processes, diffusion and embedding processes occur" (p. 1). Within the conceptual framework of Gorissen et al. (2018), five mechanisms are identified: replicating, partnering, upscaling, instrumentalising and embedding. These mechanisms are ordered as illustrated in Figure 1.
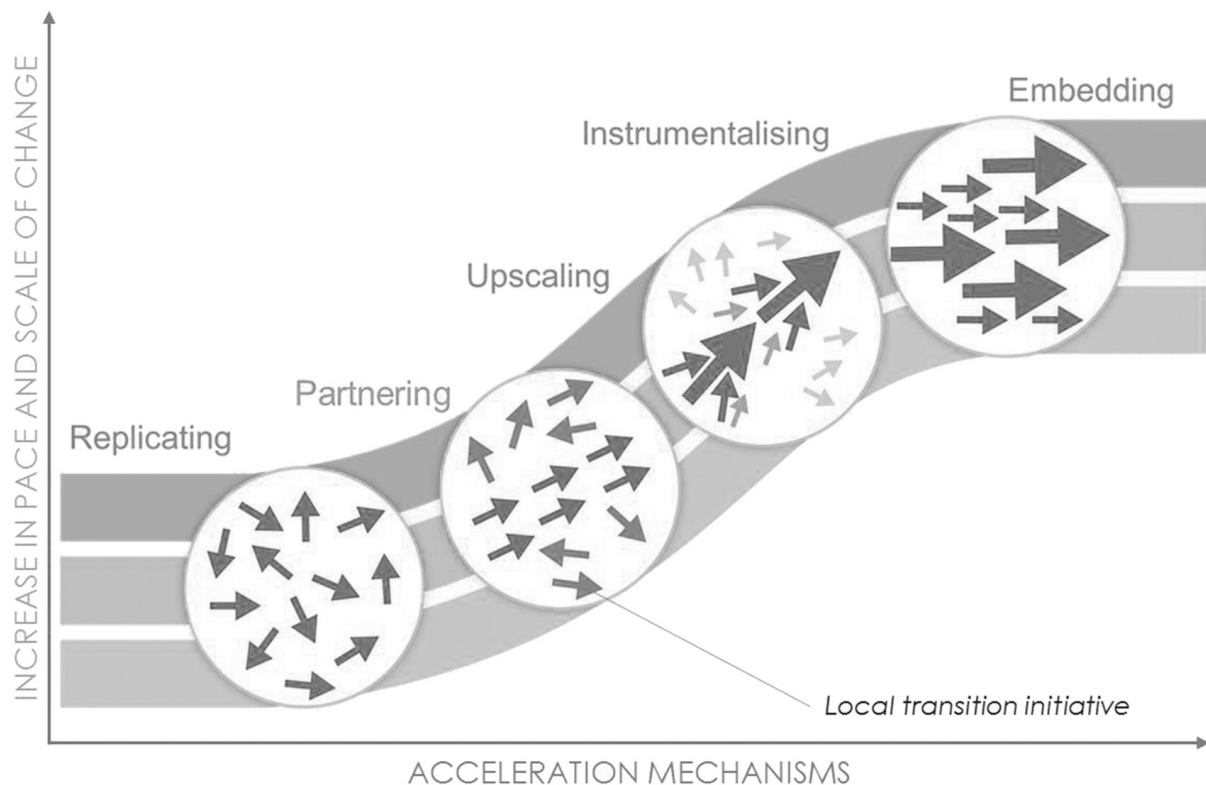
Figure 1 - Acceleration Mechanisms retrieved from Gorissen et al. (2018)

When it comes to upscaling small-scale initiatives, nuance is needed. The definition given by Gorissen et al. (2018) emphasises the growth of members, users, or supporters, resulting in strengthening the initiatives. However, when it comes to SFSC initiatives, the growth of members and, therefore, of the small-scale initiative is often not an objective. The primary identity of those actors is their smallness and alternative mindset, which could be lost when one initiative grows (Feagan, 2007). SFSCs cannot follow the similar growth path required by the definition of upscaling given by Gorissen et al. (2018) as they would then lose their legitimacy (Mount, 2012). A more applicable definition of upscaling is needed to fit better the context within which SFSCs develop.

Studying the development of grassroots innovation movements, Hermans, Roep, & Klerkx (2016) defined upscaling as the way "*opportunities and barriers within institutional structures are being identified to properly embed an innovation and the actions that niches actors employ to achieve that*" (p. 287). Those mechanisms are often illustrated by diverse actors coming together, adopting a similar alternative vision, and pulling for institutionalised actors to make space for this innovation (Hermans, Roep, & Klerkx, 2016). Therefore, the acceleration mechanisms of Gorissen et al. (2018) are adapted as defined in Table 2.

Within local food systems, SFSCs could be identified as transition initiatives, defined as "*actor-networks that start-up, adopt and/or engage with new practices, technologies and experiments that seek to profoundly change established unsustainable routines and perceptions towards more sustainable ones*" (Gorissen, et al., 2018, p.2). The framework of Gorissen et al. (2018) however lack in identifying which actor is needed in enhancing the transition from one phase to another.

Table 2 - Acceleration Mechanisms of Gorissen et al. (2018) adapted with Hermans et al. (2016)'s upscaling definition

Acceleration Mechanisms	Definition
Replicating	The way different initiatives appear and are being multiplied within a similar system.
Partnering	When resources, competences, and capacities are being aligned or complemented through different collaborations. Synergies between initiatives are then being created to support and ensure the continuity of the initiatives.
Upscaling *By Hermans, Roep & Klerkx (2016)*	Different types of actors coming together around a similar vision, creating momentum, and pushing for institutionalised actors to make space for the initiative (Hermans, Roep, & Klerkx, 2016).
Instrumentalising	The use of opportunities provided at multiple levels of the city/region governance to strengthen the network of actors locally.
Embedding	The alignment of old and new ways to integrate them within the institutionalised system.

2.3 Actors' alliances for transformative changes

To fill the gap of poorly represented actors within transition theories, Haan & Rotmans (2018) suggest a framework in which actors in transformative changes are characterised. Moreover, the different collaborations between actors needed to drive transformative changes are identified. Four types of actors are suggested. Each type has a well-defined role in transformative change processes: frontrunners, connectors, topplers, and supporters. These actors could be part of both an emerging system and the conventional one. Therefore, individual actors could embody different types depending on the analysed system (Haan & Rotmans, 2018). The role of each type of actor is given in Table 3. These same actors could offer alternative solutions either on their own or by creating alliances with other actors based on a shared set of values. Actors sharing this similar set of values then join an emerging "stream". The importance of this stream depends on the diversity of actors constituting it: the more diverse the set of actors is, the stronger the emerging stream is to influence the conventional one. Therefore, three types of alliances have been identified as crucial in transformative changes: initiatives, networks, and movements (Haan & Rotmans, 2018) (Table 4).

This framework offers ways to characterise the different types of stakeholders involved and needed for SFSCs to develop in Utrecht. SFSC actors, as described by Gorissen and colleagues (2018), could here be seen as similar to the frontrunners Haan and Rotmans (2018) propose. Ultimately, this framework leads to not looking solely at SFSC actors but also to other actors of the system such as the municipality, universities, and other supporting organisations joining a common stream related to fostering local food in Utrecht. The typology of actors and the different types of alliances that can be created help identify who is fostering an initiative, which connectors could help the initiatives find an aligned vision and how common networks and movements can be enhanced. Linking it to acceleration mechanisms, connectors could be seen as important enablers for the partnering phase while topplers might be central to the upscaling phase (see Table 4). The way a group of stakeholders would then work together can be suggested based on the different types of alliances of Haan and Rotmans (2018).

Table 3 - Transformative actors' role by de Haan & Rotmans (2018)

Type of actors	Role Description
Frontrunners	There to make alternative solutions known and available early on, providing systems with diversity.
Connectors	Provide connectivity amongst actors by aligning actors sharing the same set of values. They connect solutions and systems by institutionalising the solutions, making them established options for society. They are therefore crucial in the formation of alliances.
Topplers	Introduce, change, and phase out institutions to make way for alternative solutions. They articulate the values that connect their alliances to a rising stream and make them explicit. By externalising values, they can attract supporters (followers).
Supporters	Although not considered as transformative, their support is an important factor of institutionalising the transformative change by providing legitimisation of the new solution and changed system.

Table 4 - Transformative alliances by de Haan & Rotmans (2018) and the acceleration mechanisms of Gorissen *et al.* (2018)

Transformative alliances	Definition of de Haan & Rotmans (2018)	Acceleration Mechanisms of Gorissen *et al.* (2018)
Initiatives	An organised set of actors aiming at making alternative solutions to the conventional system known or available. Launched by frontrunners but topplers and supporters may be involved.	Replicating
Networks	Organised by connectors who align different initiatives and actors sharing the same set of values. The networks are there to align initiatives, fostering the institutionalisation of those initiatives.	Partnering and upscaling
Movements	Related to the action of the topplers. By articulating value sets, topplers are connecting actors to a rising stream. A transformative movement therefore emerges and can attract supporters. As opposed to networks, there is not specifically a direct connection from the supporters to the transformative actors in the alliance. However, supporters will connect on a more abstract level to the value sets embodied by the movement.	Instrumentalising and embedding

2.4 Typology of collaborations between local food actors

After looking at the overall landscape of alliances created between groups of actors, a classification of the nature of one-to-one collaborations is also needed to identify the specific links that bind one actor to the other within an alliance. Mittal, White, & Krejci (2017) offered a classification for the different types of collaboration existing amongst regional food actors that is split between three levels: operational, strategic and co-creation. All three levels are being further described in Table 5.

Table 5 - Typology of collaboration levels amongst regional food actors, retrieved from Mittal, White, & Krejci (2017)

Collaboration level	Description
Operational	Actors collaborating to optimize specific activities. This level of collaboration often requires low commitments and interactions, as well as minimal share of information among partners. This implies that an actor could easily end the collaboration if interests are no longer shared.
Strategic	Actors within a strategic collaboration share key infrastructure and/or sensitive information. They jointly plan operations, agree on objectives, and share strategic information (i.e., customer demand, forecasts, and operational capacities).
Co-Creation	Actors are involved in complex information exchanges and intertwined business interactions such as the creation of a new entity, a consortium, or a joint venture. This results in a significant interdependency among the members.

This framework can assess the strength of the connection between one actor and the other. This level of assessment will ensure a better understanding of the specific connections between actors and suggest a more nuanced landscape of collaborations. The strength of transformative alliances can then be evaluated based on the types of collaboration formed within. To ensure the creation of solid alliances, strategic or co-creation types will then be preferred to ensure more sustainable collaborations between actors. This hypothesis is supported by the idea that knowledge and competencies are being shared and built efficiently within more robust collaboration levels (Winarno, Perdana, Handayati, & Purnomo, 2020). Alliances are, therefore, more resilient in tackling potential issues through collaborative problem-solving (Caniëls & Henny A. Romijn, 2008; Page, Stone, Bryson, & Crosby, 2015).

2.5 Conceptual framework

Combined, these theories help to better understand the actor dynamics needed to foster systematic change within SFSCs. For each acceleration phase of Gorissen et al. (2018), a specific set of actors comes to play, interacting at different collaboration levels (Mittal et al., 2017) and developing transformative alliances as defined by Haan & Rotmans (2018). This is illustrated in the conceptual framework shown in Figure 2.
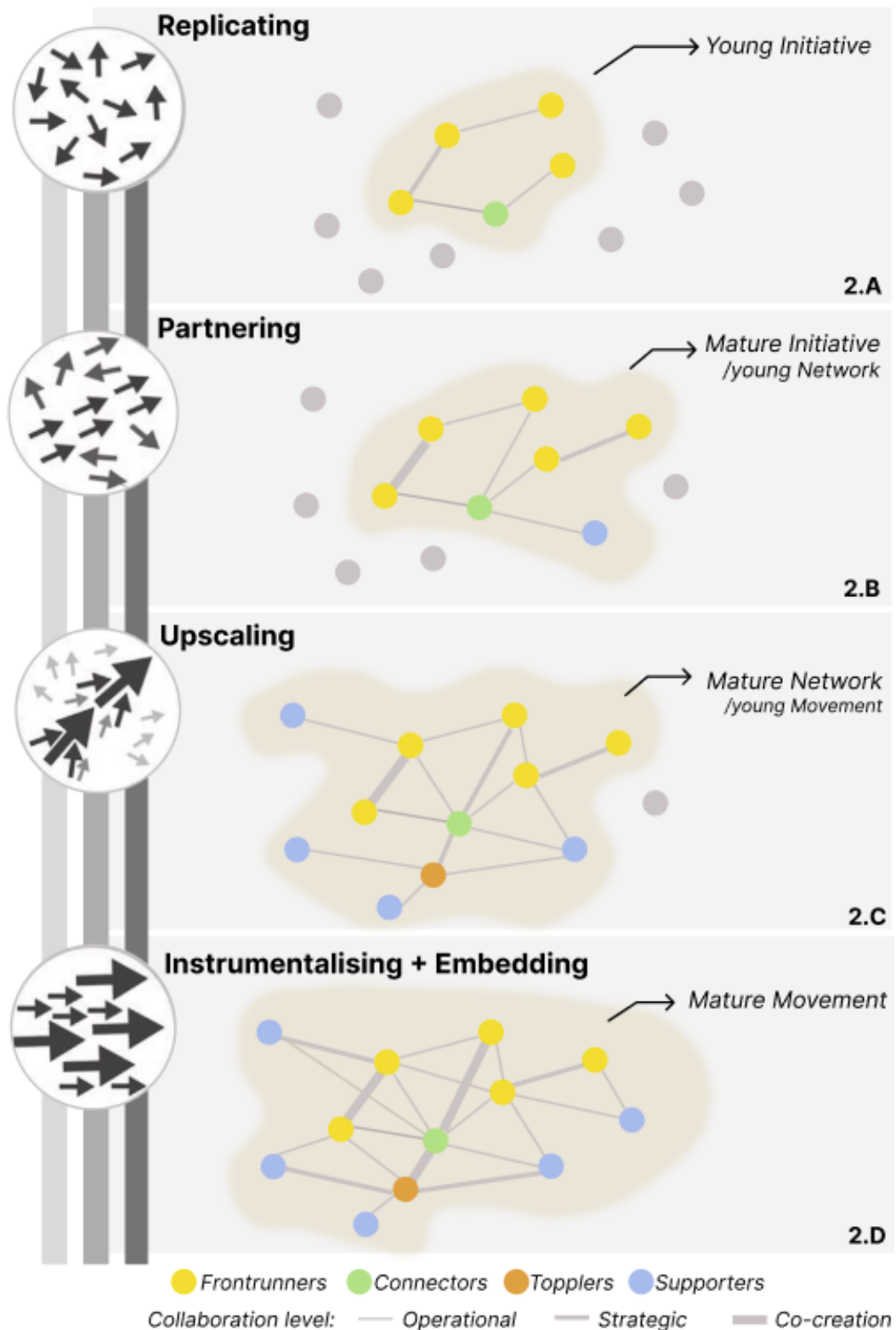
Figure 2 - Conceptual Framework. Author's own elaboration.

The replicating phase is the earliest acceleration phase of an alternative system, implying the presence of primary frontrunners. Collaborations on the operational and strategic level could arise, inducing the formation of an initiative. However, this phase still lacks the role of connectors to efficiently set up a strong initiative (Figure 2.A).

Mature initiatives where most actors collaborate on operational and strategic levels become young networks where frontrunners can collaborate on both strategic and co-creation levels. The partnering phase is mainly the result of the connectors' work. Since the alternative system is now more organised, supporters are starting to join the network, attracted by the alternative solutions offered by the frontrunners, and coordinated by the connectors (Figure 2.B).

The critical actors for the upscaling phase are the topplers. As they formulate the alternative solution in an attractive way for supporters, they gather a broader set of actors within the network. As more supporters join, the network has the potential to evolve into a movement. All actors are collaborating on both strategic and co-creation levels and are driven by a similar goal (Figure 2.C).

Finally, the instrumentalising phase is the result of the actions of topplers as well as connectors. The topplers pulled a significant number of critical supporters while the connectors continue to align frontrunners. Collaborations on the co-creation level are being formulated under instrumental coalitions: a movement is born. The embedding phase is the final stage for the alternative system to then be recognised as a conventional one (Figure 2.D).

The last few years have seen a significant spread of SFSCs initiatives amongst European countries, showing the growing impact SFSCs have on food consumption (Renting & Marsden, 2003). In Utrecht, multiple elements indicate that Utrecht's SFSCs also follow that trend. A report published in 2018 analysing the food system of Utrecht identified more than 70 different urban agriculture farms of gardens, five community supported agriculture businesses/farms, 57 retail points explicitly offering regional food products, as well as 19 catering businesses working with regional products (Haenen, et al., 2018). Since then, the province of Utrecht has announced its involvement in fostering the consumption of local food through connecting local actors better with the help of "*voedselmakelaar*" (food agent in Dutch) (Provincie Utrecht, 2022). Meanwhile, the rollout strategy led by L2L suggests that tight connections between actors of Utrecht's SFSCs are already being created. For these reasons, SFSCs of Utrecht seem to have completed the replicating phase and to be entering the partnering one. The challenges to upscale SFSCs in Utrecht, as defined by Hermans et al. (2016), are to create synergies between the different actors. The key actors are the connectors and topplers; both needed to harmonise SFSCs from a bottom-up and top-down perspective.

To study this framework effectively, an actor network can be created. Whilst this could be based on spatial co-location, the network property itself can also be used to understand the structure of the Utrecht SFSCs. In this regard, communities and betweenness centrality are two relevant concepts of network theory. A definition of both concepts is given in Table 6.

Table 6 - Networks Theory: Definition of Communities and Betweenness Centrality

Network Theory Concept	Definition

Communities	*"Locally dense connected subgraphs in a network. This expectation relies on two distinct hypotheses:*
	
	1. *Connectedness Hypothesis*
	   Each community corresponds to a connected subgraph […]. Consequently, if a network consists of two isolated components, each community is limited to only one component. The hypothesis also implies that on the same component a community cannot consist of two subgraphs that do not have a link to each other […].
	
	2. *Density Hypothesis*
	   Nodes in a community are more likely to connect to other members of the same community than to nodes in other communities. "
	
	(Barabási, 2016)

Betweenness Centrality	*"Betweenness centrality measures the extent to which actors in a network lie on the shortest path connecting all pairs of actors in the network"* (Everton, 2012, p. 210)

The concept of communities can be used to identify alliances, as they relate to the idea of a tighter set of actors interacting within one system. Haan & Rotmans (2018) transformative alliance can then be formulated based on the actors present in one identified community. The tides representing the collaboration existing between one actor and the other are weighted according to the different collaboration levels of Mittal et al. (2017). Weighting these tides then offers an extra parameter to analyse the network on the maturity of the different alliances and the importance of specific actors (Horvath, 2011).

As connectors and supporters' core role is to align frontrunners and pull supporters in, it is hypothesised that effective connectors and topplers will have a higher betweenness centrality than frontrunners and supporters. As some actors are more connected with others, this implies that these actors could have more influence on the community they are part of. The betweenness centrality measure can therefore be used to highlight these actors more.

3. Methodology

The research was designed to answer the research question and sub-questions as illustrated in Figure 3. Based on the conceptual framework outlined, the research aimed to identify at which stage of acceleration the SFSCs in Utrecht are at, whether it contains distinct communities and the relative role of the different actors in the network. The actors' network was created based on the data collected through desk research interviews of different SFSC actors in Utrecht. The network was then analysed to understand the system structure and the different types of alliances, thus determining which acceleration phase it is currently in. Based on barriers and drivers to upscaling reported by actors and a system-level analysis of the SFSC, recommendations are made to help the system move to the next acceleration phase. The steps of the research are further developed below.
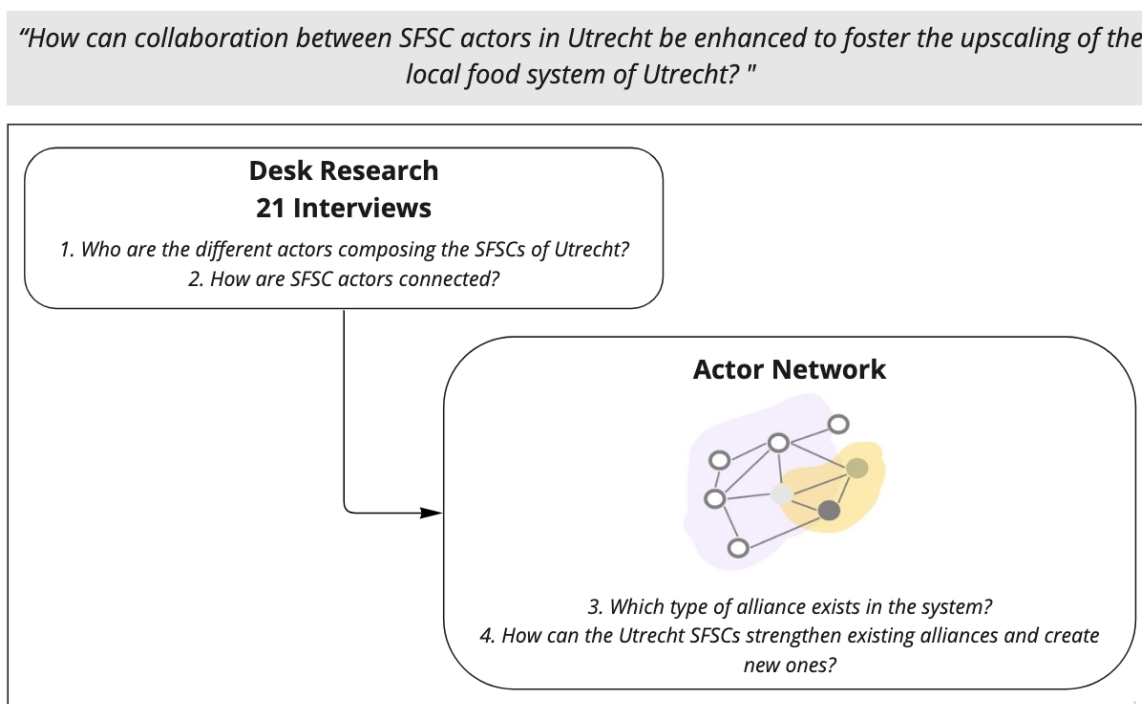
Figure 3 - Visualisation of the research design. Author's own elaboration.

3.1 Identify actors and their collaborations

3.1.1 Desk research: identify the actors

The first step in creating the network was to conduct desk research. This part of the research has been done through both the L2L and the municipality of Utrecht databases. The main goal was to identify the actors and the existing collaborations composing the SFSC system of Utrecht. These actors formed the initial set of interviewees. From that point, a snowball technique was applied to find further actors through the actor's internet page or information media. In this way, we aimed to capture a diverse set of the main actors involved in enhancing the SFSCs of Utrecht (Kirchherr & Charles, 2018).

3.1.2 Interviews: identify the existing collaborations between actors

Once the first set of actors was identified, 21 semi-structured interviews were conducted. The aim was to have a clear overview of the actors as well as the different collaborations already created with other actors. Therefore, interviews were crucial to deriving the SFSC network. A diverse sample of actors' roles has been interviewed: 8 frontrunners, seven connectors, three

topplers, and three supporters. This allowed the research to offer a nuanced landscape of actors and perspectives.

Similar questions were asked to all participants, supported by follow-up questions to specify the interviewees' answers. This ensured to gather of similar data for each actor, allowing clear comparison between cases and facilitating the research process (Bryman, 2012). The questions were divided into three main sections: the first to know the exact activity of the actor and its specific role, and the second to go through the different collaborations the interviewee is part of. These two sections helped identify the actor's role, its existing collaborations, and at which level these occurred. The third section dived into creating potential new collaborations based on how the actor wishes to evolve in the future, which helped to understand the barriers and ways to facilitate upscaling. An overview of the interview guide can be found in Appendix 3.

The new actors mentioned by the interviewee were also contacted for an interview, following the similar snowball technique mentioned above. This process resulted in identifying 75 actors. The description of all the actors identified and interviewed can be found in Appendix 4. The actors were deemed relevant to this list when (part of) their activities were focused on the production, retailing, or supporting of local food consumption in Utrecht.

Finally, the recordings of the interviews were transcribed (Appendix 5) and then coded in the coding software Nvivo Pro. The coding process was held in the following order: thematic and open coding. Thematic coding was structured in the same order as the interview guide: the description of the actor, the current collaborations, and the potential collaborations to be created (Table 7). Within these categories, open coding was used to create room for further description of the role of each actor involved and the type of collaboration. Those descriptions have later been used to identify in which transformative actor category the interviewee belongs according to the definitions given by Haan and Rotmans (2018). The description of the current collaborations was used to identify which collaboration type of Mittal et al. (2017) each partnership belongs. The last part of the interview served as a basis to formulate the recommendation regarding the evolution of the overall system. This method has been replicated for each interviewee. The codes were then used to build the actor network and identify the different transformative alliances, as Haan and Rotmans (2018) described.

Table 7 - Structure of the interviews' codes

Interview Actor 1	
Description	Main activities and role
	Number of employees, members, …
Its current collaborations	Collaboration with actor *w*
	Collaboration with actor *x*
Its potential collaborations	Potential collaboration with actor *y*
	Potential collaboration with actor *z*

3.2 Creation of the actor network

Once the interviews were coded, the network of actors was created through the program Ucinet. This program is a tool used to analyse and visualise social networks (Ucinet, nd). The links previously identified in the interviews were coded in a matrix form to create a visual map

of the actors. The definitions of transformative actors given by Haan and Rotmans (2018) (Table 4) helped categorise each identified actor as described in Appendix 4. A colour code was given to each type of actor to ensure a clear visualisation of the network and facilitate the analysis later. When actors mentioned a collaboration with another actor, a link was created. The strength of this link was then categorised according to the collaboration level of Mittal et al. (2017) to ensure a more nuanced visualisation of the different links between actors. As shown in Table X, a scale from 1 to 3 was given to each level, one being the weakest and three the strongest. As not all the actors composing the network have been interviewed, a distinction between interviewed and non-interviewed actors was made by annotating with an Asterix the actors interviewed. The overall disposition of each node was set up using the Spring Embedding function of the program. This algorithm uses iterative fitting to locate the network nodes (actors) in a way that minimises the path lengths between them (Williams & Shepherd, 2015). This, therefore, allowed the creation of a clear and visual map where actors working together were located close to each other.

Table 8 - Collaboration level: scale

Collaboration level (Mittal et al. (2017)	Link strength
Operational	1
Strategic	2
Co-Creation	3

3.3 Identifying the types of alliances, the current state of the network and formulating suggestions to enhance collaborations

With the visual map previously created, the transformative alliances defined by Haan and Rotmans (2018) have been highlighted by applying the Girvan-Newman clustering algorithm. This algorithm is based on repeatedly deleting edges with the highest edge betweenness centrality. This choice of centrality measure is because it can identify edges on a large number of shortest paths between nodes, which are believed to connect different non-overlapping communities (Girvan & Newman, 2002). This method, therefore, suggests a selection of subgroups that is both meaningful and allows for a close-to-maximal measure of fit to what is observed in real life (Sloane & Reilly, 2012). To this end, the chosen clusters were minimum of 5 to a maximum of 10. A broader clustering highlighted only one community, while narrower clusters were deemed irrelevant enough due to the small number of actors per community. This allowed a visualisation of the different alliances created within the local food system of Utrecht. The actors-to-actors collaborations level and the diversity of actors present within one community were used to describe the overall strength of an alliance qualitatively.

The importance of specific actors within the network was studied by looking at the betweenness centrality measure. As defined in Table 6, this centrality measure is relevant to the current case of transformative actors collaborating to create alliances: highlighting the betweenness of each actor will give interesting insights into the highly connected actors who foster the development of the alliance they evolve in. This was visually shown with the program's help: actors with a stronger betweenness were given a bigger node.

Based on these observations and the data collected through the interviews, recommendations have then been formulated to suggest potential stronger collaborations. These recommendations also dived into which specific actor's role is deemed crucial to push the initiatives forward through creating a network or enhancing the evolution of a network to a movement.

3.4 Data collection, data handling and data storage: ethical issues

This research conducted interviews that consequently involved participants. Therefore, privacy and ethical matters are to be raised to ensure the anonymity of each participant (SRA, 2021). Written information on the content of the interview was shared beforehand. The consent to record had been asked at the beginning of each session and the informed consent form provided by the Utrecht University has been signed (Appendix 7). To ensure the anonymity of the participants, a code was given to them when coding each interview. When an actor involved is deemed relevant to name, their consent has been asked beforehand.

4. Results

To answer the research question *"How can collaboration between SFSC actors in Utrecht be enhanced to foster the upscaling of the local food system of Utrecht?"* interviews were carried out to understand different actors' experiences and goals within the SFSC. These insights were combined within an actors' network (Figure 4 and Figure 5) to develop a system-level understanding of the SFSC in Utrecht and how the system can be strengthened by connecting certain actors. This network will be used to look at the different actors, their roles, the existing collaborations between actors, and the different transformative alliances. Based on the observations formulated in the first section, recommendations for SFSCs to further develop in Utrecht are drafted in the second section.

4.1 Current state

This section will first investigate the different actors' roles and the internal drivers and barriers they face when collaborating with other actors. Second, the different transformative alliances identified will be analysed using the SFSC network. Both results will then allow identifying the current acceleration phase of SFSCs of Utrecht and which challenges need to be overcome to reach the next phase.

The studied SFSCs actors' network of Utrecht is pictured in Figure 5. 34 frontrunners, 8 connectors, 5 topplers and 28 supporters have been identified. All actors are comparatively evolving within the SFSCs sector of Utrecht. The betweenness of each actor is represented by the relative size of the node characterising each actor. The different size of links connecting actors follows the scale offered by Mittal et al. (2017). The high diversity of actors' role and importance and the different levels at which these actors interact already suggest the complexity of this alternative system that are Utrecht's SFSCs. The SFSC network's communities and stage will be explained in more detail in section 5.1.2, but first, the roles and goals of each interviewed actor will be explained.

Collaboration level
— Operational
— Strategic
— Co-creation
* interviewed actor

Transformative Actors
Frontrunners
Connectors
Topplers
Supporters

De Groene Febo
De Velde Keuken
Fietsen Voor Mn Eten
Voedsel Bank
Gorillas
de Groene Hart Corporation
Lokale Zuivel*
HKU
Ministeren LNV
Compazz
Reinarde
Boeren Harts
De Lokalist
MKB Nederland
Utrecht Food Freedom*
Local2Local*
Amped
Eurest Compass
Task Force Korte Keten
Lokale Voedsel Utrecht*
Zwamsap
BuurtBuik
Grounded
Leader Utrecht Oost/Weidse Veenweiden
Slow Food Youth Network*
Landschap Erfgoed Utrecht
The Green Office (UU)*
Utrecht Province
Be Bright
Food-Print Utrecht Region*
LTO
Rabobank*
Uber Eats
Geertje's Hoeve
Groententas*
Louis Bolk institute
Future Food Utrecht (UU)*
UMC
Enactus
Locals Utrecht*
Stroof Peren
Parnassos
Groentjes Soup
ROM*
Voedsel Surplus
Municipality of Utrecht
Lavett bread
de Koningshof*
Boerderij Nieuw Slagmaat
De Clique*
HU
Roze Bunker
Buitengewoon Varkens
Utrecht Natuurlijk*
Van het Eiland van Schalkwijk
Krachtstation
Café Averechts
VOKO Utrecht*
Bakkerij Van Eekeren
Wilderlands
Koprol
Loos
Natuur en Milieu Federatie Utrecht*
Living Lab Regio Foodvalley Circulair
Natuur en Milieu Nederland
Impact 030*
Social Impact Factory
Jongen Honden
Lunch Maatjes*
Buurt Maaltijd*
Food for Good
Kiwiboerderij
Fungi Factory

4.1.1 Transformative actors of the SFSCs network of Utrecht

Looking at the different actors composing the network, this section will aim at answering the sub question 1 *"Who are the different actors composing the SFSCs of Utrecht?"*. Simultaneously, the different links drafted between each actors allow a quite extensive answer to the second sub question *"How are SFSC actors connected?"*. For each actor, an extensive description on their activities as well as the connection level at which they interact will be given.

a. *Collaborating frontrunners*

The high diversity of SFSC frontrunners in Utrecht should be acknowledged. Within the studied actor network, 34 frontrunners have been identified (Table 10). The producers are the biggest category, followed by the retailers. These are, however, playing an important role in connecting different producers and making those local products more accessible to the consumers, as indicated by the high betweenness of the retailers in the network. It is also essential to highlight the diversity of activities offered per actor. The community-supported agriculture (CSA) initiatives often combine gardening with education, community building, and reintegrating of disabled persons into society. In the meantime, the producers often offer small catering services and directly sell their products through a small shop installed on the property. It can be acknowledged that the primary role of frontrunners as transformative actors (i.e., providing systems with diversity) is accomplished. Moreover, their high connectedness with each other already suggests a strong network when it comes to offering local food in Utrecht.

Table 9 - Frontrunners' Category

Frontrunners' Category	Number
Producers	17
Retailers	7
Caterers	3
Community Supported Agriculture	3
Consumer co-operatives	1
Other	3
Total	34

The frontrunners interact around multiple levels of collaboration. The operational level often occurs when producers are suppliers of the retailers. However, more substantial types of collaborations are being created. On the strategic level, we can see actors sharing their facilities. The reasons behind this strategic form of collaboration are mainly economic or organised to nurture stronger relations with existing partners.

We are working in the kitchen […] of a local theatre here in Overvecht. We can rent it for quite a decent price. And we do that together with another company: […] they cook in the afternoon and the evening, and we can use the kitchen in the morning and in the

afternoon. So that's why we can work together and rent this kitchen together and, well, share costs. (F3)

We do work together with producers, for example, tonight, [...] one of the producers comes to the shop to do some tastings. So that's something that we do as well. [...] Whoever wants to be here and build up something in front of the shop: that's fine with us. (F5)

Collaborations on the co-creation level also arise. Those relations are often created when founders from one organisation decide to create another SFSC-related business or when two organisations share a common goal and decide to merge their activities. In this context, tighter connections between the two organisations can be more easily created.

For example, [Name], we use their bicycle. A few weeks ago, they were plucking the Magnolia flowers again. So then this is their home base for that day: They store the Magnolia here for a day and then work from this place. (F5)

We've worked with them in Leidsche Rijn, and we've worked with them in Park Transwijk. And actually, we've taken over [their activities]. So you could say that a symbiosis arose. It was not necessary to have two organisations behind the initiative: nothing like a hostile takeover just a logical cooperation. (F2)

Those different levels of collaboration are often created organically. Producers will knock on the door of retailers, or retailers will discover producers through a joint partner, word of mouth, or simply through online research. This process is often supported by the locality of each actor, making it easier to connect and co-create.

It's a girl on our studies who works with [the partner] and she put [...] her in touch with me. And we organised that we would sell [their products] at [our stand]. That was just total word of mouth. (F6)

A lot of organisations or companies [...] that try to work with [us], they come knocking at our doors. (F5)

We also have a farmer's team. So they also look on Google, or they ask around to see if there's new organic farmers in the neighbourhood within a 30 kilometres distance. (F1)

Adding to this, a shared particularity amongst frontrunners is their disinclination to grow or further expand their activities in a conventional way. The growth of consumers or members is not an objective. Instead, the idea is to remain small or eventually duplicate the similar concept in another area of the city or another region, to maintain the local identity of the concept.

Once [we] are on the road a bit [...] we want to copy paste the same concepts in different cities. And the beauty of the idea is that it is a decentralised organisational model. So there won't be a motherboard in that sense, but every hub will be able to operate

independently in terms of organisation. So what will happen is you can establish these local circular food chains in different regions, and keep it local in that sense. (F8)

I think it works best if it's small, because you still have the possibility to get to know people. And remember people that are in the system, or when you see them at a distribution you can make a little talk. I mean, there's an app group where there's 80 people in it. And you have your own team, the transport team, administration team. And they also know each other. And you can take over shifts, which is really easy because you know each other. I think, the max of 100 people would work, but you can of course make multiple ones in the city if you want to grow. I think for me, that works best. (F1)

What's your hang up with having to grow? (F2)

Overall, the frontrunners of the SFSCs' network of Utrecht are highly active in connecting with one another and making the consumption of local food more accessible for the citizens of Utrecht. For those actors, collaborating is a critical component of their activities. Symbiosis often arose as those actors often share the same value sets: feeding locals with fresh and locally gown products. Moreover, the locality and smallness of frontrunners are at the core of their identity. This, therefore, leave out the idea of having to grow, as this would hinder the feeling of community and the overall way they organise their activities. The similar overarching goal as well as a low, competitive mindset, fostered by the willingness to remain small, seem therefore to be critical drivers for the creation of meaningful collaborations

b. Connecting connectors

Connectors are critical in forming solid initiatives and nurturing the creation of networks as they link frontrunners together and set up an aligned vision around a common goal (Haan & Rotmans, 2018). The key similarity between connectors is that each is closely related to a toppler, collaborating on the co-creation level. The reason behind such a close link is that topplers are often the ones who first created the connector's role, wishing to connect better with the frontrunners and create bottom-up solutions to enhance SFSCs.

The betweenness of connectors is usually higher than other actors, highlighting the critical role of connectors in bringing actors together. Some connectors, however, appear to be more important in that role than others, as shown by their respective betweenness (Table 10). Two reasons can be given. On the one hand, connectors connecting with a high diversity of actors are fully embedded in the network and ultimately have a higher betweenness. On the other hand, other connectors are not as embedded in the network as their counterparts. They, however, connect with actors that would have been excluded from the network otherwise. These connectors are therefore important actors to extend the existing network, which is characterised by their high betweenness.

Table 10 - Connectors' Purpose and Betweenness

Connector	Mission/purpose	Betweenness Centrality
Utrecht Food Freedom	Connecting food with heritage	171.600
Local2Local	Connecting local producers together and with caterers	335.165
The Green Office (UU)	Fostering student-lead projects around sustainable and healthy food	0.000
Lokaal Voedsel Utrecht	Connecting local producers together	348.244
Food-Print Utrecht Region	Connecting local producers together	32.836
Slow Food Youth Network	Bringing sustainable food to students	198.621
Impact 030	Connecting local social & circular enterprises together	346.611
Social Impact Factory	Connecting local social & circular enterprises together	140.000

The primary mission connectors attach to varies based on the sector they evolve in, linking local food consumption to other specific purposes such as reconnection to heritage, encouraging sustainable and healthy eating or fostering social and circular entrepreneurship (Table 10). The high diversity of connectors leads to the engagement of a more comprehensive set of frontrunners connecting to the connector they relate the most to. However, some disconnections still arose between the two types of actors when understanding the needs of one and communicating the solution the other can bring.

Frontrunners need to connect with other local actors meaningfully and create solid new partnerships to ease their overall activities. The connectors seem unable to fulfil these needs and nurture a trustworthy environment for the frontrunners.

We visited [the connector's event] and we do that because we think it's important to show we're there and what we do but it's really hard to make a meaningful connection […]. I no longer attended these meetings, but our director did. But what I thought is that they're all in there for […] their own interests, not for the common good. (F2)

There are so many platforms who try to do something with local makers. But there is not one […] that is extensive, so big and has everyone and everything. So because […] some products are hard to find, you seek for this one product and wonder, is that available locally? Yes or no? And if it's not, okay, but if it is, why is it so hard to find? (F5)

We could really use some help in finding those new suppliers who are actually from the environment of Utrecht. […] I'm an entrepreneur, and everything takes a lot of time. So I really have to focus what we will do this week or next week. […]
If you look for suppliers, let's say for example, I'm looking for a dairy supplier. I can easily google it, dairy supplier Utrecht region, but my first 20 hits will be the […] big commercial

ones. So it's hard for me to really find a local farmer who has a great project for reasonable price. Who can actually work with me, they very often don't have a big website, or they don't score high on Google search thing. So that's why for me, it's difficult to find a few suppliers […]. I know they must be out there. But it's hard for me now to easily find them. (F3)

From the connectors' side, the discourse goes in the other way, arguing that the frontrunners are the ones that need to take on the initiative to enhance the connections. The main argument is that by clearly formulating needs and goals, effective solutions can be found to enhance the frontrunner's activities.

It should come from business and entrepreneurs. That's the only way we can make things work. Because then there's a goal and then reasons to keep on organising it. We cannot do it for them. We need them […] in terms of production and so on, but they have to have their reasons to do it. (C7)

But more important, it has to come from the enterprises themselves. They need to know what the problem is that needs to grow from and then we can provide them with links to funding organisations or the Municipality or business programmes or whatever they need to go for. So they need to be organised. And that's a criterion to go further from there. (C5)

These disparities between frontrunners and connectors could come from the inability of connectors to communicate the mission they wish to achieve. Therefore, this leads to mistrust or confusion on why frontrunners should connect with the connectors in the first place. For these reasons, connectors should reassess their way of communicating with the frontrunners and the intrinsic reasons behind their wish to enhance SFSCs in Utrecht.

There are other organisations within the region […] who also can organise all kinds of small actors in the food system. So, I think that that every organisation should use his own strength. And we should not do the same as another organisation. (T2)

c. Institutionalised Topplers pulling Supporters in

Six topplers have been identified in the SFSC actor network. Of these, only three seem to be of greater importance, as suggested by their higher betweenness and stronger connections with other actors in the network. While they are barely connected with frontrunners in the first place, their strengths lie in the fact that they create collaborations with supporters and connectors on both a strategic and co-creation level. This situation confirms Haan & Rotmans (2018)'s framework. The particularity in this case is that topplers often are the (co-)founders of a connector's initiative, with the will to pull frontrunners in. They are the main attractors of supporters, either from a governmental institution (Municipality, Province) or business partners interested in offering local food to their consumers. Their ability to connect with institutionalised actors comes through their already established reputation, which facilitates the creation of trustworthy collaborations. The topplers indeed did not start with having SFSCs as their main activities. The focus on this sector either came as a natural next step or developed into one branch of their activities. This, therefore, has allowed them to have a better overview of the

current challenges SFSCs face and how to develop them better. A shared view amongst topplers is that every stakeholder should be in to enhance the sustainable development of SFSCs. However, the strategy to reach this objective remains blurry.

You need the government, you need the producers, you need the retailers, you need the consumers, you need the citizens, you need the farmers, etc. And you need a certain kind of management direction from the government. Because everybody is a piece of the puzzle and does his best. But we do not know if the pieces fit together. And that at the end, we get the total puzzle complete. (T2)

How do you organise the ecosystem and the networks around cities and rural areas to connect efficiently in order to support the transition towards more sustainable food system? […] That is as complex and diverse as it can be. Because you don't want to exclude, you only want to include. (T3)

d. Supporters

The supporters are seen as essential actors when legitimising SFSCs and institutionalising it. Currently, supporters engage mainly with topplers, as mentioned above. Other supporters connect with frontrunners and connectors, but primarily for occasional reasons. When talking about frontrunners, supporters often identify SFSCs as another niche in the food market that should follow similar growth and competition business rules. For these reasons, it seems to be quite a strong disconnection between the frontrunners and the supporters.

It is also still a market kind of thing. You have to let them also compete each other and the strongest one creates this network. And I think in the Netherlands […], all the provinces, we are starting to work together more and more. But in the region of Utrecht, there is not that collaboration yet, we feel. (S1)

In the end, I think all developments are kind of the products of supply and demand. That's economics. That's what goes in. That's what drives the world. (S3)

However, as highlighted above, frontrunners usually tend to collaborate towards the same goal tightly: feed the people of Utrecht with local food. This disconnection then leads to confusion from the supporters on what exactly is done and needs to be done to support SFSCs in Utrecht properly.

We are not aware of all local initiatives. And as a local initiative, you're not always aware what the policy or how we can actually connect or help each other. So that's why you need networks in between to make that connection. (S1)

Some [local initiatives] are asking for money, and some are asking for contacts. And some really want to go very fast. And they hand in a project proposal like this is going to be the solution for a better food system in Utrecht. But then we see another project proposal and they are claiming the same. So right now, we're in that quite tricky role as a governmental body. But who are we going to support? And as you can imagine, quite subjective. [We] want to say yes to everything. But we also have to be […] very critical.

Why would we support one and the other not? Or do we support all? How are we going to? (S1)

From the network, three supporters appear to be stronger, as indicated by their higher betweenness. Together, they represent a pretty interesting combination of institutions on the political and financial levels, both highly needed to foster change. They are often essential partners or founders of a connector or a toppler, enhancing their overall development. However, the disconnection mentioned above leads to inefficient use of this potential, which is strongly felt amongst frontrunners and connectors

From the municipality and the region, it would be really nice, to think along with us. […] They just need to be really involved from the get-go to see the impact [that producing local food has on storing water] and think about, okay, how can we build reward systems from that? (C4)

Overall, this disconnection seems due mainly to a lack of a general overview of what is happening within the city and province of Utrecht regarding local food initiatives. This could be explained by a lack of direct connections with the frontrunners or a lack of clear and concrete communication between the topplers directly connected to them, as highlighted above.

4.1.2 Transformative alliances

This section will answer the sub-question 3, "*Which type of alliance exist in the system*?". After analysing the different types of actors and their direct interactions within the network, it is interesting to look at the overall transformative alliances existing within the SFSC network.

Three central communities appeared when applying the Girvan-Newman algorithm to the network, as shown in Figure 5. Each community, or alliance, is attached to the production and promotion of local food. However, the way they engage with this stream differs per community, mostly enhanced by the action of the connectors as mentioned above. This, therefore, has led to three communities evolving around three topics: circularity, community building, and eating food from Utrecht-based small producers. All are evolving at their own pace, as their evolution is fostered by the type of actors evolving within the community. This, therefore, resulted in having alliances at different maturity stages.

The Community Builders
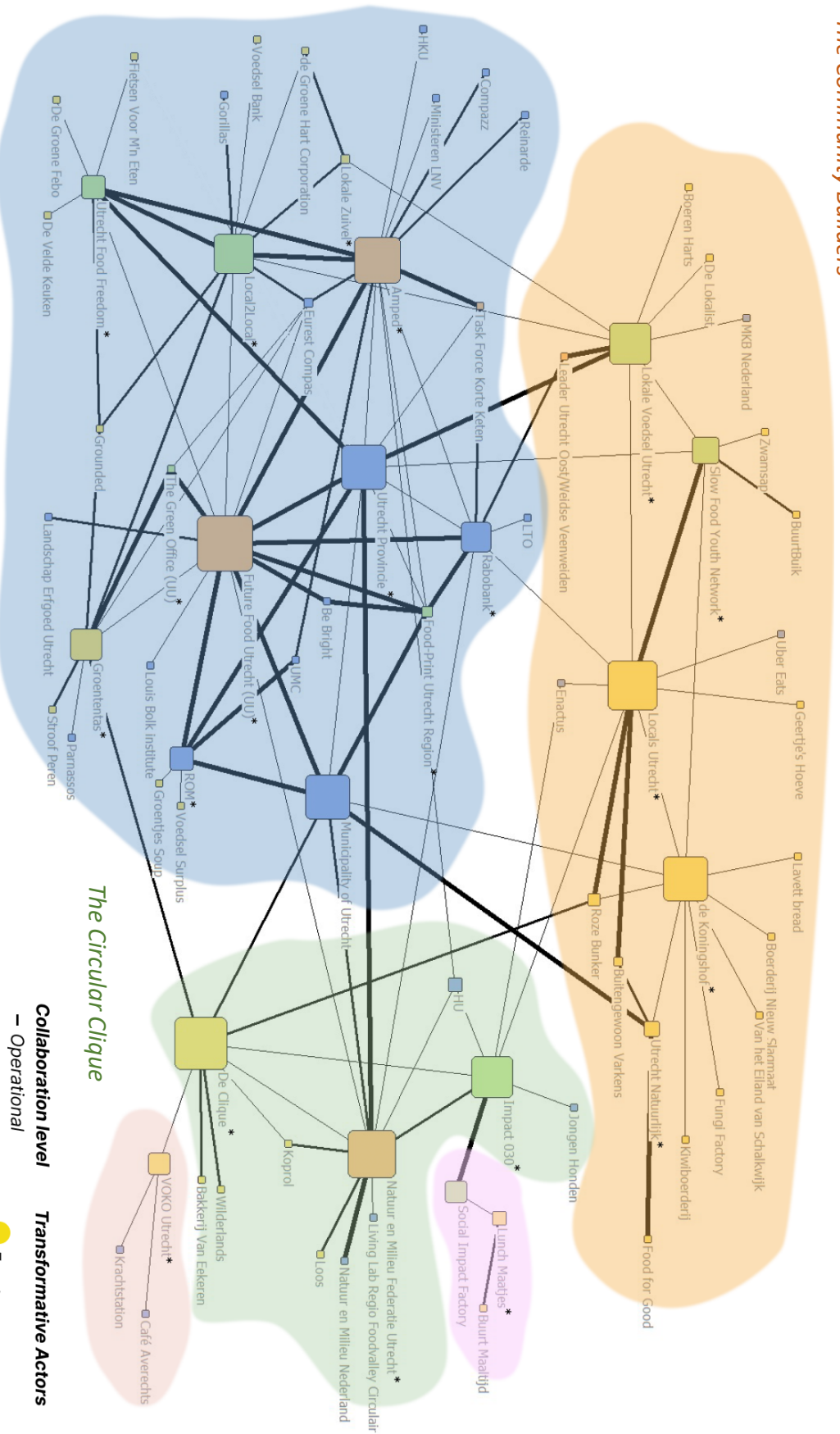
The Local Food Accelerators

The Circular Clique

Collaboration level
- Operational
- Strategic
- Co-creation

* interviewed actor

Transformative Actors
- Frontrunners
- Connectors
- Topplers
- Supporters

30

a. The Circular Clique

The first identified community, the Circular Clique, is evolving around the idea of offering a new type of business model around circularity principles. These embody the idea of eliminating waste and pollution through circulating products and materials at their highest value (Ellen MacArthur Foundation [1], nd). When related to the food sector, circularity could mean transitioning to regenerative food production and eliminating food waste (Ellen MacArthur Foundation [2], nd).

Within this alliance, frontrunners are leading the way by offering new solutions and business models. While frontrunners seem to be pretty good at creating connections with other frontrunners on their own, meaningful new collaborations are being created with the help of the connectors. These characteristics, therefore, lead to identifying this alliance as a network, where actors with shared value sets are connected, and initiatives are aligned (Haan & Rotmans, 2018). Nevertheless, this alliance also includes a strong toppler who effectively seems to pull supporters in. However, a better definition of the role this toppler should have when it comes to local food and circularity is needed to draft a conclusion on whether the role of this toppler would foster the creation of a movement or not.

b. The Community Builders

The second identified community, the Community Builders, is mainly made of frontrunners. The main shared set of values here is about how growing and consuming local food allows the consumers to reconnect to their surroundings and local producers. These actors actively engage with consumers around community-building agriculture or by showcasing multiple products from Utrecht-based producers. Here, the retailers have an essential role in connecting with producers, as they allow the community of consumers linked to the retailers to discover different Utrecht-based producers.

In this alliance, two connectors have been identified. However, these connectors still fail to create meaningful connections between frontrunners. This is highlighted by the lack of engagement created by the connectors with the frontrunners (i.e., low betweenness) compared to the ones already created through the retailers who appear to have a higher betweenness (Figure 5, Table 11). Nevertheless, this alliance is gaining momentum, as shown by the supporters starting to join the alliance. The Community Builders can be identified as an initiative (Haan & Rotmans, 2018).

Table 11 - Community Builders: Connectors and Retailers' Betweenness

Community Builders' Actors		Betweenness Centrality
Connectors	Lokaal Voedsel Utrecht	348.244
	Slow Food Youth Network	198.621
Retailers (Frontrunners)	Locals Utrecht	426.046
	De Koningshof	384.684

c. The Local Food Accelerators

The third and last leading community, the Local Food Accelerators, is the most connected and advanced one. While the connectors effectively connect with a diverse set of frontrunners, the topplers play the most critical role in this alliance. They are highly connected with small and more prominent supporters from various sectors, providing coherence and legitimacy to the actions of the frontrunners. Connectors and topplers have managed to pull a high diversity of actors together, from local farmers to national banks, knowledge institutions and federal governments. The collaborative links between actors are often at a strategic or co-creation level. A core example of collaborations on the co-creation level is the current rolling-out strategy implemented by this community's actors. This multiplicity of tightly connected actors led to identifying this alliance as the start of a movement (Haan & Rotmans, 2018).

4.1.3 SFSCs system: current acceleration phase

Merging the conclusions of the two previous sections will help identify in which acceleration phase of Gorissen et al. (2018) the current SFSCs system of Utrecht currently lies. Acceleration mechanisms do not occur linearly. This is confirmed by the different maturity levels of the three main communities identified, suggesting that entities within the system evolve at a different pace. The way these entities are connected and evolve can, however, lead to the conclusion that the SFSCs system is between the partnering and upscaling phases.

Frontrunners, the creators of SFSC initiatives, understand the importance of collaborating, which helps them to engage with a broader range of customers and be more resilient. As mentioned earlier, they are highly connected to each other's, sharing resources, competencies, and knowledge. Synergies and partnerships are being created with the help of connectors or retailers in a mutually beneficial way. These elements are strong proof of the high maturity of the partnering phase in which part of the overall SFSC system of Utrecht lies.

Meanwhile, SFSC initiatives are making more noise by pulling supporters in with the help of topplers. These supporters, therefore, foster the institutionalisation of the initiatives, and similar cross-sectoral visions are being created. This is highlighted by the creation of the rolling out strategy initiated by L2L and Amped, linking bottom-up and top-down solutions together and the overall tightly connected alliance observed in the Local Food Accelerator community. These examples are solid arguments for affirming that the SFSC system of Utrecht is entering its upscaling phase. However, this momentum is not happening within the overall network. The upscaling phase, therefore, is at its early stage, as more actors and alliances need to follow the same path.

4.2 Next steps: strengthening and expending the existing alliances

After identifying the actors, the different links between them and the existing alliances constituting the SFSCs system of Utrecht, recommendations need to be formulated to answer the last sub-question, "*How can the Utrecht SFSCs strengthen existing alliances and create new ones?*" Different recommendations are being drawn regarding the connections within and between the existing alliances and the key identified actors needed to foster upscaling SFSCs in Utrecht: the connectors and topplers.

4.2.1 Within each alliance

The *Circular Clique* needs to further pull both frontrunners and supporters in. The connectors and topplers of the alliance are currently the key actors in transforming this network into a movement. To do so, an aligned vision needs to be formulated. This must be done in strong collaboration with the frontrunners. The solutions brought by this alliance should be formulated clearly to attract supporters and institutionalise the alliance better.

In the *Community Builders* alliance, the connectors need to do a better job of connecting frontrunners together. The current connectors are not strong enough or will not be relevant in the future as their action was initiated as a project ending this year. The solutions here could be that one of the retailers takes the lead in connecting other frontrunners together or that the frontrunners join another existing and more mature alliance based on the ones they relate the most to. In either case, there is strong potential for this alliance to grow.

The *Local Food Accelerators* are the leaders of this SFSCs system in Utrecht. Their strength lies in the tight connections created between key connectors and topplers. The connectors successfully connect with frontrunners while the topplers pull supporters in. This combined bottom-up (frontrunners to connectors) and top-down (supporters to topplers) approach allows for a high diversity of actors. The next step for this movement to grow will be to attract even more supporters. The supporters in this alliance are indeed not entirely in tune with how they can best act. Supporters have a crucial role in embedding local food in the conventional system. This potential can be unlocked through efficient communication with the topplers regarding the actions needed to be taken. Supporters should also realise the asset they bring to the table and act accordingly instead of attempting to take the role of a connector or support some frontrunners' initiatives here and there.

4.2.2 Connectors to further connect the three alliances together

While all align on the idea that local food should be enhanced in Utrecht, the suggested ways to reach that goal differ per alliance, which ensures a broader umbrella of actors to join the overall SFSCs system. Between the existing alliances, the main recommendation would be to connect the alliances better together. It, however, does not mean there should only be one big alliance: the diversity of alliances fosters the diversity of actors that join SFSCs from one way or the other. A better connection between alliances could foster knowledge sharing and empower the alliances at an earlier stage to 'grow' better and avoid replicating past mistakes. For these reasons, the connectors have a crucial role to play.

4.3.2 Topplers to engage with governmental bodies

The role of the topplers needs to be further enhanced. As they often are in the best spot to have a good overview of the overall development of the SFSCs in Utrecht, they should further

connect with the governmental bodies. Those are primarily identified as supporters of this system and are not fully aware of the state of SFSCs in Utrecht. Local governments are currently too lightly connected with frontrunners and therefore are not in the best place to embody a connector or toppler's role. As supporters, local governments are best at providing financial and legal support and awareness on the citizens' side instead of trying to embody the role of a connector. However, support should be given in a way that allows efficient use of the available resources and creates the most positive, impactful results. Decisions should therefore be taken following the advice of topplers, as they have better knowledge and expertise on the action plan needed to move SFSCs forward. Trust, meaningful connections, and clear communication must be created with topplers to finance critical initiatives instead of blindly allowing finances to close parties.

5. Discussion

The answers given to the research questions already offer quite strong insights on how SFSCs can develop in Utrecht. This section aims at discussing the theoretical and methodological implications of the research. The conceptual framework and methodology used helped to better illustrate how local food initiatives can upscale. Lastly, the section provides some faced limitations and elaborates on further research suggestions.

5.1 Upscaling alternative systems through collaborations

While this research will not establish another definition of upscaling, it suggests a new narrative on how alternative systems and actors not focused on conventional growth can still upscale their overall impact. The results confirmed that the conventional idea of upscaling (i.e., growth of members, customers, or followers) as provided by Gorissen et al. (2018) could not be applied within this local context of SFSCs. Instead of multiple individual initiatives, SFSCs should be studied as an overarching movement. Upscaling can then be considered through specific pathways that will move the innovation (i.e., SFSCs) from a niche-level change to a regime-level change (Geels F., 2002). However, pathways are often a complex combination of opportunities to be seized on multiple levels instead of something that can be engineered (Tozer, et al., 2022).

Using Haan & Rotmans (2018) transformative actors' framework, this research sheds more light on how actors create pathways where SFSCs can further develop. The results showed that to foster the upscaling of SFSCs, a diverse set of transformative actors (frontrunners, connectors, topplers and supporters) coming together is needed to create momentum, as highlighted in the Local Food Accelerator alliance. This also appears to fit the local context of SFSCs better, as tighter and shorter networks of actors are easier to create when all actors evolve near each other. Moreover, the willingness to not expand their activities, shared amongst most frontrunners, fosters the creation of transparent and strategic collaborations between similar actors instead of the competition seen in other conventional markets (Milestad, Kummer, & Hirner, 2017). Therefore, the research contributes to a clearer understanding of how pathways can be created with a multiplicity of actors coming together.

This then allowed SFSCs to resonate at different institution levels but still on a local scale. This point of view relates to vertical upscaling as defined by Doren, Driessen, Runhaar, & Giezen (2018). Vertical upscaling occurs when "an initiative has influenced formal institutions (policy goals or instruments) and/or informal institutions (values, ideas) of policy networks thereby creating an enabling environment for change" (Doren et al., 2018, p. 179). The results showed that connectors enabling bottom-up collaborations with frontrunners, while topplers organise top-down collaborations with supporters, are vital components to influence formal and informal institutions, as shown in the Local Food Accelerators alliance. While vertical upscaling is often studied through the interdependent connections of institutions created on an inter-city, national or international scale (Kern, 2019), this study shows how this concept also coincides with the small, local, and collaborative nature of SFSCs. Vertical upscaling seems to be the only way SFSCs could sustainably develop within one location (e.g., the region of Utrecht).

5.2 Actor network analysis for studying transitions

Social network analysis techniques have already been used to generate more insights into how an actor network affects a sector's innovation performance and development prospects (Caniëls & Romijn, 2008) and within supply chains' networks (Sloane & Reilly, 2012). This research offers new insights on using social network theory to analyse transition within an alternative system, such as SFSCs. Methodologically, there is a need to investigate transitions research further. One suggested way is using specific cases to explore transition mechanisms deeper (Geels, 2022). The results highlighted the collaborative dimension needed to further develop alternative systems, such as SFSCs, by studying the way actors were interacting with each other. Linking social network concepts to transition theories offered a more practical and tangible overview currently needed to study larger-scale system changes (Fazey & Leicester, 2022). The network theories' concepts used within this research (communities and betweenness centrality) appeared to efficiently highlight the transformative alliances and actors described by Haan & Rotmans (2018).

Combined with interviews, the network analysis showed a more qualitative way to analyse networks and a more visual approach to studying the emergence of an alternative system (Decuypere, 2020). Furthermore, the visual map created gave solid insights into the different actors enhancing SFSCs in Utrecht and the different ways they interact together. Finally, adding up the different collaboration levels' framework of Mittal et al. (2017) allowed a weighted network suitable to preserve the nuanced connections that bind one actor to another (Horvath, 2011).

5.3 Limitations

This study faced some limitations in the way the results could be interpreted. First, the links created between each actor were not based on the frequency of the interactions between two actors but on the subjective importance an actor has on the other. This could therefore have led to a biased network. The framework of Mittal et al. (2017), although still subjected to the author's own appreciation, allowed to overcome this limitation by offering a structure to identify the level of collaboration and a build weighted network.

Furthermore, the betweenness centrality measure assessing the importance of one actor could have been biased as more collaborations could be found around one interviewed actor than around actors of the network that have not been interviewed. The primary desk research allowed to partly overcome this bias by researching a diverse set of actors that were not explicitly connected (Kirchherr & Charles, 2018). Ensuring a decent number of interviews with a diverse set of actors and being transparent about the actors that were interviewed also allowed to minimise the bias.

Finally, the actor network analysis remained relatively light compared to the quantitative ways networks are usually studied. Only the concepts of betweenness and centrality measures have been used. While this selection already offered interesting insights for the theory used, it is believed that a deeper network analysis could offer even more relevant results.

5.4 Recommendations for future research

Building on the conceptualisation of how transformative actors interact to foster alternative system's acceleration, the conceptual framework offered a detailed overview of how SFSCs in Utrecht could be further developed. Further research is needed to apply the methodology and framework to other systems and situations, such as alternative finance or nature-based solutions in an urban context. This could offer more insights and examples on the role of each actor, as well as the way alliances evolve in a local setup. Moreover, additional concepts of social network theories could be added to offer more insight into the particularity of each actor. For example, the concept of "bottlenecks" within communities (i.e., an actor from one community that is connected to another community) could be interesting to use for creating a better connection between transformative alliances (Rocha, Thorson, Lambiotte, & Liljeros, 2017). Ultimately, similar research could be conducted in the next few years to analyse how SFSCs of Utrecht evolved and whether and how the current barriers have been overcome.

6. Conclusion

This research aimed to understand better the different actors participating in the SFSCs of Utrecht and how the collaborations created between them can foster the upscaling of SFSCs in Utrecht. The actor network supported by the interviews allowed a thorough answer to the main research question "*How can collaboration between SFSC actors in Utrecht be enhanced to foster the upscaling of the local food system of Utrecht?*".

It was found that in Utrecht, SFSCs are attracting a lot of diverse actors collaborating on different levels and progressively strengthening the way actors interact around this topic. Three main transformative alliances have been identified: the Circular Clique, the Community Builders, and the Local Food Accelerators. These are evolving at a different pace, influenced by the type of actors in each alliance. The Local Food Accelerators alliance is the most advanced one, characterised by the high diversity of actors collaborating on a strong level. This, therefore, suggests identifying this alliance as the start of a movement. Simultaneously, the Circular Clique is organising itself around the idea of making local food circular. While a shared vision is still lacking, this alliance is an excellent example of a network where frontrunners organise themselves with the help of a connector. Lastly, the Community Builders still are at the early stage. The current connectors are lacking in creating a common structure and vision to organise frontrunners around, which leads to identifying this alliance as an initiative. To reach a further stage, the challenges of each alliance vary. The Local Food Accelerators mainly need better work from their topplers to uniformise the supporters around the vision they are building. The Circular Clique needs stronger collaborations between the connector and toppler to gather frontrunners and supporters towards the same vision efficiently. Lastly, the Community Builders need a firm grip from the connector's side to harmonise the activities of frontrunners. Another scenario could be that the actors of this alliance join one of the two more progressive alliances. Local governments are critical supporters of SFSCs to develop in Utrecht. They, however, should reassess the exact role they wish to embody and move forward by following the advice of the topplers.

The results gave exciting insights on how the local food system of Utrecht, or other similar alternative systems, can be scaled up. The data indicate that SFSCs of Utrecht are in the partnering phase, as presented in the framework of Gorissen et al. (2018). The different pace at which transformative alliances are evolving, however, still suggests some fragmentation within the SFSC landscape of Utrecht. The results confirmed the importance of connectors and topplers when organising actors together, as Haan & Rotmans (2018) suggested. The main challenges in reaching the next phase of the acceleration mechanisms (i.e., upscaling SFSCs in Utrecht) are on the side of both topplers and supporters. The Connectors need to provide uniformity with the frontrunners they relate to and between the different alliances. Topplers should adopt a better communication style when connecting with supporters. Through this, trust can be built, and collaborations on a more substantial level can arise.

This research gives a clear overview of how collaborations enhance the upscaling of the local food system of Utrecht. The magic can only happen when a highly diverse set of actors from different roles, sectors and expertise align on a similar goal and create new narratives. This is then fostered by the core motivation of each actor to provide alternative solutions for a more sustainable food system, society, and future.

Bibliography

Amped Concepts, B. (2021). *Uitrolstrategie robuust, regionaal, regeneratief voedselsysteem regio Utrecht.* Utrecht: Amped Concepts BV.

Barabási, A.-L. (2016). *Network Science.* Cambridge University Press.

Bryman, A. (2012). *Social research methods.* Oxford university press.

Buchan, R., Cloutier, D. S., & Friedman, A. (2019). Transformative incrementalism: Planning for transformative change in local food systems. *Progress in Planning, 134.*

Campbell, A. M., & MacRae, R. (2013). Local Food Plus: the connective tissue in local/sustainable supply chain development,. *Local Environment, 18*(5), 557-566.

Caniëls, M. C., & Henny A. Romijn. (2008). Actor networks in Strategic Niche Management: Insights from social network theory. *Futures, 40*(7), 613-629.

Clapp, J. (2021). The problem with growing corporate concentration and power in the global food system. *Nature Food, 2*(6), 404–408.

Clark, J. K., & Inwood, S. M. (2016). Scaling-up regional fruit and vegetable distribution: potential for adaptive change in the food system. *Agric Hum Values, 33*, 503–519.

Cone, C., & Myhre, A. (2000). Community-supported agriculture: A sustainable alternative to industrial agriculture? . *Human organization, 59*(2), 187-197. Retrieved from Cone, C., & Myhre, A. (2000). Community-supported agriculture: A sustainable alternative to industrial agriculture?. Human organization, 59(2), 187-197.

Crippa, M., Solazzo, E., Guizzardi, D., Monforti-Ferrario, F., Tubiello, F., & Leip, A. (2021). Food systems are responsible for a third of global anthropogenic GHG emissions. *Nature Food, 2*, 198–209.

Decuypere, M. (2020). Visual Network Analysis: A qualitative method for researching sociomaterial practice. *Qualitative Research, 20*(1), 73-90.

Doren, D. v., Driessen, P. P., Runhaar, H., & Giezen, M. (2018). Scaling-up low-carbon urban initiatives: Towards a better understanding. *Urban Studies, 55*(1), 175–194.

EAFRD, E. (2013, December 17). *Regulation (EU) No 1305/2013 of the European Parliament and of the Council of 17 December 2013 on support for rural development by the European Agricultural Fund for Rural Development (EAFRD) and repealing Council Regulation (EC) No 1698/2005.* Retrieved January 17, 2022, from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32013R1305

EIP-AGRI. (2015). *EIP-AGRI Report.* Retrieved January 2022, from https://ec.europa.eu/eip/agriculture/sites/agri-eip/files/eip-agri_fg_innovative_food_supply_chain_management_final_report_2015_en.pdf

Ellen MacArthur Foundation [1]. (nd). *What is circular economy?* Retrieved June 2022, from Ellen MacArthur Foundation: https://ellenmacarthurfoundation.org/topics/circular-economy-introduction/overview

Ellen MacArthur Foundation [2]. (nd). *A circular economy for food will help people and nature thrive*. Retrieved June 2022, from Ellen MacArthur Foundation: https://ellenmacarthurfoundation.org/topics/food/overview

Enthoven, L., & Broeck, G. V. (2021). Local food systems: Reviewing two decades of research. . *Agricultural Systems, 193*, 103226.

Everton, S. F. (2012). *Disrupting Dark Networks.* Cambridge University Press.

Fazey, I., & Leicester, G. (2022). Archetypes of system transition and transformation: Six lessons for stewarding change. *Energy Research & Social Science, 91*.

Feagan, R. (2007). The place of food: mapping out the 'local'in local food systems. *Progress in human geography, 31* (1), 23-42.

Fobbe, L. (2020). Analysing Organisational Collaboration Practices for Sustainability. *Sustainability, 12*(6), 2466.

Foley, J. A., DeFries, R., Asner, G., Barford, C., Bonan, G., Carpenter, S., & Snyder, P. (2005). Global consequences of land use. *Science, 309*(5734), 570-574.

Forssell, S., & Lankoski, L. (2015). The sustainability promise of alternative food networks: an examination through "alternative" characteristics. *Agric Hum Values, 32*, 63–75.

Frantzeskaki, N., & de Haan, H. (2009). Transitions: two steps from theory to policy. *Futures, 41*, 593-606.

Garnett, T. (2013). Food sustainability: Problems, perspectives and solutions. *Proceedings of the Nutrition Society, 72*(1), 29-39.

Geels, F. (2002). Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study. *Research policy, 31*(8-9), 1257-1274.

Geels, F. (2022). Causality and explanation in socio-technical transitions research: Mobilising epistemological insights from the wider social sciences. *Research Policy, 51*(6).

Girvan, M., & Newman, M. E. (2002). Community structure in social and biological networks. *Proceedings of the National Academy of Sciences, 99*, 7821-7826.

Gorissen, L., Spira, F., Meynaerts, E., Valkeringa, P., & Frantzeskaki, N. (2018). Moving towards systemic change? Investigating acceleration dynamics of urban sustainability transitions in the Belgian City of Genk. *Journal of Cleaner Production, 173*, 171-185.

Haan, F. J., & Rotmans, J. (2018). A proposed theoretical framework for actors in transformative change. *Technological Forecasting & Social Change, 128*, 275–286.

Haenen, I., Renting, H., Dubbeling, M., & Hoekstra, F. (2018). *Assessment and Planning of the Utrecht City Region Food System - Synthesis Report.* Leusden, The Netherlands: RUAF Foundation.

Hedberg, R. C., & Zimmerer, K. S. (2020). What's the market got to do with it? Social-ecological embeddedness and environmental practices in a local food system initiative. *Geoforum, 110*, 35-45.

Hermans, F., Roep, D., & Klerkx, L. (2016). Scale dynamics of grassroots innovations through parallel pathways of transformative change. *Ecological Economics, 130*, 285-295.

Horvath, S. (2011). *Weighted Network Analysis.* New York, NY: Springer.

IPCC. (2019). *Climate Change and Land: An IPCC Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse Gas Fluxes in Terrestrial Ecosystems.* Geneva: IPCC.

Jarzebowski, S. M.-J. (2020). Short food supply chains (SFSC) as local and sustainable systems. *Sustainability, 12*(11), 4715.

Kern, K. (2019). Cities as leaders in EU multilevel climate governance: embedded upscaling of local experiments in Europe. *Environmental Politics, 28*(1), 125-145.

Kirchherr, J., & Charles, K. (2018). Enhancing the sample diversity of snowball samples: Recommendations from a research project on anti-dam movements in Southeast Asia. *PLoS ONE, 13*(8).

Kneafsey, M., Venn, L., Schmutz, U., Balázs, B., Trenchard, L., Eyden-Wood, T., & Blackett, M. (2013). Short food supply chains and local food systems in the EU. A state of play of their socio-economic characteristics. . *JRC scientific and policy report, 123*, 129.
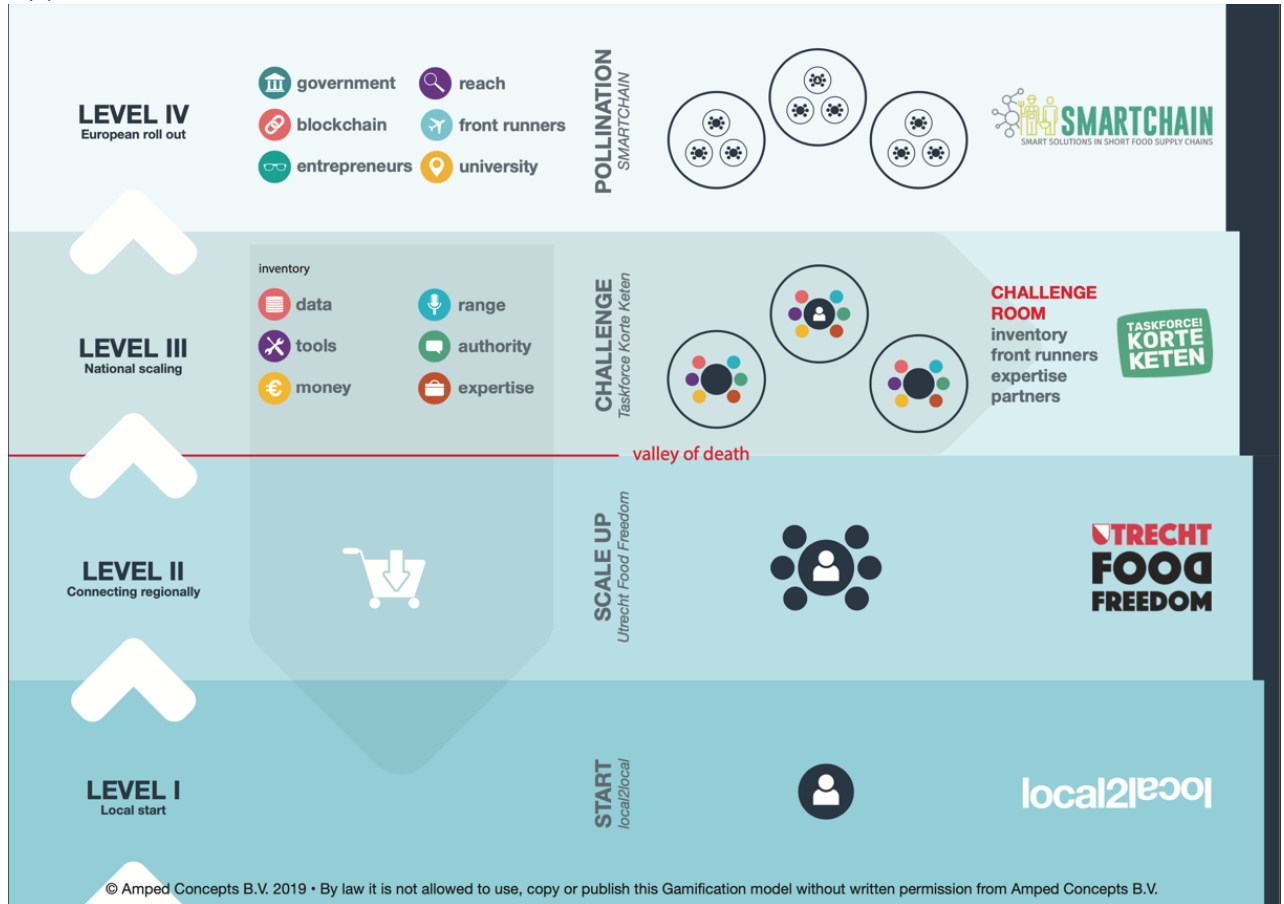
Lam, D. P., Martín-López, B., Wiek, A., Bennett, E. M., Frantzeskaki, N., Horcea-Milcu, A. I., & Lang, D. J. (2020). Scaling the impact of sustainability initiatives: a typology of amplification processes. *Urban Transformations, 2*(3).

Lamine, C. (2015). Sustainability and resilience in agrifood systems: reconnecting agriculture, food and the environment. *Sociologia ruralis, 55*(1), 41-61.

Lutz, J., Smetschka, B., & Grima, N. (2017). Farmer cooperation as a means for creating local food systems—potentials and challenges. *Sustainability, 9*(6), 925.

MacRae, R., Cuddeford, V., Young, S. B., & Matsubuchi-Shaw, M. (2013). The Food System and Climate Change: An Exploration of Emerging Strategies to Reduce GHG Emissions in Canada . *Agroecology and Sustainable Food Systems , 37*(8), 933-963.

Marsden, T., Banks, J., & Bristow, G. (2012). Food Supply Chain Approaches: Exploring their Role in Rural Development. *Sociol. Rural , 40*, 424–438.

Matson, J., & Thayer, J. (2013). The role of food hubs in food supply chains. *Journal of Agriculture, Food Systems, and Community Development, 3*(4), 43-47.

Milestad, R., Kummer, S., & Hirner, P. (2017). Does scale matter? Investigating the growth of a local organic box scheme in Austria. *Journal of Rural Studies, 54*(1), 304-313.

Mittal, A., White, V., & Krejci, C. C. (2017). A framework for collaboration among regional food system participants. *Industrial and Systems Engineering Conference.* Retrieved from Mittal, A., White, V., & Krejci, C. C. (2017, May). A framework for collaboration among regional food system participants. In Proceedings of the Industrial and Systems Engineering Conference.

Mount, P. (2012). Growing local food: scale and local food systems governance. *Springer Science & Business, 29*, 107–121.

Newbold, T., Hudson, L., Hill, S., & al., e. (2015). Global effects of land use on local terrestrial biodiversity. *Nature*, 45–50.

Page, S. B., Stone, M. M., Bryson, J. M., & Crosby, B. C. (2015). Public value creation by cross-sector collaborations: A framework and challenges of assessment. *Public Administration, 93*(3), 715-732.

Provincie Utrecht. (2022). *Gezond en Duurzaam Eten In en Uit de Regio - Uitvoeringsprogramma Voedselagenda 2022.* Utrecht: Provincie Utrect.

Renting, H., & Marsden, T. K. (2003). Understanding alternative food networks: exploring the role of short food supply chains in rural development. *Environment and Planning, 35*, 393-411.

Rocha, L. E., Thorson, A. E., Lambiotte, R., & Liljeros, F. (2017). Respondent-driven sampling bias induced by community structure and response rates in social networks. *Journal of the Royal Statistical Society: Series A (Statistics in Society), 180*(1), 99-118.

Rockström, J., Steffen, W., Noone, K., Persson, Å., Chapin, F., Lambin, E., . . . al., e. (2009). Planetary boundaries: Exploring the safe operating space for humanity. *Nature, 461*, 472–475.

Rotz, S., & Fraser, E. D. (2015). Resilience and the industrial food system: Analyzing the impacts of agricultural industrialization on food system vulnerability. *Journal of environmental studies and sciences, 5*(3), 459-473.

Sloane, A., & Reilly, S. (2012). The emergence of supply network ecosystems: A social network analysis perspective. *Production Planning & Contro, 24*, 1-19.

Smartchain. (nd.). *Insights & recommendations to support collaborative Short Food Supply Chains.* Smartchain-H2020.

Sonnino, R., & Marsden, T. (2006). Beyond the divide: rethinking relationships between alternative and conventional food networks in Europe. *Journal of economic geography, 6*(2), 181-199.

SRA. (2021, February). *Research ethics guidance.* Retrieved February 2022, from SRA - Social Research Association: https://www.the-sra.org.uk/SRA/Ethics/Research-ethics-guidance/SRA/Ethics/Research-Ethics-Guidance.aspx?hkey=5e809828-fb49-42be-a17e-c95d6cc72da1

Staggenborg, S., & Ogrodnik, C. (2015). New environmentalism and Transition Pittsburgh. *Environmental Politics, 24*, 723 - 741.

Tozer, L., Bulkeley, H., Jagt, A. v., Toxopeus, H., Xie, L., & Runhaar, H. (2022). Catalyzing sustainability pathways: Navigating urban nature based solutions in Europe. *Global Environmental Change, 74.*

Ucinet. (nd). Retrieved from UCINET Software: https://sites.google.com/site/ucinetsoftware/home

Williams, T., & Shepherd, D. (2015). Mix Method Social Network Analysis: Combining Inductive Concept Development, Content Analysis, and Secondary Data for Quantitative Analysis. *Organizational Research Methods, 20.*

Winarno, H., Perdana, T., Handayati, Y., & Purnomo, D. (2020). Food Hubs and Short Food Supply chain, Efforts to Realize Regional Food Distribution Center. *International Journal of Supply Chain Management, 9*, 338-350.

Appendices

Appendix 1 – The GAIN Transition Model

© Amped Concepts B.V. 2019 • By law it is not allowed to use, copy or publish this Gamification model without written permission from Amped Concepts B.V.

Introduction
1. Could you tell me a bit more about your organisation in general and what is being done there?
2. How many people are working with you? How many people are benefiting from your activities (customers, …)?

Existing collaborations with SFSC actors
3. Do you have other organisations (similar to yours) with whom you often collaborate?
   o Who? (from which initiative?)/which initiative? Who?
   o What kind of collaboration?
4. Do you receive support from an overarching organisation?
   o Do they help other organisations?
   o Who?
   o What kind of support?
5. (Do you receive support from other organisations that differ from yours but that are interested in your activities?
   o Who?
   o What kind of support?

Will/need of scaling up
6. How do you see your organisation evolve in the future?
7. What would you need for your organisation to evolve?
8. Would you need support from specific actors for your organisation to develop?
   o Who?

Possible collaborations with SFSC actors
9. Collaborations you would like to create in the nearby future?
   o With whom?/what type of help?
   o How?
   o Why?
10. When it comes to collaborating better with your peers (i.e., similar organisation), *why and how* would you see it happening?
11. Which type of support from other organisations do you need to ease your overall activities/growth?
    o How do you see this support being offered?

Other SFSC actors
12. Which actor that hasn't been mentioned yet comes to your mind when you think about offering (local) food to people from Utrecht in another way than in the usual supermarkets?

Finalising
13. Is there anything you would like to add that hasn't been discussed?
14. Can I contact you if I need clarification on what has been discussed here?

Appendix 3 – Actors from the network: name, description, and roles

Name	Role	Description	Interviewed?
Amped	Toppler	Develop new fresh ideas, feasible strategies and smart technology for accessible sustainable products and services that are scalable.	Yes
Bakkerij Van Eekeren	Frontrunner	Biological and local products	No
Be Bright	Supporter	Strategy and Innovation consultancy firm working in pharma & life science, healthcare, government, regional collaboration, and nutrition & prevention	No
Boerderij Nieuw Slagmaat	Frontrunner	Farm	No
Boeren Harts	Frontrunner	Online e-commerce platform where consumers can order local products	No
Buitengewoon Varkens	Frontrunner	Remote pig farms where the pigs are being put in diverse community gardens and other locations to ensure a good quality of life for the pigs	No
Buurt Maaltijd	Frontrunner	Deliver vegan meals, chilled to the consumer's doorstep	No
BuurtBuik	Frontrunner	Non profit organisation that collect food from diverse actors and cook them to offer free meals to people in need	No
Café Averechts	Supporter	Café in Vogelen Buurt (Utrecht)	No
Compazz	Supporter	connector and bridge builder in the transition to a circular and inclusive economy and society	No
De Clique	Frontrunner	De Clique is a startup here in Utrecht. It began about three years ago. The mission of the clique is offering a radical new concept to reducing organic waste, in particular in Horeca (restaurants, hotels) but also in the business sector. For now, they don't have a direct focs on consumers. They provide a bin system in which, let's say a restaurant can separate its organic wastes not only in one organic waste bin, but also subdivided in one for coffee grounds in one for orange peels in one for cutlets of vegetables. And once a week, we pick up these separated flows are being picked up and used resources to create circular food products on a local scale. To do that, they work together with local producers to see how in creative ways, they can link these resource flows from restaurants, etc, to their products.	Yes

De Groene Febo	Frontrunner	Small, automated shop in the Utrecht's landscape where you can get all kinds of vegetables, cheese, fruit, juices from local farms	No
de Groene Hart Corporation	Supporter	The Groene Hart Foundation's mission is to preserve and develop the qualities of the Groene Hart. The qualities of the Groene Hart include the open landscape of the characteristic Dutch polders, old farms and old forts, and the tranquility amidst the hustle and bustle of the Randstad.	No
de Koningshof	Frontrunner	Both a community garden and farm open to volunteers that come every Saturday to harvest the products that will be sold in the shop at the entrance. The community garden part is made from parcels that are rented to individuals. They have a WhatsApp group to exchange knowledge, seeds, etc. The community receive a monthly newsletter about useful information for harvesting/gardening etc. The Koningshof also provide some seeds/sprouts to the renter if needed.	Yes
De Lokalist	Frontrunner	Online e-commerce platform where consumers can order local products	No
De Velde Keuken	Frontrunner	Restaurant and bakery using only local products	No
Enactus	Supporter	Student organisation that foster impact entrepreneurship through meaningful student-lead startups and projects	No
Eurest Compas	Supporter	Catering company active in small and bigger companies and organisations of the Netherlands	No
Fietsen Voor M'n Eten	Frontrunner	consumer platform and an information source to gather daily food by bike.	No
Food for Good	Frontrunner	Community garden	No
Food-Print Utrecht Region	Connector	Network organisation to support a healthy and sustainable food system in Utrecht, in the region. They organise events twice a year, around a specific theme, and always with the same setup (three speakers that speak for 20 minutes). They recently discussed whether they would like to extend their activities and impact in a more prominent way.	Yes
Fungi Factory	Frontrunner	Circular oyster mushrooms farm	No
Future Food Utrecht (UU)	Toppler	Food lab/unit of the Utrecht University. Its goal is to foster research on food amongst the UU community and external actors. Is involved on the local level too through multiple partnerships with small and bigger actors	Yes
Geertje's Hoeve	Frontrunner	Goat farm	No

Gorillas	Supporter	Fast delivery company actives in cities of The Netherlands	No
Groente ntas	Frontrunner	Groententas is a non-profit organisation that runs in Utrecht University that was founded in 1994, by sustainably minded students. The whole concept is bringing locally produced and seasonal fruits and vegetables to the UU community.	Yes
Groentj es Soup	Frontrunner	Organisation promoting the knowledge of different vegetables to children in special education	No
Ground ed	Frontrunner	Diversely skilled community, driven by the common goal of regenerating our social and ecological system. Grounded is a community that stimulates connection, competence and autonomy by giving people the opportunity to create value-based initiatives. At Grounded, we engage people with culture and empower them to co-create projects surrounding food, education and art. Together we can have fun, without causing harm.	No
HKU	Supporter	Art school of Utrecht	No
HU	Supporter	University of applied sciences in Utrecht	No
Impact 030	Connector	Organisation that reinforces the Utrecht ecosystem of social entrepreneurs	Yes
Jongen Honden	Supporter	Researchers, designers, organizational changers, project managers, facilitators and communication specialists who combine their specialism with qualities that are needed right now. They aim at getting organizations and projects moving.	No
Kiwiboe rderij	Frontrunner	Kiwi farm in Utrecht	No
Koprol	Frontrunner	Producer of food-based candies out of fruit that are too riped to be sold on supermarket	No
Krachtst ation	Supporter	Multifunctional building including: a gym, a coffee and lunchroom, studios. The 'Kuil', the former auditorium, is available for all kinds of small-scale events.	No
Landsch ap Erfgoed Utrecht	Supporter	Protection organisation for cultural and land heritage in Utrecht	No
Lavett bread	Frontrunner	Local Bakery	No
Leader Utrecht Oost/W eidse Veenwe iden	Toppler	European program active in Utrecht to promote the development of the countryside area through supporting initiatives that bring both the city and countryside together	No
Living Lab Regio	Supporter	Network organisation to connect entrepreneurs, NGO and governemental institutions around food and circularity	Yes

		Foodvalley Circulair		
Local2Local	Connector	Local2Local is, on the one hand, an active short food supply chain, making it easy for their customers to order from quite a wide variety of local producers on one single platform, one logistical movement and one billing address. On the other hand, they facilitate collaboration with other regions in order to share logistical costs and assortments. They now have collaboration with seven regions and a couple of bigger business to business clients who we supply with local product.	Yes
Locals Utrecht	Frontrunner	Store in the centre of Utrecht that sells food from local producers of Utrecht. Now organise catering as well.	Yes
Lokale Voedsel Utrecht	Connector	Lokale Voedsel is a project aimed by the leader regions, two of them in Utrecht, who stimulates prosperity on the countryside and specifically to stimulate the local production and consumption of foods that is produced in Utrecht. The role of Lokale Voedsel Utrecht is to match producers and business parties who are interested in local foods, to introduce partners and facilitate meetings.	Yes
Lokale Zuivel	Frontrunner	Farm that provides a room for other local dairy farmers to make yoghurt & cheese	Yes
Loos	Frontrunner	On-wheels supermarket selling unpackaged dry products in Utrecht	No
Louis Bolk institute	Supporter	Knowledge and research Institute active in many projects around sustainable food, agriculture and health.	No
LTO	Supporter	Governmental institution of Dutch farmers and gardeners	No
Lunch Maatjes	Frontrunner	Social enterprise that prepares healthy lunches for primary schools' pupils. The idea behind this initiative is to fight inequality by providing food and education around a healthy diet.	Yes
Ministeren LNV	Supporter	Ministry of Agriculture (Landbouw), Nature (Natuur) and food quality (Voedselkwaliteit) in the Netherlands	No
MKB Nederland	Supporter	Organisation who supports small companies from all sector in the Utrecht's Region	No
Municipality of Amersfoort	Supporter	Municipality of Amersfoort	No
Municipality of Hilversum	Supporter	Municipality of Hilversum	No

Municipality of Utrecht	Supporter	Municipality of Utrecht	No
Natuur en Milieu Federatie Utrecht	Toppler	Non profit organisation active in the Province of Utrecht to foster the adoption of different initiatives linked with nature, landscape and the overall environment of Utrecht.	Yes
Natuur en Milieu Nederland	Supporter	NGO working on finding solutions for the climate and the environment in the Netherlands with the governments, businesses and civil parties	No
Parnassos	Supporter	Cultural Center of the Utrecht University	No
Rabobank	Supporter	National financial institution. Focus on three transition pillars: food transition, energy transition and inclusivity. Within food transition, there are a lot of challenges, developments, a lot of also a lot of innovation, evolutions. They see local food as one of the solutions, not the only one, to create a more sustainable food chain.	Yes
Reinarde	Supporter	Organisation based in Utrecht that assists people with various types of disabilities or mental health problems.	No
ROM	Supporter	Support entrepreneurs through knowledge support, financial support, and accessibility to other markets	yes
Roze Bunker	Frontrunner	Sirup made out of local fruits and herbs	No
Slow Food Youth Network	Connector	In 2015, the Youth Food movement was created in the Netherlands at least. And three years ago, it switched to the Slow Food Youth Network. SFYN Utrecht are trying to influence youth to eat more healthy, sustainable, clean, fair foods through different ways. They organise events and activities for their members (50).	Yes
Social Impact Factory	Connector	Hotspot for social entrepreneurship. They help innovative entrepreneurs solve social challenges by connecting them together and fostering collaborations and support amongst the social entrepreneurs of Utrecht	No
Stroof Peren	Frontrunner	Pears that would go to waste turned into Stroof Peren (pears in jars)	No
Task Force Korte Keten	Toppler	Organisation that supports inter-regional collaborations of local food actors	Yes

The Green Office (UU)	Connector	The Green Office is a branch of the Utrecht University. Their main purpose is to bring sustainability or the idea of sustainability, closer to students of the university, and also its employees. They organise activities to try to bring the urge sustainability closer to the students. They are also an open environment for students to suggest new activities by themselves. Regarding to food, they were hosting the Sustasty Food event: a sort of food truck festival with all kinds of like sustainable food truck options. Now, they started the project group, the sustainable foods project group from the green office with the idea to try and improve, for example, the eating habits of students from Utrecht University.	Yes
Uber Eats	Supporter	Food delivery platform	No
UMC	Supporter	University Medical Center of Utrecht	No
Utrecht Food Freedom	Connector	Utrecht food freedom aims connecting the heritage of the new Dutch water line defence system, to small scale community initiatives. With active support from the Province and University of Utrecht, the organisation promote food from Utrecht through reconnecting the waterline to new food initiatives and the consumers.	Yes
Utrecht Natuurlijk	Frontrunner	Utrecht Natuurlijk is an NGO that aims to bring nature and sustainability close for everyone. They coordinate city farms and garden where people can participate and people can visit, enjoy healthy urban living space. They offer educational activities for children between four and 12 on the gardens in the farms, and with materials and lessons for schools, and all forms in between. And for everything from the ages 13 and up.	Yes
Utrecht Provincie	Supporter	Provincial governmental institution of Utrecht	Yes
Van het Eiland van Schalkwijk	Frontrunner	Farm	No
Voedsel Bank	Frontrunner	Food bank of Utrecht that gathers food from multiple actors (farms, restaurants, supermarkets) to give them for free/low prices to people in need	No
Voedsel Surplus	Frontrunner	Middleman between supermarkets and social community centres focused on eliminating food waste.	No

VOKO Utrecht	Frontrunner	VOKO is a group of people for about 120 persons that run together to organise collective local food orders. All the parts of the chain are managed by local people. The transports, the distribution, administration, design, ID, it's all done by volunteers and all the VOKO members help with approximately four hours a month to make it all work. They now have 30 farmers that supply VOKO members with local fresh food.	Yes
Wilderlands	Frontrunner	Tea based on herbs that enhance biodiversity in fields	No
Zwamsap	Frontrunner	Kombucha producers	No

Appendix 4 – Interviews' Transcript
See external data set

Appendix 5 - Informed consent form

Utrecht University   **INFORMED CONSENT FORM** for participation in:

<Please enter title of your thesis>

To be completed by the participant:

I confirm that:
- I am satisfied with the received information about the research;
- I have been given opportunity to ask questions about the research and that any questions that have been risen have been answered satisfactorily;
- I had the opportunity to think carefully about participating in the study;
- I will give an honest answer to the questions asked.

I agree that:
- the data to be collected will be obtained and stored for scientific purposes;
- the collected, completely anonymous, research data can be shared and re-used by scientists to answer other research questions;
- video and/or audio recordings may also be used for scientific purposes.

I understand that:
- I have the right to withdraw my consent to use the data;
- I have the right to see the research report afterwards.

Name of participant: _____

Signature: _____   Date, place: ___ / ___ / ____, _____