



Motivations, changes and challenges of participating in food-related social innovations and their transformative potential: three cases from Berlin (Germany)

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Abstract

Dominant agri-food systems are increasingly seen as unsustainable in terms of environmental degradation, mass production or high food waste. In an attempt to counteract these developments and foster sustainability transitions in agri-food systems, a variety of actors are engaging in socially innovative models of food production and consumption. Using a multiple case study approach, our study examines three contrasting alternative economic models in the city of Berlin: community gardens, the app Too Good To Go (TGTG), and a cooperative supermarket. Based on 15 qualitative interviews, we provide insights into their transformative potential by exploring participants' underlying motivations, the changes they have experienced, and the challenges and potential for future development of these models. We find that participation in community gardens and the cooperative supermarket is similarly motivated by social aspects and dissatisfaction with existing food access options, while TGTG users are more motivated by financial reasons. Our study shows that change is experienced mainly at the individual level, e.g. by building new relationships, changing cognitive framings, and learning (new) practices, especially in community-oriented settings. The individualization of change shows that these models have a rather low potential to lead to more systemic accounts of changes. Yet, they can prefigure regime change, describe resistance, and foster cumulative incremental change that may spill over into society. We conclude that in order to sustain this role and drive transitions, it is important to up- and outscale these models; and we provide recommendations on how these models can mutually support their development, establishment, and protection.

Keywords Sustainability transitions; agri-food system; cooperation · Transformative social innovation · Food sharing · Community development · Consumer research

Introduction

The dominant food system of the corporate food regime (McMichael 2009) is increasingly criticized for various aspects along the entire value chain, including unsustainable farming practices and resulting environmental degradation, unjust working conditions, mass production, a lack of transparency in production methods, and the dominance of a few corporations (McGreevy et al. 2022). Additional problems arise at the end of the supply chain: In a globalized food system, consumers are largely disconnected from the places of production. As a result, consumers are rarely able to understand the social and environmental conditions under which their food is produced (Hartwick 2000; Monaco et al. 2017) and supermarket food shopping is often perceived as an anonymous experience (Zoll et al. 2021). However, consumers' interaction with food production and preparation

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is essential for building food literacy (Vamos et al. 2021) and making self-defined food choices. The concentration of market power of large supermarkets also threatens the existence of small grocery stores (Borraz et al. 2014). This presents an additional barrier to consumer interactions with food producers, which are more common in direct marketing schemes (Leiper and Clarke-Sather 2017). Furthermore, food waste at the consumption stage is typically high in countries of the Global North, both at the household level and in the food service and retail sectors (Beretta and Hellweg 2019; de Moraes et al. 2020). This implies a waste of energy and resources in food production, quality control, transportation, processing, storage, and preparation (Stangherlin et al. 2019). Considering that a high proportion of retail food waste is still edible (Cicatiello et al. 2017), there is a high potential to reduce food waste and associated emissions.

Overall, it is obvious that a transformation of the existing system is necessary, which requires a change in the ways people produce, consume and think about food. As cities are the main places of consumption, they are also important sites of investigation (Sonnino 2023). Furthermore, consumers have been identified as important actors for inducing change and impacting markets through their actions. Yet this individualization of change on the shoulders of consumers is also suspected of reproducing an imperial mode of living, rather than scrutinizing it through an inquiry into capitalist principles and logics, such as growth (Hirth et al. 2022). Nevertheless, consumers increasingly seek to engage with socio-ecological and socio-economic issues of the existing food system in everyday life through activities related to producing and consuming food (Dobernig and Stagl 2015). In this way, consumers can be both a cause and a solution to sustainability related issues. Local initiatives, social action, and consumer groups (also conceptualized as alternative networks, e.g., Rosol 2020) are considered to have transformative potential as they turn passive consumers into active food citizens (Signori and Forno 2019). Over the last two decades an urban food movement has emerged in Germany and elsewhere. Based on different motives, city dwellers engage in a wide range of actions such as community gardening, self-organized ways of food procurement or activities aimed at preventing food waste (Kropp 2018).

In light of these developments, in this article, we are interested in three innovative approaches where consumers address shortcomings of the existing food system: community gardening, a participatory consumer cooperative supermarket, and an app that aims to reduce food waste. Community-gardens seek to address the disconnect between food production and consumption, often as a result of grassroots movements. They represent spaces where community engagement, urban food production, education, and political agendas meet (Piorr et al. 2018) and the roles of production

and consumption converge. They bring people together to collectively grow vegetables and share their respective knowledge, duties and resources (Krikser et al. 2019; Pongstingel 2022).

However, a consumer-oriented transition of unsustainable food systems to more sustainable patterns and levels of production and consumption also requires innovative business models (Gullstrand Edbring et al. 2016). In food distribution, there are attempts to create alternatives to discounters and supermarket chains.

Since the nineteenth century, consumers in the United States and Europe have used food cooperatives in differing organizational forms and sizes to express dissatisfaction with contemporary food buying options and resist dominant food systems (Carreiro 2015; Wertheim 1976). Most commonly today in Germany and Europe, food cooperatives take the form of informal buying clubs where privately organized members regularly purchase food products directly from farmers (Fonte and Cucco 2017; Bilewicz and Śpiewak 2019; Zoll et al. 2021). Historically, consumers have also formed cooperatively managed supermarkets, which can resemble traditional supermarkets in their organization (supermarket types), while others hold member ownership, participation, and democratic organizational decision-making as key tenets of their businesses (participatory types) (Sommer et al. 1983; Zahkarov and Maciejczak 2018). Cooperative supermarkets are usually small and often fail within a number of years; the cooperative supermarkets of the 70s and 80s closed when they could not compete with price setting and consolidation in the dominant food market of the 90s, a trend which has continued until today (Knupfer 2013). However, there is growing (re-)interest in cooperative supermarkets after decades of low numbers (Knupfer 2013; Giacchè and Retière 2019). Of particular contrast to the dominant food system is the participatory consumer cooperative supermarket, where self-organized members work together to grow a retail food business centered around co-ownership, democratic decision making, and shared values. One such participatory cooperative supermarket opened in Berlin in 2021, which we will refer to as a “cooperative supermarket” for the purposes of this paper.

Several initiatives have also emerged to reduce food waste at the household level. One allows consumers to pick up unsold food that would otherwise go to waste from retailers and restaurants through an app called Too Good To Go (TGTG). Consumers pay in advance without knowing exactly what their portion will contain (van der Haar and Zeinstra 2019; Vo-Thanh et al. 2021).

All three models (community gardens, cooperative supermarkets, TGTG) aim to address the above-mentioned shortcomings of the existing food systems by changing existing social practices and social relations related to food production and consumption. They comprise alternative networks

Table 1 Overview of the cases and their attributes

Attribute/ Innovation	Community garden	Cooperative supermarket	Too Good to go
Focus of innovation	Community-based food production	Alternative to monopolies in retail	Reducing food waste
Self-descriptions	Promote empowerment using a voluntary participatory approach; present an educational opportunity; promote “the good life for all”; healing of social and ecological crises through the community working together in the garden	Providing high-quality, organic, and locally sourced products at fair prices, while promoting sustainable and socially responsible practices; committing to sourcing products from local producers, farmers and suppliers; emphasizes environmentally friendly practices, such as reducing waste and packaging; commitment to transparency and democratic decision-making	Mission is to reduce the amount of food waste by connecting businesses which have surplus food with consumers through a mobile app; claims to reach a large and international audience through its app that has been downloaded by millions of users
Actors	Volunteers who grow food together, 120* community gardens are listed for Berlin (according to www. Urbane-gaerten.de), the number of participating gardeners is unknown due to the dynamic character of voluntary participation	Members (more than 1300*); cooperative is owned and controlled by members who have to buy cooperative shares, pay a joining fee and mandatorily contribute a certain amount of labor per month; only members can shop there. To our knowledge only one supermarket in Berlin follows this specific model	Users: Consumers that collect surplus food at reduced prices (from participating cafés, restaurants, supermarkets). More than 1000* businesses offer food via Too Good To Go in Berlin (approximate data retrieved from the app), the number of participating consumers is unknown
Organizational model (Alternative) Economic Model (oriented on Rosol 2020, Rosol and Barbosa 2021; see also Gibson-Graham 2008)	Collective, informal Transactions: non-market Labor: unpaid/volunteer Property: cooperatively managed Financing: cooperative/member (non-market)	Cooperative, formal Transactions: alternative market-based, collective price-making Labor: wage & member Property: rented storage room Financing: membership (alternative market)	Individual, formal Transactions: alternative market-based (app) for surplus food Labor: wage Property: Private (app, stores) Financing: market

*numbers should only provide an orientation on the prevalence of these models in Berlin, they are highly dynamic

in the way of new organizational forms of food production and distribution and in terms of their alternative economic models (cf. Rosol 2020; Rosol and Barbosa 2021, Table 1). In addition, they can also be considered as social innovations which are defined as ‘*new ways of doing (practices, technologies, material commitments), organizing (rules, decision-making, modes of governance), framing (meaning, visions, imaginaries, discursive commitments) and knowing (cognitive resources, competence, learning, appraisal)*’ (Pel et al. 2020, 3).

In light of these theoretical and empirical considerations, our article aims to detail the transformative potential for sustainability transitions in food systems and sustainable change in wider society that rests in these three approaches. By doing so, we contribute to existing literature in two ways: First, it has to be noted that existing approaches which address changes to the existing food system are often conceptualized as alternative food networks (Duncan and Pascucci 2017; Zhang and Barr 2019) or grassroots innovations (Rossi 2017; Sage et al. 2020). The use of these two concepts has proven useful to explain transformational efforts but they are limited

to food provisioning models that are in opposition to the existing system and bottom-up approaches. However, tackling existing problems of food systems is complex and has to be addressed by a variety of local initiatives and their cumulative effects on food system transformation have to be taken into account (Motta 2021), ranging along a gradient between radical non-capitalist and more market-driven initiatives. Following Rosol and Barbosa (2021), we chose to examine three cases that follow different organizational and economic models which are characterized by either non-capitalist (community gardens), alternative (cooperative supermarket) or capitalist (TGTG) practices (Rosol and Barbosa 2021, see Table 1). Alternative food networks should not be analyzed in isolation but along a continuum with conventional approaches to determine whether more mainstream approaches still bear potential for alternative organization to the food system (Ponte 2016). Nevertheless, studies comparing different food-related innovations (FSIs) are scarce (Zoll et al. 2021).

While German community gardens in particular have already been the subject of empirical research (Rosol 2012; Bendt et al. 2013; Fox-Kämper et al. 2018; Piore

et al. 2018; Kirby et al. 2021; Ponstingel 2022), the second contribution of our article to existing research is to explore two forms of innovation that have (re-)emerged more recently. Consumer food cooperatives in their many forms have historical precedent, but cooperative supermarkets that combine the convenience of a supermarket with participatory processes are relatively uncommon today, especially in Europe and in particular Germany. Existing literature is scarce and not comprehensive, yet there is a growing (re)new(ed) interest in cooperative supermarkets and their possibilities across Europe (Zahkarov and Maciejczak 2018; Giacchè and Retière 2019; Grashuis and Hakelius 2023). Our research therefore adds to the discussion by including Germany and providing more insight as to the motivations and perceptions of individual members of an under-studied topic. Studies on TGTG are generally scarce, as it has so far only been explored with regard to entrepreneurial aspects focusing on perspectives of TGTG managers and the media (Kjeldsen and Schmeltz 2023) or company data (Lewandowski 2023). This calls for more research on TGTG users' perceptions and actions (Vo-Thanh et al. 2021).

Our research aim and questions are guided by social innovation theory which has become an important concept when analyzing food system changes in the context of new processes and institutional arrangements (Da Silva et al. 2024), as well as for facilitating, analyzing, and pre-figuring sustainability transitions and social change (e.g., Royson et al. 2024; Törnberg 2018; Wittmayer et al. 2019). Understanding motivations of social actors for joining such innovative models can reveal the problems for which new solutions are being sought and the context in which they occur (Mulgan 2006; Avelino et al. 2019a, b; Pel et al. 2020). Motivations (and motivational patterns) also provide further insight into the levels of engagement (Moser and Bader 2023) and how to keep actors engaged (Pel et al. 2020), which has implications for the success of a social innovation initiative and the diffusion of alternative practices (Neumeier 2017). To assess the transformative potential of socially innovative initiatives, it is furthermore important to explore which alternative practices, values and relations these initiatives shape (Pel et al. 2020). Research on social innovation often focuses on success stories while operational obstacles have received less attention. Exploring existing challenges is thus essential to predict the evolution of a social innovation (Chalmers 2013). To assess these aspects in the context of our three case studies, we aim to answer the following research questions:

1. What are the motivations for joining FSIs?
2. How does participation in a FSI change the way people think, practice and live?

3. What are the current challenges of FSIs and how do members perceive the future development of the innovations that they participate in?

To answer these three research questions we will first elaborate on the theoretical approach of social innovation and our three FSIs, before presenting the results of our case study and discussing them in relation to the broader implications of food system change and sustainability transitions in agri-food systems.

Theoretical background

A perspective on the transformative potential of social innovation—motivations, changes, stabilization, and challenges

Social innovation has raised interest in a broad variety of scholarly communities (i.e. community psychology; creativity research; social and societal challenges; local development) that differ in their basic view of social innovation and in their focus on key themes and outcomes. Nevertheless, they share more commonalities than differences, enabling the identification of two core characteristics: social innovation entails changing social relationships, systems and structures and these changes address a common social need (van der Have and Rubalcaba 2016). Moulaert and MacCallum (2019) confirm that a universal definition of social innovation does not exist. However, another common denominator of existing understandings is that social innovations are a people-led attempt to collectively empower people and address social inequalities through a variety of bottom-up actions (Moulaert and MacCallum 2019). Social innovations are an attempt to change or replace practices and solutions that are no longer adequate, address everyday challenges or problems (Jaeger-Erben et al. 2015), and are often driven by the normative aim of progressing towards something 'better' (Evers and Ewert 2015). This implies that social innovation is embedded in a specific social discourse or development (Bock 2012; Pel et al. 2020). The initial aim of social innovation to overcome societal challenges has been adapted as it has proven difficult to track this desired outcome. Therefore, more recent literature defines impact as the objective of social innovation (Meister Broekema et al. 2022). Challenging prevailing practices requires a change in values or an increased awareness of an issue (Biggs et al. 2010). Changes in values are particularly relevant for transformative change, amongst others discussed as the "personal" sphere of transformation (O'Brien and Sygna 2013), "deep leverage points" to transformations (Abson et al. 2017), or "normative dimensions" of innovation systems (e.g., Schlaile et al. 2017). They harness sustainable change and point to changes in

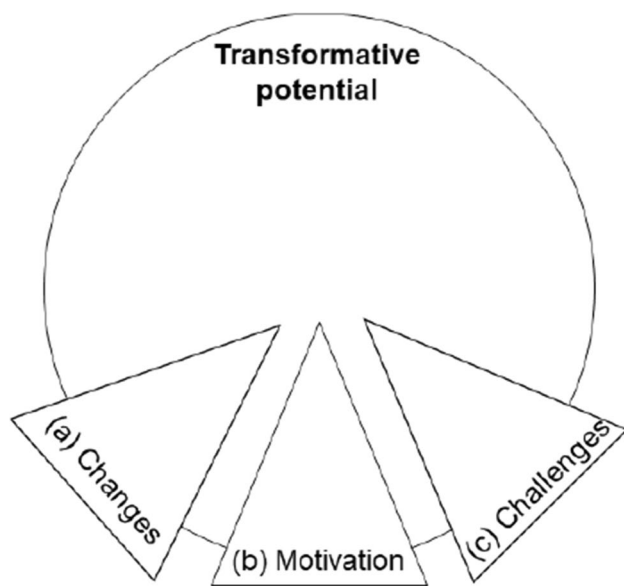


Fig. 1 Transformative potential of FSIs: How (a) motivation, (b) changes and (c) challenges provide insights into the transformative potential of FSIs (own figure). Note that we understand transformative potential to refer to both regime level changes (in line with theories of sustainability transitions) and individual level changes that spill over in wider society (in line with theories of transformative adaptation). For further discussion of these aspects, see Section 5.2

worldviews, social imaginaries and normative considerations (and affirmative constitution) of what ought to be. We view transformative change to refer to effects at the regime level of agriculture triggered by (prefigurative) social innovation (in line with theories of sustainability transitions, e.g., Törnberg 2018) and to (micro-)changes among individuals (participants in social innovation) that spill over into the wider society (in line with theories of transformative adaptation, e.g., O'Brien and Sygna 2013; see also Royson et al. 2024 for a perspective on diffusion of grassroots innovations). Social innovation occurs when changes in attitudes, behaviors, or perceptions lead to the emergence of new social practices or relations. They are created when individuals engage in intentional and purposeful actions that seek social change (Cajaiba-Santana 2014). Initially, the innovation represents a deviation from existing norms and routines and must compete with them until it is accepted as the new "normality" and adopted by more and more social actors (Rammert 2010). Social innovation can be categorized as transformative, regular or incremental and it is often difficult where and how to draw the line (Pel et al. 2023a).

In this article, we focus on three aspects by which we gain insights into the transformative potential of social innovation: (a) motivations, (b) changes and (c) challenges (see Fig. 1). (a) Understanding the motivations of those involved in social innovation is essential to distinguishing between social and business innovation. Business innovation

is typically driven by the desire for profit, while social innovation aims to meet a social need. However, there are instances where business and social goals intersect (Pol and Ville 2009). Intentions and the underlying motives are the basis for a change of practices and actions but also determine the commitment of actors to a specific cause such as altering existing social structures (Horlings et al. 2021). At the outset of a social innovation initiative, members are often motivated by the novelty of alternative practices, values, and relationships. Sustaining this initial spirit is critical to fostering transformative agency (Pel et al. 2020). Social innovations have the potential to empower individuals and contribute to transformative processes, but this requires a sufficient number of committed members. To be successful, a social innovation initiative must create an environment in which members can act according to their personal values, feel a sense of belonging to the group, and perceive that their actions are effective in achieving their goals (Avelino et al. 2019b; Pel et al. 2020). This environment satisfies the core aspects of intrinsic motivation: autonomy, competence, and relatedness (Ryan and Deci 2000). When these needs are met, a sense of empowerment and commitment is created, allowing members to internalize the organizational values and channel their individual motivations into effective collective action (Avelino et al. 2019b). Exploring motivations can also reveal the presence of shared narratives of change. Such narratives challenge the current system and can help communicate ideas about alternative futures. In doing so, they provide guidance for action and are shaped by practices (Wittmayer et al. 2019).

(b) Jaeger-Erben et al. (2015) outline a three-phase process for the implementation of social innovations and the changes in values, routines and relationships they can trigger. In the initiation phase, a small group of "change agents" identifies an existing problem and challenges the related norms and practices by deviating from them. These groups are often mobilized by shocks or public discourses. In the subsequent phase, the developed possible solutions are put into practice in a trial-and-error manner to test their practicality and suitability. Successful alternative practices become innovations if they manage to stabilize and diffuse more widely within society, which is the third and last stage of a social innovation process. Diffusion can occur through various mechanisms, including replication or through a certain depth in the quality of change and, finally, the integration into existing legal frameworks or institutions. However, challenges related to resource availability, long-term commitment and accessibility can depict major challenges for the stabilization of a social innovation (Jaeger-Erben et al. 2015). This process is in line with our research objectives, which are to examine the motivation for participating in innovative practices, to explore their influence on everyday practices, and finally to capture perceptions about the

challenges of the innovation and how it will develop in the future.

(c) Challenges that prevent the provision of social innovation are often related to dominating economic logics, power relations and the lack of acknowledgment and legitimacy by existing institutions (van der Have and Rubalcaba 2016). Socially innovative activities are also often prevented by risk aversion, the complexity of the problem that needs to be solved, and the access to both networks and financial resources (Chalmers 2013). Furthermore, prevailing legal and ethical norms can constrain social innovation even though these norms can also be altered by social innovation in the long run (Kaletka et al. 2016).

Social innovation in the context of food and agriculture

With regard to food and agriculture there are mainly three different types of social innovation. First, instruments such as food councils can change public policy to improve well-being. Second, social enterprises and social entrepreneurs can address both economic and social objectives through their economic activities. Third, local bottom-up initiatives strive for social change and address social needs that are not met by public policies or markets (Chiffolleau and Loconto 2018). Social innovation initiatives in the agricultural domain also often aim at multifunctionality, e.g. linking agricultural activities with social services such as education, caregiving or social inclusion of marginalized groups (Baselice et al. 2021; Leitheiser 2022). An additional research area is of social innovations that re-establish relationships between producers and consumers in order to reconnect consumers with food production (Baselice et al. 2021; Zoll et al. 2021). A particularity of social innovation related to agriculture is that people are able to be involved in the production of the good they desire. In community-supported agriculture or community gardens, actors can participate collectively in food production and therefore become community-based “prosumers” (Alberio and Moralli 2021; Zoll et al. 2021; Ritzel et al. 2022). Apart from food and agriculture, the occurrence of self-organized prosumer groups is rare except for in the energy sector (Martens 2022; Pel et al. 2023b) as prosumption is often individual and does not aim to fulfill a collective need (Ritzel et al. 2022).

Motivation, changes, and challenges in FSIs

Participation in food-related social innovation can be motivated by a variety of factors that include personal, social, and environmental dimensions. Research conducted by Kirby et al. (2021) suggests that, in general, motivations to participate in community gardens vary by region. For community gardens, existing research has identified social motivations (Ruggeri

et al. 2016), self-directed food production (Pourias et al. 2016), and spending leisure time (Dubová et al. 2020) as primary motivations. In Germany, individuals are also motivated by the desire to create a community, to reconnect with nature and to manifest their urge to live an ecologically sound lifestyle (Winkler et al. 2019). By growing their own food, community garden participants can develop a sense of self-sufficiency and contribute to local food systems. In addition, community gardens provide desired opportunities for social interaction and knowledge sharing, fostering a sense of belonging and collective empowerment. These motivations can vary depending on the cultural, economic, and social contexts of the individuals and communities involved in social innovation. In particular, in countries of the global north, such as Germany, community gardening is more motivated by social benefits than by food production (Rogge et al. 2018). Overall, changes resulting from participation in community gardens are often related to learning processes. When joining a community garden, few participants have the necessary gardening or organizational skills to care for a garden, but they learn from others how to work with soil and how to work together (Ulug and Horlings 2019).

In contrast to community gardens which are well researched, the motivations for participating in new iterations of small-scale cooperative supermarkets that combine the convenience of shopping in a supermarket with member involvement have not been the subject of extensive research yet. It is suggested that the primary motivation for individual consumers to join food cooperatives is to align with social values and ethical consumption practices and to avoid mainstream supermarkets (Seyfang 2008). Food cooperatives often emphasize local produce and environmentally sustainable practices, attracting consumers seeking to make socially responsible choices. Beyond these consumption-driven choices, important motivations also stem from the sense of community and social capital that these initiatives foster. This includes building relationships with local producers, suppliers, and consumers, strengthening social ties, and promoting a sense of belonging (Zoll et al. 2018, 2021). This points to a research need to explore how a participatory supermarket setting will create the same level of member engagement that occurs in small scale consumer food cooperatives with high member involvement (Zoll et al. 2021). The more convenient setting of a cooperative supermarket also raises the question whether consumers are looking for an access to regional food or whether they are attracted by the organizational model. In the case of TGTG, there are generally very few existing studies. The main drivers for using the TGTG app are discussed as the desire to reduce food waste, to experience the surprise-effect of the magic boxes,¹ and to save money (van der Haar and Zeinstra 2019).

¹ When collecting leftover food from restaurants or grocery stores, you can also opt for “magic boxes” where the contents are a surprise.

Both food providers and consumers highlight the social value of the app as a means to combat food waste and to establish a sense of social responsibility (Vo-Thanh et al. 2021). According to an exploratory study by van der Haar & Zeinstra (2019), the use of TGTG did not result in significant behavior change in users. However, nearly half of the study's respondents valued food obtained through TGTG more than their 'regular' food. Our article aims to add knowledge to these few studies on TGTG and cooperative supermarkets in the context of Germany.

FSIs face challenges, and the success of community gardens is limited by the actors involved and the local context (Diaz et al. 2018). A common issue for the longevity and spread of community gardens is the permanent access to land (Fox-Kämper et al. 2018; Ulug and Horlings 2019). Other common barriers include insufficient funding, a lack of professional coordination, and long-term commitment of volunteers (Fox-Kämper et al. 2018). Challenges that consumer food cooperatives often face are access to a space to distribute food and that self-organized structures often do not comply with existing legal frameworks (Zoll et al. 2021). Still, new cooperative supermarkets in the United States are confronted with many of the same obstacles that have been apparent in past cooperative movements, such as competition from national grocery chains, and disagreements among members about values (Wertheim 1976; Halliday and Foster 2020). However, it is not clear whether this is also the case for consumer-led cooperative supermarkets in a different regional context. Obtaining food through TGTG poses a number of challenges for its users. These may include the availability of food, limited pickup times, or what to cook with the ingredients (van der Haar and Zeinstra 2019).

Methods

In this study, we are interested in the motivations that lead social actors to join FSIs, the changes their participation brings to their everyday lives, and the challenges they perceive in their participation. To operationalize the aim of this study, we followed a qualitative research approach and followed the research design of "diverse cases" (Seawright and Gerring 2008). This approach allows us to gain a comprehensive picture of the object of study and to generate findings beyond the case study context. We choose different FSIs in the city of Berlin, namely community gardening, a cooperative supermarket and TGTG, which complement each other (see Table 1). We chose Berlin as a case study region as it is a growing city which hosts a broad variety of food-related initiatives, a diverse food culture and is connected to an agricultural hinterland. Furthermore, an urban space seems a suitable investigation site as it is used

by urban dwellers, policymakers and businesses to test and create innovative approaches that aim at more sustainable consumption and production patterns (López Cifuentes et al. 2023).

Data collection

The goal of our data collection was to gain a comprehensive picture of the different motivations that drive participation in FSIs, the changes in practices that are leveraged through participation in FSIs, and the challenges that participants experience. To this end, we conducted a total of 15 qualitative and problem-centered interviews (Witzel 2000) with participants of our three case studies. The structure of the interviews was modeled on Witzel's concept of problem-centered interviews, thus revolving around the notion of problems that these innovations aim to solve, as well as on the theory of social innovation (Moulaert et al. 2005; Mulgan 2006; Cajaiba-Santana 2014; Pel et al. 2020) (see Section 2.1, see Tables 2, 3 in Annex 1 and 2). A web search was conducted to identify existing community gardens and shops and restaurants offering food through TGTG in Berlin. From this overview, we *randomly* selected community gardens that had similar goals as displayed on their websites (see also Table 1) to gain insights that are valuable beyond their individual context; and TGTG pick-up points through which we contacted participants. Small cooperative supermarkets are relatively new, so we included the only one in Berlin in our study. We recruited our first interviewees through direct on-site canvassing of FSI participants, i.e. directly at the community gardens, during the supermarket's opening hours, and during the pickup times of food retailers participating in the TGTG. We used snowball sampling to identify additional interviewees by asking our interviewees for contacts of potential interviewees who are also part of the innovation and may have different perspectives on issues related to the FSI (Rubin 2021). We stopped our data collection after we reached content saturation, which we defined as recurring arguments about the motivation and changes that participation leveraged (Saunders et al. 2018; Rubin 2021). Our sample consists of six TGTG users, four worker-owners of the cooperative supermarket, and five volunteer members of three different community gardens (see Section 4.1 for an introduction of interviewees). Interviews were conducted between May and July 2022, lasted between 25 and 45 min, and were audio recorded.

Data processing and analysis

All audio data from the interviews were fully transcribed and analyzed using MAXQDA software. In our analysis, we followed an iterative deductive-inductive approach based on Kuckartz's (2014) seven-step guide to qualitative content analysis. Thus, after the initial text work, we coded the interviews with deductive codes represented in

Fig. 2 Motivation of participants for the participation in FSIs. The dots indicate the occurrence of categories in the interviews, but do not necessarily indicate the importance of these aspects to the interviewees. Therefore, the figure and the dots should be seen as a supplement to, and not a substitute for, the presentation of results in the text

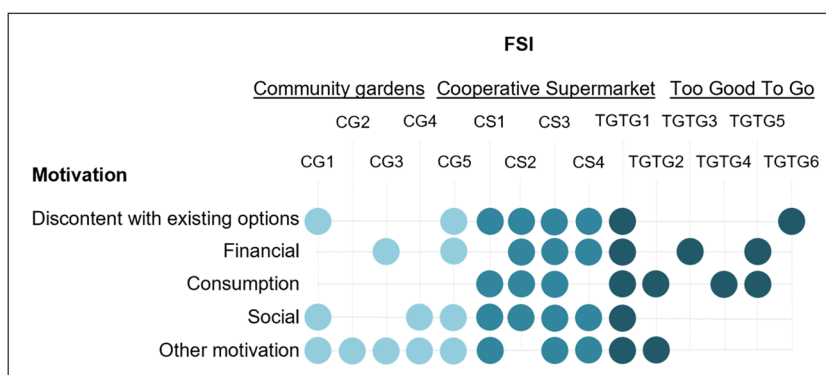


Fig. 3 Changes perceived by participants as a result of their participation. The dots indicate the occurrence of categories in the interviews, but do not necessarily indicate the importance of these aspects to the interviewees. Therefore, the figure and the dots should be seen as a supplement to, and not a substitute for, the presentation of results in the text

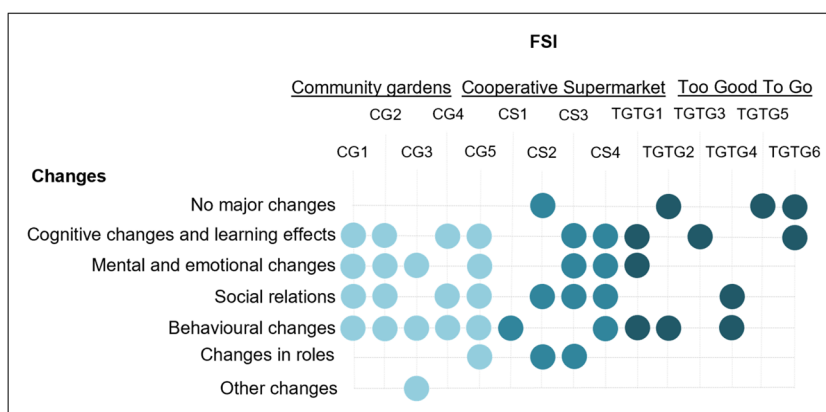
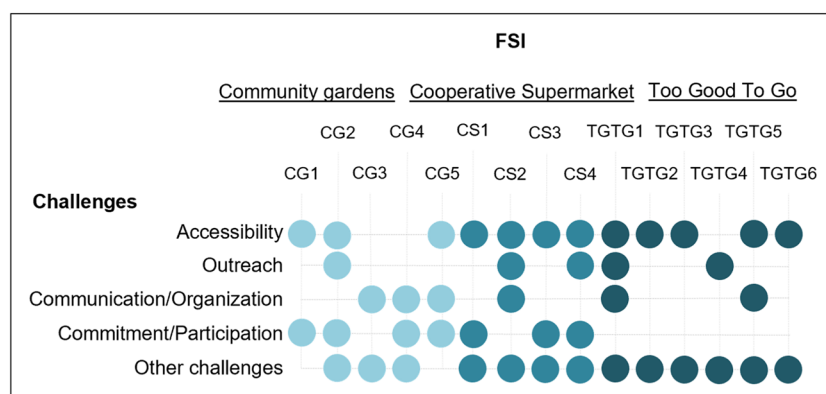


Fig. 4 Perceived challenges of participating in FSIs by participants. The dots indicate the occurrence of categories in the interviews, but do not necessarily indicate the importance of these aspects to the interviewees. Therefore, the figure and the dots should be seen as a supplement to, and not a substitute for, the presentation of results in the text



our interview questions and added inductive subcategories and additional categories after open coding. In an iterative process, moving back and forth between different category systems, we arrived at our final coding scheme (see Figs. 2, 3, 4), which was applied to the remaining textual data. All of the authors of this paper were involved in coding the material, and we ensured inter-coder reliability through several rounds of discussion of the coding scheme among the four authors of this article. Table 3 in Annex 2 of this paper gives insights into our coding categories.

Results

In the following section, we answer the aim of our study based on our empirical interview data. We will first present some more general insights about our sample (Section 4.1) before presenting findings about the motivations for joining FSIs (Section 4.2), the changes that participants experience (Section 4.3), and the challenges they face (Section 4.4). The abbreviation CS refers to the cooperative supermarket, TGTG describes Too Good To Go, and CG refers to the community gardens.

Background of the interviewees

Almost all respondents, regardless of the innovation, reported practicing sustainability beyond their individual engagement in their FSIs and the general agrifood context. Community garden participants mentioned buying household products with less plastic packaging, biking or using public transportation instead of owning and using cars, and upcycling clothes instead of buying new ones. Cooperative supermarket participants explained that they try to fly as little as possible, always bring their own bags when shopping, or buy products from stores without packaging. TGTG users reported that they buy clothes and furniture thriftily, try to use green transportation, and reduce plastic by using biodegradable substitutes or reusable products (e.g., when collecting surplus food). Among our respondents, we could not identify a particular sustainability-oriented attitude that was specific to one innovation. However, all interviewees perceived the existing food system as problematic and identified numerous challenges, such as rising food prices, high levels of food waste, or the excessive use of pesticides in crop production and antibiotics in livestock production.

Motivation of participants to join FSIs

A major motivation for *community garden* participants interviewed was to participate for social reasons (see Fig. 2). As an example, CG5 mentioned the attraction of meeting people in their own neighborhood while enjoying some greenery in the city of Berlin. Another important motivation was the urge to garden and spend time in nature, which often stemmed from a pre-existing interest in plants and gardening. This motivation to be in contact with nature was unique to the garden participants. We found that dissatisfaction with existing opportunities was also a motivation. In particular, the difference between joining a community garden, where anyone can join immediately and for free, and having their own private allotment, which is regulated and costs money. CG1 mentioned the long waiting periods for an allotment: "[...] they told me that if I apply for my own plot, I would be applying for my children and not for myself". CG5 also said that since the garden is a community organization, the financial burden is not on the individual as it is with a private allotment.

All members of the *cooperative supermarket* who were interviewed had been specifically looking for a cooperative grocery store to join prior to their involvement, expressing dissatisfaction with the existing options for grocery shopping in Berlin (see Fig. 2). What they were looking for in comparison to "normal" supermarkets was expressed in consumption-related motives such as: less or no packaging (CS1), buying local (CS1, CS2), and transparency in their food choices or proximity to producers (CS1, CS2,

CS3). Respondents also mentioned the financial incentive to get involved, as membership offers significant discounts on organic food compared to a regular organic supermarket (CS2, CS3, CS4). Another primary attraction of joining the cooperative market for interviewees was the socially motivated desire to be part of an active community of people working towards a similar goal of sustainability in their food purchasing (CS1, CS3, CS4). This is particularly evident in CS1's quote: "*When I saw that they were doing this from the ground up, I thought, yes, a community-based approach to dealing with these food issues is important.*" CS2 had belonged to a similar store in France and liked the community model, the benefits it offered, and the revaluation of food it brought.

The primary motivation for using the *TGTG* app for interviewees was the discount on food (TGTG1, TGTG3, TGTG5), which we coded as a financial motivation (Fig. 2). For example, for TGTG1, as a student, said that they felt the app catered to them at a time when they did not have a significant amount of disposable income. TGTG's concept of reducing the amount of waste from food already produced was even more frequently mentioned, but less strongly expressed, as a reason for using the app (TGTG1, TGTG2, TGTG6). These interviewees and one interviewee who was already interested in sustainability and food sharing (TGTG4) saw the app as an easy way to take action on these issues without making a big commitment.

Perceived changes resulting from participation in FSIs

When *community garden* respondents talked about the changes they experienced, they overwhelmingly reported that their participation led to social changes (particularly in social relationships) characterized by new friendships formed through their involvement with their gardens (CG1, CG2, CG3, CG5; see Fig. 3). Through these new relations, some participants also reported to have changed practices: Some of them had gardened for the first time and felt empowered to acquire respective skills (CG1, CG2). Others claimed to live a more sustainable-oriented life in general. For example, CG1 responded that they were now flying less because some of the members of their garden did not fly at all. Interviewees also brought up cognitive changes in the way they understood the effort that goes into growing food for the world, as expressed by CG2's quote: "*When you grow a small plant by yourself for the first time, and you take care of it for the whole season until it ripens and you harvest it, you wonder or realize how it is possible to fill the whole supermarket with fruits and vegetables, because it's so hard.*" CG5 similarly said that participating in the garden helped them mentally internalize what they already perceived as problems in the food system by having first-hand

experience with growing food instead of just buying food at the supermarket. CG2 also said that they were encouraged to think more about climate change because the garden was growing plants that might not have been possible to grow in Berlin decades ago. In addition, emotional changes were highlighted, such as how interviewees experience joy in being in the garden and in nature and develop a sense of emotional attachment to the garden.

Similar to the community garden respondents, the *cooperative supermarket* respondents also emphasized a change in their social relationships as a main result of active participation at a cooperative member (CS2, CS3, CS4; see Fig. 3). The change in social relations also influenced several different cognitive changes. For example, for CS4, being in a community made them think more in different ways: Being in contact with people they would not otherwise meet made them think about stereotypes. In addition, being exposed to a group focused on sustainability made them reevaluate their own practices. Through their experience at the cooperative, CS3 reported another cognitive shift, saying that they now have a sense of optimism about what communities can accomplish in a short period of time as a result of being a member of the cooperative supermarket. In addition, CS3 noted, "A [regular] supermarket is for me to buy something. But with [the cooperative supermarket], there's a different feeling, I'm also part of it, even if I'm a very small part". Changed practices were less frequently mentioned, but CS1 said that they now generally volunteer more, and CS4 now buys unpackaged food and has started separating her waste.

Half of the respondents for *TGTG* said that they did not experience a big change by using the app (TGTG2, TGTG5, TGTG6). As an example, these interviewees reported that this is because they were previously already mindful of avoiding food waste, even though they liked the idea of the app (see Fig. 3). Half of the respondents also mentioned that the amount of food they receive is sometimes too much for one person, which can shift the problem of food waste from restaurants or shops to the private household, which would not contribute to the originally intended change towards reducing food waste (TGTG2, TGTG3 and TGTG5). The quote from TGTG2 illustrates this aspect: "The problem is actually that you get so much stuff that it is counterproductive for you to pick something up when you are alone or in pairs so that it is not thrown away and then throw it away yourself. But it really only works if you know you have a lot of people or you can take it somewhere the next day where there are a lot of people." TGTG3 and TGTG6 went so far as to say that they had become skeptical, suspecting that the app was just a way for restaurants to sell more food. However, in terms of social relationships and behavioral changes, two respondents (TGTG2 and TGTG4) mentioned that the large amounts of food in a *TGTG* bag created an opportunity for more communal behavior by sharing food with others

or cooking together. One *TGTG* respondent also reported a cognitive change as a result of using the app, saying that they became more aware of waste, both at home and when eating out (TGTG1).

Perceived challenges of participation and FSIs

Community gardeners experienced a variety of challenges to and during participation, mostly related to accessibility, communication/organization, and engagement/participation (see Fig. 4). CG1 mentioned that they perceived a lack of general accessibility for people with physical disabilities; and the dominant use of German and English in the garden may exclude people who speak other languages. CG2 and CG5 said that temporal and spatial accessibility was also a factor in their participation, and that other hobbies and commitments such as work and school interfered with regular visits to the garden. CG2 and CG5 also stressed the importance of living close to the garden, as if it was too far away they might stop participating. CG2, CG4 and CG5 expressed that commitment/participation was a challenge to the functioning of the garden itself, as participation in their respective gardens tended to revolve around a small number of regulars.

Accessibility was also the main challenge expressed by the *cooperative supermarket* members (see Fig. 4). CS1, CS2, CS3 and CS4 mentioned financial accessibility as a barrier to participation, especially in relation to the €110 investment required to become a cooperative member. In addition, while prices for organic products are comparatively low at the cooperative supermarket, participants said that prices at discount supermarkets for conventional products remain lower. CS1, CS2, CS3 and CS4 also raised the challenge of commitment/participation, which in their case related to the monthly 3 h work requirement for members, the difficulty of remembering tasks, and forming deeper social ties when working only once a month.

The extent and capacity of what and when restaurants list items for pickup was perceived as a challenge by all interviewees of *TGTG* (see Fig. 4: other challenges). Users reported receiving inconveniently large quantities of items, or even items that did not match their preferences. The statement from TGTG4 illustrates this: "[...] I'm a student, I live alone, so if I take a big bag of bread home, I'm still wasting the food at the end because I can't eat that much bread. Then I think the purpose of the app isn't fulfilled." *TGTG* users also frequently mentioned both general and personal accessibility challenges. TGTG2, TGTG3, and TGTG4 all mentioned that users need to have a smartphone to use the innovation, which may exclude economically disadvantaged people, e.g., without smartphones who would benefit from using *TGTG*. Time constraints and lack of convenience were also cited as key accessibility challenges. The

number (TGTG6) and geographical proximity (TGTG1) of restaurants or shops to one's home, or the possibility of integrating food collection into routine procedures and routes, were mentioned as key aspects for participation (TGTG1, TGTG5).

Outlook and future expectations of participants

When asked about their expectations for the future development of FSIs, our interviewees mentioned several aspects related to the context and the (developmental) stage of the innovations. These aspects therefore describe a reflective perspective on how participants view potentials for facilitating more systemic changes and the diffusion of SI models (see Royson et al. 2024).

For *community gardening* initiatives, interviewees perceived that their viability depends on permanent access to land (CG2, CG3), which in turn depends on the will and plans of the landowner (CG3). In this respect, the participants see the future as highly uncertain. One participant pointed out that the future development and systemic impact of gardens may depend very much on their ability to connect and collaborate, as this can enhance their effects (CG5). In terms of the internal organization of the groups, one participant expects community garden groups to remain dynamic in the future, with people joining and leaving the group while the core team remains the same, potentially comprising a hurdle for the further development of the garden. Regarding the *cooperative supermarket*, our respondents mentioned several ideas for future development and systemic impacts. CS4 mentioned the decentralization of the supermarket by introducing pick-up stations around the city to increase the physical proximity between the consumer and the supermarket. This may allow more people in different parts of the city to participate in the cooperative supermarket. Another idea may be to involve youth by holding workshops where children can learn about the cooperative supermarket and its contribution to the local community, thereby disseminating knowledge and reaching people of other socio-economic dispositions. With regard to the future development of *TGTG*, the interviewees had mixed predictions and expectations. Half of the respondents were rather pessimistic, expecting little commitment from users to use the app consistently (TGTG1, TGTG4, TGTG5). Others were optimistic about the future reach of *TGTG* in terms of an increase of the number of people using the app (TGTG2) and the number of stores and restaurants serving food (TGTG3), thereby enhancing the systemic effects of the app. To reach more people, respondents suggested developing specific marketing strategies (TGTG4), expanding target groups (TGTG2), improving the app in terms of transparency of what food the user is getting (TGTG5), or covering a wider variety of different businesses (TGTG6).

Discussion

Our study aimed at understanding the transformative potential of three food-related innovations, namely community gardening, a new cooperative supermarket, and the "Too Good To Go" app. In the following, we identify commonalities and differences between our three cases and discuss our findings in relation to the existing literature on social innovation and other findings on food related initiatives (Section 5.1). Afterwards, we discuss their (prefigurative) role in sustainability transitions of broader agri-food systems and success factors for their further development (Section 5.2), before briefly reflecting on the limitations of our study (Section 5.3).

Social innovations: motivations for participation in FSIs and related changes

A common feature of the three innovations studied was that expressed motivations for participation were mixed. This is a popular finding across different types of FSIs due to their context and problem focus (Blättel-Mink et al. 2017; Ulug and Horlings 2019; Zoll et al. 2021). In a more nuanced perspective, Hasanov et al. (2019) argue that food initiatives accommodate different motivations that come together under the collective goal of community self-organization. They see the differences as an asset, as the occurrence of complementary and conflicting motivations fosters the ability to change and find pathways for transformation. A closer look at our cases reveals such similarities and differences: in both the community gardens and the cooperative supermarket, the urge for social interaction and dissatisfaction with existing options were the main drivers of participation. The social motivation emphasizes the innovative character of collective food production in community gardens and collective food distribution in the cooperative supermarket (the latter with a formalized, non-hierarchical organizational structure). For cooperative supermarkets this indicates that consumers actually participate due to the novel organizational structure and not just to conveniently get access to regional and organic food. In general, participation in social innovation is often motivated by dissatisfaction with existing options, and the ability to identify grievances in the existing system indicates that the actors involved are willing to address these problems (Mulgan 2006; Vercher et al. 2021). Community gardeners were motivated by a social need to have access to a garden and green space. Satisfying such a social need is also an important characteristic of social innovations (Moulaert et al. 2005; Mulgan 2006; Caulier-Grice et al. 2012). Other research on community gardens in the Netherlands found that gardeners were much more pragmatic and motivated primarily by the joy of gardening and food production. Unlike our gardeners,

they were rarely concerned about sustainability or pushing for change in the existing food system (Veen et al. 2021).

Conversely, the main motivation for using TGTG was to save money. This raises the question of the extent to which TGTG can be considered socially innovative. While economic and social goals may overlap, social innovation should be driven primarily by the goal of meeting a social need, not by financial motivations (Pol and Ville 2009). Therefore, we argue that TGTG is not a clear-cut example of social innovation (discussed in more detail below). Since reducing food waste was a less pronounced motivation among TGTG users, further research is needed to explore how TGTG consolidates this problem by moving food waste from the retail level to the individual household level. While our respondents were aware that TGTG users were saving leftover food, this does not necessarily solve the problem of overproduction and oversupply by restaurants and food retailers and, in the worst case, may even be a pull factor for increased production and leftover food by opening up a new market.

Changes resulting from participation in an innovation were most pronounced in the community gardens and least pronounced among TGTG participants. For members of both the community gardens and the cooperative supermarket, the most important changes resulting from their participation were related social relationships, consistent with the strong social motivations in these two cases. The change in practices is characterized by active participation, which can lead to friendships and a group spirit. In general, the creation of social relationships is a key feature of social innovation, as it promotes empowerment and collective action (Pel et al. 2020). However, newly created social relationships have so far been limited to intra-organizational connections between participants of the community gardens and the cooperative supermarket. Motivations of the cooperative supermarket members also differ from research on small scale food cooperatives where people often want to be involved in food production (Zoll et al. 2021).

Another common feature of the innovations studied was that the new social interactions and practices also triggered cognitive changes in thinking about the sustainability of one's own behavior. In the community gardens, participants became involved in food production for the first time and acquired gardening skills that changed their roles from consumers to producers, leading to a greater understanding of how food is produced. As such, this is also a clear departure from common practices in the dominant food system, where production and consumption are separated (Monaco et al. 2017; Zoll et al. 2021).

Compared to the other two innovations, TGTG users reported the least change, although the collection of surplus food is already different from the usual practice of buying food in supermarkets. This change in practice was not reported as a motivation by interviewees, nor was it perceived as a

different practice, most likely because consumers do not usually see how much consumable food is thrown away by food retailers. It may also be that the high awareness of responsible consumption reported by TGTG users is a prerequisite for using the app and that the spontaneous offer of food bags in the app makes it difficult to establish routines for using it, as opposed to, for example, being part of a community garden. Although using TGTG was an individual activity, it occasionally led to community activities, also with non-users, where food was shared. These were spontaneous events and not regularly organized though, as in the community gardens and the cooperative supermarket. Hence, the latter two may have led to more change. While other research has found that TGTG participants perceive themselves as a community fighting food waste (Vo-Thanh et al. 2021), our research suggests that this group spirit does not (yet) exist in Berlin. Nevertheless, citizen engagement does not only take place on a collective, but also on an individual level (Horlings et al. 2021). Especially for TGTG (and to a lesser extent the cooperative supermarket), it could be argued that they are more of a social enterprise, combining economic and social objectives, which can still be considered social innovations (Chiffolleau and Loconto 2018). Future research should also take into account the perceptions of both restaurant owners and grocers and how TGTG leads to a change in their practices. However, as long as food retailers can profit from selling food that would otherwise be thrown away, and consumers can get food at reduced prices, we think it is unlikely that TGTG will change the core problem of food oversupply.

Overall, the non-capitalist case study (community gardens) triggered most changes in people's lives followed by the alternative (cooperative supermarket) and the capitalist (TGTG). However, community gardens exhibit the lowest degree of formality which might be an obstacle for their stabilization and diffusion (Jaeger-Erben et al. 2015) compared to the cooperative supermarket and TGTG which are more embedded into the dominant economic system. Future research should therefore explore trade-offs between the degree of formality of social innovations and their ability to stabilize alternative practices.

FSIs as a contribution for sustainable change in agri-food systems and beyond?

Social innovation is seen as a model through which sustainability transitions (in agrifood systems) evolve and sustainable societal change is leveraged. In the previous Section 5.1, we elaborated on the individual changes reported by participants. Transformative change of unsustainable patterns can only occur when a social innovation exceeds ideas and experiments and changes social settings and meanings (Jaeger-Erben et al. 2015). In our cases, this is particularly true for the community gardens and partly for the

cooperative supermarket, while the changes resulting from the use of TGTG appear to be limited. Our findings suggest that the reported changes are mostly perceived at the micro, actor level within the group involved. This is consistent with research on a wide range of different alternative food networks and food-related grassroots innovations, including community-supported agriculture, food cooperatives, self-harvest gardens, and community gardens. While participants may yearn for systemic change, they often question whether the changes taking place in their initiatives have an impact beyond the movement itself (Kropp et al. 2021; Zoll et al. 2021).

However, broadening this perspective, social innovations do not only lead to individual changes as in our research. FSIs can provide spaces for experimentation, for creating new ways of how people want to live in relation to food and its production (Jaeger-Erben et al. 2015), for learning and unlearning (Van Oers et al. 2023), for deliberately dismantling regimes (Törnberg 2018), and for the performativity of alternative and non-capitalist practices that provide alternative organizational and economic orientations (Rosol 2020; Rosol and Barbosa 2021) that prefigure social change. In the following and based on our results, therefore, we would like to critically discuss the more systemic and (broader) societal proposals for change of the social innovations we have studied, as well as strategies for enhancing their transformative potential.

Sustainability transitions are generally described as changes in the configuration of socio-technical arrangements in regimes, and innovations can alter this dynamic-stable configuration of actors, technologies, and institutions through different transition pathways. In this context, social innovations can be seen as models that prefigure change (Törnberg 2018) as well as a form of resistance (Juárez et al. 2018) that challenge the path-dependent and institutionalized nature of current problems in agri-food systems (Conti et al. 2021; Friedrich et al. 2022, 2023). Social innovations and their participants deliberately work towards dismantling regimes by presenting viable alternatives or pointing out current problems, and at the right moment can change existing regimes (Törnberg 2018). This is documented in the motivations that our actors experienced when participating in social innovation, and how these point to problems in the agrifood system (see 5.1). However, the impact of innovations on regime reconfigurations depends not least on their constitution as either incremental or radical social innovations (Vercher et al. 2023). Vercher et al. (2023: 235) distinguish incremental from radical social innovations, among other things, by the way in which they challenge the status quo. Based on our brief elaboration of the alternative economic model (see Table 1) that our innovations follow, and the changes perceived by members (5.1), we argue that all of the innovations studied are more incremental in nature. Within

the incremental spectrum, community gardens represent a more radical innovation (non-market based, experiencing change and community), while TGTG and the cooperative supermarket are clear examples of incremental innovations, as both deviate only slightly from the status quo (both market-based, small changes experienced by TGTG members). Because radical innovations have a higher potential for systemic change (Vercher et al. 2023), we argue that our cases have a rather low capacity to lead to systemic change, while they present models that cumulatively (including innovations not explored in this study) contribute to regime change.

Complementary and partially overlapping to the literature on transitions, sustainable change can also be approached through the concept of transformative adaptation (O'Brien and Sygna 2013), or how social or grassroots innovations diffuse into wider society (Royson et al. 2024). In both of these approaches, learning new values and knowledge and changing framings and normative considerations play a central role. Our findings show that in community gardens in particular, but also in the cooperative supermarket, participants come into contact with people; they adapt and learn both knowledge and culture, while unlearning ideas, concepts, and practices of currently dominant food systems and capitalism (on the concept of unlearning, see van Oers et al. 2023). We argue that these FSIs thus build a cultural repertoire (Swidler 1986) from which participants can draw to make sense of their actions in relation to food and sustainability—even beyond the innovation context—and thereby influence wider society. Participation leads to a transformation of the participants' "personal sphere" (O'Brien and Sygna 2013), which is paramount in the process of sustainable change, which emerges as a non-linear process of the personal with the practical and political spheres. Although our findings point to mainly micro changes among participants (see 5.1), we argue that these changes can be seen as important learning opportunities for broader societal transformations. This "symbolic influence" (Royson et al. 2024), which represents the imaginative resources for developing just and sustainable practices and reframing futures for the agrifood context and beyond, is a crucial aspect of the process of social innovation diffusion (ibid.). In addition, participation in an FSI can lead to the further development of a community's agency beyond food, increasing reciprocal relationships and self-governance outside of dominant systems (Leitheiser 2022). However, given the indicative nature of our approach to transformative change, we call for a more thorough analysis of the multiple ways of how the FSIs studied lead to systemic change. These changes are not least open to the future development of FSIs and how they are embedded (Royson et al. 2024) in society, i.e. how they build networks with social actors outside their niche that allow the dissemination of knowledge and practices.

In order to suggest a way to achieve and improve a greater diffusion and transformative impact of FSIs, we would like to discuss participants' perceived challenges and perceptions of future development in light of theoretical elaborations on the scaling of innovations. Scaling in theory refers to different aspects, from upscaling to outscaling or replication (e.g., Kump and Fikar 2021; Moore et al. 2015; Westley et al. 2014). Critical to all of these processes is building connections with formal and informal institutions to gain better access to resources and recognition (Pel et al. 2020), sustaining commitment (Mulgan 2006), and reaching a sufficient number of adopters (Hölsgens 2022)—all of which are essential to the success of social innovation. Although discussed as important determinants of FSI success (e.g., Pel et al. 2020; Zoll et al. 2021), governance barriers and formal access to resources did not appear to be similarly important in our study.² We attribute this to the characteristics of the FSIs studied: TGTG and the cooperative supermarket appear to work well within existing regulations, and while community garden participants identified access to land as a barrier to further development, they did not request policy support to address this issue. Either because community gardens are relatively established models that already have formal institutional support (e.g., in the form of dedicated spaces in urban planning), or because our study focuses on "success stories" of innovations that have found their place despite governance barriers. Sustaining engagement can be achieved by meeting psychological needs and through individual or collective empowerment (Avelino et al. 2019b), and seems particularly important for the two community-oriented case studies where continuous participant engagement was a challenge. Without sustained engagement, social innovations run the risk of failing to solve the problems they seek to address. Therefore, we believe it is critical for FSIs to continually assess this issue and engage with other initiatives to explore ways to address it. Upscaling³ is often discussed as a strategy to increase the impact of an innovation beyond the existing group of participants. In our innovations, participants discussed this aspect in light of the major challenge of accessibility of their innovations. For the community gardens, this was more related to reaching a wider and more diverse audience and including people with disabilities or non-native speakers. For the cooperative supermarket and the TGTG, interviewees expressed that a certain financial and time budget is necessary to participate. The accessibility of social innovation is rarely discussed in the social innovation literature, possibly because social innovation often emerges from the bottom up (Signori and Forno

2019). However, social innovation is not necessarily desirable for everyone, as the changes it brings may benefit some groups more than others (Larsson and Brandsen 2016)—also discussed as the "dark side" of social innovation (Pel et al. 2023b). Therefore, the ability of social innovation to reach marginalized actors and spread its ideas and practices beyond their own group needs more attention in the future. If FSIs want to scale up and disseminate their models and reach a wider audience, this aspect needs to be critically examined. Accessibility may also be an important aspect for the outscaling⁴ or replication, another strategy particularly relevant to social innovations for increasing their impact. Specifically for community gardens and community-based initiatives in general, outscaling or replication is important because the social interactions that make up their activities can only be scaled up to a certain number of people (Kump and Fikar 2021). The question remains, however, whether outscaling and/or upscaling of FSIs can work, as more research is needed to unveil how many people are interested in joining such models (a recent study finds an increase in popularity during Covid-19, cf. Bieri et al. 2024), what the current barriers to joining are, and how more people could be motivated to join beyond the more sustainability-oriented group we interviewed.

Last but not least, we want to discuss the potential of increasing links and exchanges between our three innovations in order to cumulatively leverage systemic change in the future. At first glance, our three FSIs do not appear to have much overlap in their goals and practices, in part due to the different alternative economic models they comprise. However, after exploring the motivations, challenges, and practices of each initiative, there seems to be room for collaboration but a lack of making use of structures that could connect different initiatives. On a small scale, participants in the innovations could meet in "food hubs," a place where people can come together and participate in activities around food, ranging from food distribution to urban food planning (Klebl et al. 2022). In this space, members could adopt new knowledge and disseminate existing knowledge by sharing experiences of community self-organization and engagement, discussing normative orientations, and generating interest in their own FSI and its contribution to promoting sustainable food practices. Although not mentioned by our interviewees, we consider it crucial that policy makers also work towards the formal establishment of such spaces where different social innovations can meet, interact and share their experiences. In this way, learning and new social relationships are not limited to one's own innovation, and the transformative potential is enhanced (Avelino et al. 2019a; Royson et al. 2024). On a larger scale, we attribute potential

² These aspects appear in our material. Yet because of their rather low frequency, they are assembled in the category "other challenges" in our empirical material.

³ We understand upscaling based on Westley et al. (2014) "for situations where an organization aims to affect everybody who is in need of the social innovation they offer, or to address the larger institutional roots of a problem." (p. 4).

⁴ We understand outscaling based on Westley et al. (2014) as "the organization attempting to affect more people and cover a larger geographic area" (p. 4).

exchange to the "We are fed up!" movement. The German agrarian opposition is known for its diversity of actors and goals. The "We are fed up!" movement could serve as an umbrella under which to assemble and connect innovations and/or politically active participants, different types of critical voices organizing large protests for a transformation of the German food system (Nowack and Hoffmann 2019). We can only emphasize that such spaces of exchange are also of inescapable importance for food-related (and especially non-capitalist) social innovation in cities like Berlin, in order to learn from each other, but also to provide contexts in which shared visions and narratives of transitions in agri-food systems can be developed and aligned, and in which reframings can take place.

Limitations and reflections

Our study also has a number of limitations, which we would like to discuss briefly. Due to the small number of interviews, one should not to generalize our results to all users of the respective case studies, especially since motivations and food-related preferences are also strongly dependent and contingent on a regional context and may be different in other countries, cities, and regions (e.g., for the case of TGTG, Vo-Thanh et al. 2021). Therefore, our findings may be biased by describing a case from Berlin, a diverse and young city where multiple innovations are introduced that may not find wider social acceptance in different regions with distinct characteristics. Our novel findings following an exploratory approach, particularly regarding TGTG and cooperative supermarkets, need to be critically evaluated by research in other geographical contexts and using different methodologies (e.g., based on quantitative surveys of participants or workshop-based). This also takes into account the inclusion of, for example, restaurant owners as important actors in the TGTG innovation or food suppliers of the cooperative supermarket. As cooperative supermarkets which are both consumer led and offer a large product assortment are a rare phenomenon, we were only able to include participants from one existing market in Berlin. When this model of food retailing becomes more widespread, studies involving multiple supermarkets will be needed to evaluate and contrast our findings. Last but not least, our approach provides a perspective on the transformative potential of these innovations and we need other research approaches that assess this issue by following a more systemic account.

Conclusion

The aim of this study was to understand the transformative potential of food-related innovations in the city of Berlin by focusing on the motivations for joining FSIs,

the changes that participation brings, and the challenges that participants face. Our study followed a multiple case study approach, comparing three different innovations comprised of different (alternative) economic models: community gardens, cooperative supermarkets, and TGTG. This article is among the first to provide empirical insights into the processes of TGTG users and consumers participating in a recently established cooperative supermarket, providing new insights into these innovative food-related models. Our findings show that motivations among participants are mixed, but each innovation has a distinct focus, and suggest that non-capitalist initiatives (community-gardens) trigger most changes followed by the alternative (cooperative supermarket) and capitalist (TGTG) ones. Especially the community-orientation in community gardens and cooperative supermarkets triggers change in people's everyday lives compared to the more individual activity of picking up food via TGTG. Social exchange encourages participants to think about the sustainability of their practices around food and beyond. It is therefore unlikely that these innovations *alone* will lead to transitions in the deep structures of existing food systems. Nevertheless, they are the spaces where experimentation can take place, where new values can be learned and others unlearned, and regime changes become prefigured. Accordingly, the value of these innovations, and of community gardens in particular, lies in the high degree of self-organization that leads to learning processes, changing roles, and the acquisition of new skills and practices. Though changes were incremental and occurred at a micro level, they may spill over into wider society and leverage systemic changes. The balance between social and economic goals varies among the innovations studied and depends on their primary focus. This focus and the type of economic model gives insights into the transformative nature of social innovation and the extent to which it challenges the current food regime. The nonprofit innovation of community gardens, in particular, continues to offer great potential and requires support with regard to the outscaling of their models. We see the potential of cumulative changes through collaboration between the three studied innovations, but more structures and spaces connecting initiatives with different economic models are needed. We urge policy makers to provide resources so that civil actors can set up spaces and supportive networks through which they can exchange experiences and knowledge and disseminate their social innovations. These innovations function as expressions and counterparts that remind the existing food system of its shortcomings, inadequacies and injustices, and give citizens a voice to express what a desired food system could look like.

Annex 1

Table 2 Guiding questions of the interview

Main question*	Detailed questions
<ul style="list-style-type: none"> • How did you become a member/participant of the innovation? Why did you start participating in the innovation? 	<ul style="list-style-type: none"> ○ How did you find out about the innovation? ○ What interested you about joining? ○ When did you start? ○ What societal problem does this innovation address in your view? ○ What was your perception of the innovation before you started participating? ○ How did your perception change due to your participation?
<ul style="list-style-type: none"> • What's characteristic about being part of/using the innovation? What has been your experience so far? 	<ul style="list-style-type: none"> ○ What are current challenges that you see with regard to [the innovation]? ○ What are barriers to participation? ○ Who is most likely to participate in [innovation]? ○ How do you think [innovation] will develop further in the future? How will the "journey" go on?
<ul style="list-style-type: none"> • How has the participation in the innovation impacted (other) aspects of your life from your point of view? 	<ul style="list-style-type: none"> ○ How have your relationships with other people changed? (with whom) ○ Have there been changes with regards to the ways you think about topics/issues that have been stimulated by your participation? If so, please elaborate! ○ Which practices (in other parts) of your life have been impacted/leveraged by your participation/experience?
<ul style="list-style-type: none"> • We are also interested in some broader topics and would like to know: What current challenges do you see with regard to food production and distribution? 	<ul style="list-style-type: none"> ○ How have your relationships with other people changed? (with whom)
<ul style="list-style-type: none"> • Now that we have talked about issues in food production – Do you practice "sustainability" in other parts of your life? How do you do this? 	

* Main questions were asked broadly to allow space for interviewees to reply in any direction/delve on any topic that came to their mind. Only afterwards more detailed questions were asked if necessary to be able to focus on aspects of our research

Annex 2

Table 3 Exemplary codings

Deductive Code	Inductive Subcode	Exemplary quotes and codes
Motivation	Discontent with existing options	Discontent with existing options e.g., wanting greater participation than what is available at conventional supermarkets <i>“But it’s hard when you’re always working for someone else’s project and you don’t get to see the full, the scope of it. And so I signed up for it and then I just kept participating. So I’ve seen like all of the iterations of what this has been over the years”</i> (CS 1)
	Financial	Financial e.g., looking to save money on gardening. <i>“You need to invest a few thousand euros [...] to buy the [Kleingarten] like the, the stuff that’s already there usually [...] as there is no financial invest as the district subsidizes it, so all the advantages are on the side for this garden project.”</i> (UG5)
	Consumption	Consumption e.g. being aware of imported food and wastage. <i>“In such a country like these that you don’t have that many access to food, in general, because there’s not anything grown here like naturally it’s really important to focus on these are not wasting I’m not I’m not throwing away stuff.”</i> (TG4)
	Social	Social e.g. forming a community <i>“I miss also the proximity, I think, of having like a community. [...] And like make the community for the young kids.”</i> (CS2)
	Other motivations	Other motivations e.g. doing something good for the planet <i>“I had incentive to use it because I thought I was doing something good, you know what I mean [...] you have this feeling like you’re doing something for the planet.”</i> (TG1)
Challenges	Accessibility	Accessibility, e.g. an urban garden having mobility and language barriers <i>“The garden is definitely not wheelchair accessible for example, and i think the only two really spoken languages are German and English”</i> (UG 1)
	Outreach	Outreach e.g. the garden not being marketed well enough to the community <i>“I think they could do more marketing on it because many people are walking by having like really close looks but nobody is eager to come and just ask.”</i> (UG 1)
	Communication/Organization	Communication/ Organization e.g. disagreements over what actions the organization should take. <i>“Everybody had, of course, different ideas also what to build in a garden and what not. And then through communication of course, (?we came together, of course), in order to compromise.”</i> (UG 5)
	Commitment/Participation	Commitment/Participation e.g. forgetting how certain tasks work at the cooperative supermarket <i>“We only have to work one shifts a month every four weeks or something. I switch around to whatever shift is available [...] and because you’re not coming in every day and not doing the same things over and over, then you forget little things”</i> (CS1)
Changes	Other challenges	Other challenges, e.g. TGTG App not as convenient as originally thought <i>“It wasn’t as simple like as I thought, when we first downloaded it. Yes, maybe it’s not as convenient as they make it out to be.”</i> (TG 3)
	No major changes	No major changes, e.g. already thought about issues pertaining to waste before joining the TGTG App <i>“Trying to throw away as little as possible, or shopping in such a way that nothing ends up in the garbage, I think that was already before.”</i> (TG 2)
	Cognitive changes & learning effects	Cognitive changes & learning effects, e.g. realizing the effort that goes into growing produce <i>“If you grow for the first time a little plant by yourself, and you care for it for whole season to ripen and you can harvest it, you ask yourself or realised how it is possible to fill all the supermarket with fruits and vegetables because its so hard. Just one little tomato.... its really hard to feed the world.”</i> (UG 2)
	Mental and emotional changes	Mental and emotional changes, e.g. ideas about the ability for small actions to make a difference <i>“in the sense that these are already aspects that are relevant and where even small things can make a difference. Where I would have said before, I’m just too lazy to, that’s now just not that important to me...that has already changed”</i> (CS 4)
	Social relations	Social relations, e.g. widening the social circle beyond their normal comfort zone. <i>“Yes, I have perhaps become a bit more open through the fact that you somehow have contact with people with whom you would otherwise probably never talk and whom I would otherwise probably have quickly put into a pigeonhole where you can then reflect on your stereotypes a bit—I would say that I would now also do this more quickly in this area.”</i> (CS 4)
	Behavioral changes	Behavioral changes, e.g. other members of the garden influencing participants to fly less <i>“I think the garden really had a big impact on me in that way because they are very conscious of it and a lot of them are expert in the field so then being able to tell me exactly what impact i do have helped me to get there and at least make me think about it. [...] [I] wouldn’t fly within Germany now or Austria like those I could reach in just in a day by train, I would possibly won’t fly anymore.”</i>
	Changes in roles	Changes in roles, e.g. having ownership over food consumption through participation in the cooperative <i>“What’s working is you are taking ownership. It’s so interesting because we don’t do this, especially as a food consumer, it’s very detached from your daily life. We pay, we buy, we go home. And what I feel in the dynamic is people talk about we. [...] I buy something and feel that it’s for the community.”</i> (CS 2)

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