



Producer organizations as transition intermediaries? Insights from organic and conventional vegetable systems in Uruguay

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Abstract

Increased pressures on agri-food systems have indicated the importance of intermediaries to facilitate sustainability transitions. While producer organizations are acknowledged as intermediaries between individual producers and other food system actors, their role as sustainability transition intermediaries remains understudied. This paper explores the potential of producer organizations as transition intermediaries to support producers in their needs to adopt sustainable production practices. Ten cases of producer organizations in conventional (regime) and organic (niche) vegetable systems in Uruguay were studied qualitatively. Findings show that the classic intermediary roles that producer organizations fulfil in food systems also address the needs of producers in their transition to sustainable food systems. By providing organic inputs, organizing access to output markets, sharing knowledge, and facilitating sustainable production practices, producer organizations support producers within and across regime and niche. Producer organizations mostly function as implicit transition intermediaries, facilitated by their legitimacy among producers, their embeddedness in rural networks, and by refraining from taking a strong normative position. Producer organizations have the potential to be more explicit transition intermediaries, however this position comes with limitations. We provide policy recommendations to optimize the transition intermediary potential of producer organizations in their facilitation towards sustainable food systems.

Keywords Producer organization · Transition intermediary · Food system · Sustainability transitions · Organic agriculture · Agroecology · Vegetables · Uruguay

Abbreviation

PO Producer organization

Introduction

Agri-food systems are under unprecedented and intertwined environmental, social and economic pressures, such as climate change, ecosystem degradation, resource scarcity, population growth, and social inequalities (El Bilali 2020; Barrett et al. 2020). These pressures require sustainability transitions of dominant agri-food systems, and have

led to the rise of alternative food systems, such as organic agriculture and agroecology (Forssell and Lankoski 2014; Hinrichs 2014). There is increased attention for the role of intermediaries to catalyse transitions towards sustainable agri-food systems (Goldberger 2008; Tisenkopfs et al. 2015; Hermans et al. 2016; Betzold et al. 2018). Intermediaries bridge between actors, each with their activities, skills and resources, to build networks that can support transformative change (Gliedt et al. 2018; Kivimaa et al. 2019). Intermediaries can be various entities with different types of ownership, funding sources, governance structures, and mandates (Mignon and Kanda 2018), and they may fulfil multiple roles simultaneously. They can be specifically created for intermediation in (sustainability) transitions or they can perform classic intermediary roles in economic and societal systems, such as industry associations or advisory organizations (Watkins et al. 2015).

Producer organizations are horizontal collective action organizations of producers and they are intermediaries between producers and other food system actors, such as policymakers, service providers, sellers and buyers (World

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Bank 2007). Producer organizations can be formal or informal, and they differ in size, type of members, objectives and values, internal governance and other organizational characteristics (Bijman and Hanisch 2020). The last decade has seen an increased academic interest in producer organizations, from different disciplines (Grashuis and Su 2019). One literature stream focuses on the economic performance and impact of producer organizations, such as linking small-holder producers to global value chains through collective commercialization (Shiferaw et al. 2011). Another literature stream focuses on the ‘more-than-economic’ functions of producer organizations in providing material and immaterial benefits to members and local communities (Emery et al. 2017), for instance through contributing to sustainability movements and organizing alternative food networks (Anderson et al. 2014).

Producer organizations fulfil various classic intermediary roles in the day-to-day functioning of food systems (Poulton et al. 2010), for example as intermediary between producers and buyers in different value chains (Groot Kormelinck et al. 2019), as orchestrators of agricultural clusters (Ramirez et al. 2018), as part of agri-service hubs (Kilelu et al. 2017), and as connectors in agricultural innovation systems (Yang et al. 2014). However, to the best of our knowledge, the intermediary roles of producer organizations in a food system sustainability transition context have not been studied. Thus, whilst producer organizations are acknowledged classic intermediaries in food systems, it is not yet known to what extent they also act as so-called *transition intermediaries* (Kivimaa et al. 2019) to support their member producers in sustainability transitions.

To address this gap, the aim of this paper is to explore the (potential) roles of producer organizations as transition intermediaries. A broad interpretation of sustainability transitions is taken, including both incremental and transformative transitions. This implies that we explore how producer organizations as intermediaries support their member producers to optimize production practices in their current food system or undergo a transition from one system to the other. By taking the producer organization as the unit of analysis, a qualitative study is conducted of ten cases of producer organizations in the conventional and organic vegetable systems in Uruguay. We describe the various classic intermediary roles that producer organizations fulfil in food systems and show how these roles support sustainable production practices within and across two food systems. Subsequently, we discuss how these roles address the needs of producers to adopt sustainable production practices, and we explore the characteristics and limitations of producer organizations as transition intermediaries.

Vegetable systems in Uruguay provide a relevant research context. The vegetable sector is the second largest agricultural sector in number of producers and laborers.

The sector is characterized by small family farm producers, and is pivotal for domestic food security (Dogliotti et al. 2014; Ackermann 2014). Uruguay’s conventional vegetable systems are under high socio-economic and environmental pressures, which led many conventional producers to collapse. Latest census data showed that the number of conventional vegetable producers has declined with more than fifty percent between 2000 and 2011 (Rossing et al. 2020; DIEA-MGAP 2011). Uruguay’s organic vegetable systems have developed as a sustainable alternative to the conventional systems. With an increased consumer demand for organic vegetables, and higher and more stable prices for producers, organic vegetable systems have gradually developed over the past thirty years (Gazzano and Gómez Perazzoli 2017; Groot Kormelinck et al. 2019).

This paper aims to make contributions to both literature on producer organizations and on intermediaries in food system sustainability transitions. First, we conceptualize producer organizations as organizations that perform multiple roles within and across food systems. To address recent calls in literature on producer organizations (e.g. Forney and Häberli 2017; Papaoikonomou and Ginieis 2017; Stock et al. 2014), this paper moves beyond the dichotomy in most of the literature, where producer organizations are studied either from only an economic perspective or from only a social and political perspective. We empirically show that different producer organizations fulfil various roles in both conventional and alternative food systems, which bridge across economic and social and political perspectives.

Second, this paper contributes to the literature on producer organizations by exploring the potential of producer organizations as transition intermediaries. We show that intermediary roles of producer organizations not only take place within their current food system, but also facilitate transitions by supporting sustainable production practices from one system to the other. In addition, we assess producer organizations using four intermediary characteristics, and we discuss their contributions and limitations as transition intermediaries. This advances the understanding of intermediary roles of producer organizations in food systems, which is important considering the increased need for producer organizations to respond to sustainability challenges of their members and improve their capabilities in supporting transitions (Lucas et al. 2019).

Third, our examination of the producer organization as a specific type of transition intermediary also adds to the rapidly growing literature on transition intermediaries (e.g. Kivimaa et al. 2019). This paper responds to critique in the literature on intermediaries that, without sufficiently detailing the type of intermediary, mismatches arise between what is expected and what is actually done (Mignon and Kanda 2018).

Theoretical framework

The theoretical framework consists of three sections. The first section applies the literature on sustainability transitions to conventional and organic food systems. The second section focuses on producer organizations by discussing the two main literature stream on producer organizations, and by describing four classic intermediary roles of producer organizations in food systems. The third section provides the distinct literature on transition intermediaries by outlining roles and characteristics of transition intermediaries.

Sustainability transitions in food systems

Conventional and organic food systems

Food systems consist of interactions between actors (e.g. producers, retailers, consumers), networks (e.g. local food networks), institutions (e.g. food safety standards, innovation support policies) and infrastructures (e.g. farms, distribution centres) (Hinrichs 2014), and contain a set of activities from production to processing, distribution, retailing and consumption (Ericksen 2008). Acknowledging the importance of institutions and infrastructures, we follow Gaitán-Cremaschi et al. (2019) in operationalizing food systems into three components: (1) production; (2) value chain; and (3) institutional support.¹ Two archetype food systems form the context of our study: conventional and organic vegetable systems. Recognizing the diversity in practices in conventional and organic food systems,² we will now describe different practices in both types of food systems.

Conventional food systems consist of production systems that focus on input–output efficiency—reached through intensification by using synthetic seeds, fertilizers and

pesticides (Garibaldi et al. 2017; Levidow et al. 2014). Produce may be commercialized in a variety of value chains. Whereas commercialization in global, industrialized value chains is often emphasized, commercialization may also occur in domestic value chains, such as sales to national supermarkets (Gibbon et al. 2008; Trienekens 2011). Institutional support is provided by different actors, such as extension services, R&D and public policies. Such support is for instance directed towards the development of new inputs, training on improving output efficiency, subsidies for commodity crops, and sectoral support policies (Darnhofer 2014). Conventional food systems are widely criticized for producing unfavourable environmental and social outcomes (Buttel 2006; McMichael 2005).

Organic food systems compare favourably against conventional systems across many environmental and socio-economic sustainability indicators (Reganold and Wachter 2016). There is a huge diversity in practices and principles within organic systems, with gradients in sustainability (Pretty 2008; Shennan et al. 2017). Production practices may range from input substitution, whereby synthetic inputs are replaced for organic inputs, to the use of biodiversity ecosystem services in more holistic production systems (Ollivier et al. 2018; Titttonell et al. 2016). Commercialization may occur in global or domestic value chains, but also in local, short value chains with direct producer–consumer relations (Renting et al. 2003; Sonnino and Marsden 2006). Institutional support can be provided by actors from the conventional system, but also by dedicated NGOs and grassroots and sustainability movements oriented towards organic and agroecology (Anderson et al. 2019; Hinrichs 2014).

Transitions towards sustainable food systems

Food system transitions are often studied through the classification of niches and socio-technical regimes. Niches are considered protected spaces where alternative systems emerge, whereas regimes refer to existing sets of relatively stable practices, technologies and institutions (Geels 2019; Melchior and Newig 2021).³ Niches may induce system transitions by proposing alternatives to regimes, and replace or alter regimes (Bui 2021; Bui et al. 2016; Elzen et al. 2017). Niches may follow incremental strategies to fit-and-conform niches to the existing regime, or radical strategies to

¹ The production component refers to the farm structure and set of agricultural practices, and may comprise of cropping and livestock systems that interact with the environment (Le Gal et al. 2011). The value chain component refers to the set of actors and activities that bring a basic agricultural product from production to final consumption, whereby each stage (e.g. processing, packaging, and distribution) adds value to the product (Trienekens 2011). The institutional support component refers to structures that support producers and value chain actors to obtain knowledge, skills, capabilities and technologies, which may be provided by public policy, research institutes and extension services (Edler and Fagerberg 2017).

² In recent years, food systems have been classified based on sustainability practices that combine biotechnical functioning of farm systems with socio-economic contexts. For different classifications, see Gaitán-Cremaschi et al. (2019), Shennan et al. (2017), and Therond et al. (2017). Besides a conventional food system, these classifications include several alternative food systems. Such alternative systems are all organic but differ in production practices, type of value chains and wider food systems context (Plumecocq et al. 2018).

³ The classification of niches and regimes in the study of transitions has become prominent in key conceptual approaches: Multi-level perspective, strategic niche management, transition management, and technological innovation systems (see Markard et al. 2012; Köhler et al. 2019). The literature on food system transitions and transition intermediaries mostly uses the conceptual approaches of multi-level perspective and strategic niche management (Kivimaa et al. 2019; El Bilali 2020).

stretch-and-transform regimes (Smith and Raven 2012). System transitions may also rely on regime actors that change regimes from within, for instance by reorienting towards niche innovations (Ingram 2015; Runhaar et al. 2020). To match the empirical context of Uruguay, we classify conventional as regime, and organic as niche. Such classification is also found in other studies (e.g. Bui et al. 2016; Smith 2006, 2007). Nonetheless we acknowledge that in some contexts, organic has moved out of its niche and is appropriated or captured by the regime (Darnhofer et al. 2010), although considerable variation exists (Nikol and Jansen 2021).

Transitions to sustainable food systems generally take place over a considerable period of time (10–20 years or longer). They may occur through different transition pathways that include sustainability in production, and socio-economic and institutional policy practices connected to various food system components (Meynard et al. 2017; Marsden 2013).⁴ Producers may adopt sustainable production practices within the current food system, or undergo a transition from one system to the other. For instance, producers may adopt sustainable production practices within their conventional food system by lowering the use of synthetic inputs in integrated pest management systems (Pretty and Bharucha 2015), thereby following incremental, sustainable intensification pathways (Struik and Kuyper 2017; Weltin et al. 2018). Producers may also convert from conventional to organic systems by replacing synthetic inputs by organic inputs in input-substitution systems (Lamine 2011). In addition, producers may adopt sustainable production practices within organic systems, for instance by moving from input substitution to the adoption of ecosystem services (Bommarco et al. 2013; Tittonell et al. 2016)—thereby following more transformative (agro)ecological pathways (Dumont et al. 2020; Wezel et al. 2020).

Depending on the sustainable production practices they adopt and transition pathways they follow, producers need different kinds of support related to the various food system components. Producers need access to non-synthetic seeds, fertilizers and pesticides. They may also need knowledge

and skills on crop diversification and rotation, biological pest control, management of soil fertility and nutrients, and conservation of energy, water, biodiversity, and landscape (Shennan et al. 2017; Therond et al. 2017). Knowledge and skills may be needed about how to add sustainability value to products, and commercialize these successfully in value chains, for instance through selling to traditional regime actors or by creating new markets such as organic street markets or boxing schemes (Anderson et al. 2019; Morgan and Murdoch 2000). For fulfilling these needs, producers often need institutional support. Producers may participate in innovation projects, receive training and extension on sustainable production practices, and benefit from an established certification system and favourable sustainability policies (Hermans et al. 2016; Laforge et al. 2017). Producer organizations, as collective organizations of producers, may support producer members to meet their needs to adopt more sustainable practices.

Producer organizations in food systems

Producer organizations

Two streams of literature on producer organizations can be distinguished. The first stream is rooted in organizational economics and focuses mostly on formal producer organizations, such as cooperatives, as object of study. Recent years have seen an increase in studies (for an overview, see for instance Bijman and Hanisch 2020; Grashuis and Su 2019; Luo et al. 2020). Producer organizations are conceptualized based on their user-owned, user-controlled, and user-benefit principles (Dunn 1988). Studies use theoretical approaches from new institutional economics, with applications of transaction cost economics, property rights theory, and collective action theory (Cook 1995). Main topics under study are the evolution and survival of producer organizations (Cook 2018; Grashuis 2020), the weak incentives for members to invest in their cooperative (Cook and Chaddad 2004), the performance of producer organizations as businesses (Grashuis and Su 2019; Soboh et al. 2009), and internal governance structures of cooperatives (Bijman et al. 2014). Of particular policy and academic attention is the role of producer organizations in linking smallholder producers to modern value chains in developing and transition countries (Markelova et al. 2009).

The second stream is rooted in sociology and political economy and deals with a large variety of formal and informal producer organizations. Producer organizations are conceptualized based on the cooperative principles of

⁴ Three main transition pathways are sustainable intensification, ecological intensification, and agroecological intensification. Although the boundaries among these pathways are not always clear-cut (Therond et al. 2017), general differences are recognized. Sustainable intensification may include any intensification practice with a sustainability component, and is more general and widely used—often associated with more incremental transitions in regimes. Ecological intensification and agroecological intensification have more nuances and sharper definitions, and focus on the role of nature in system design and synergies with livelihoods, food security and other system components, such as social, cultural and economic relations with food system actors based on principles of food sovereignty, justice, and fairness (for reviews, see Mockshell and Kamanda 2018; Tittonell 2014; and Wezel et al. 2015).

the international cooperative alliance,⁵ which emphasize the democracy, solidarity, and autonomy principles that underpin (transformative) collective action. The last decade has seen an increase in studies on producer organizations that contribute to alternative food systems.⁶ Studies use actor-network theory (e.g. Goodman 1999) and social capital theory (e.g. Tregear and Cooper 2016), sometimes combined with political economy theories when dealing with grassroots sustainability movements and alternative food systems (Goodman et al. 2011). Main topics include the social, cultural, ethical and other values-based roles of producer organizations for their members and their communities, thereby promoting bottom-up agrarian-based, sustainable rural development (Marsden et al. 2002; Ortiz-Miranda et al. 2010).

The two literature streams have often been positioned as a reductionist dichotomy, with each stream relying on a different logic for collective action. While in one stream the producer organization is conceptualized as a jointly-owned enterprise, in the other stream the producer organization is seen as a social, solidarity and community organization. Particularly the second stream positions itself opposite the first stream by emphasizing the small size of the organization, the democratic and solidarity values, and the sustainability inherent in the organization. This second stream of literature often studies the role of producer organizations in short food supply chains, alternative food systems, and wider social movements (Anderson et al. 2014; Fonte and Cucco 2017; Mooney 2004). However, even within this stream, some authors doubt whether the alternative perspectives on collective action in food systems are truly different from the economic perspectives they challenge (e.g. Hinrichs 2003; Papaoikonomou and Ginieis 2017). In addition, scholars have argued against a reductionist and simplified dichotomy, for instance by warning for romanticization (Stock et al. 2014).

Following a plea for converging perspectives in studies on producer organizations (Forney and Häberli 2017), we look for complementarity between the two streams and find three main areas of correspondence. First, both streams study social mechanisms that facilitate cooperation, often conceptualized as social capital. In the first stream, researchers focus on trust (e.g. Groot Kormelinck et al. 2016), and commitment (e.g. Cechin et al. 2013), whereas in the second stream social capital relates to embeddedness of producer organizations and their members in local communities and

networks (e.g. Tregear and Cooper 2016). Second, both streams position producer organizations in a value chain by emphasizing their interdependence with other food system actors. In the first stream, this is particularly shown in studies on how producer organizations operate and survive in increasingly complex global value chains (Markelova et al. 2009), whereas in the second stream, this is studied through local, short value chains, for instance by establishing direct producer–consumer relations (Papaoikonomou and Ginieis 2017). Studies that bridge across the streams show how both large producer organizations in mainstream food systems (De Herde et al. 2020; Forney and Häberli 2016, 2017), and small producer organizations in alternative food systems, such as in organic (Groot Kormelinck et al. 2019), redesign and align economic activities with different social and sustainability objectives. Third, both streams study the impact of producer organizations on local communities as well as the contribution to wider rural development. For instance, a large number of studies in the first stream investigate inclusiveness of producer organizations and the impact of membership on producer livelihoods and rural development outcomes, such as improvements in income, employment, food security and gender equality (Bijman and Wijers 2019; Bizikova et al. 2020; Mwambi et al. 2020). In the second stream, benefits to community and rural development are at the core of all studies (Wynne-Jones 2017; Emery et al. 2017).

Classic intermediary roles of producer organizations

Given the complementarity in approaches that study roles of producer organizations in food systems, we suggest, based on a transversal reading of the literature, that producer organizations can perform up to four classic intermediary roles. First, producer organizations *provide market access* by operating as intermediaries in the value chain between producers and input suppliers or output buyers. Through pooling of resources, achieving economies of scale, increasing bargaining power, coordinating compliance to buyer requirements, bulking production, setting common quality standards, processing and packaging, producer organizations provide better market access for producers (World Bank 2007). Producer organizations may provide market access in efficiency-driven global value chains (Fałkowski et al. 2017; Shiferaw et al. 2011), or in local, short food chains through direct producer–consumer relations that are based on socio-environmental values (Ajates Gonzalez 2017; Anderson et al. 2014).

Second, producer organizations *facilitate production support* by operating as intermediaries between producers and providers of inputs and services, such as financial service providers, manufacturers of production inputs, research, knowledge and extension agencies (Poulton

⁵ www.ica.coop. Retrieved, June 21, 2021.

⁶ Two special issues have been devoted to roles of producer organizations, particularly in their contributions to alternative food system initiatives: in the *Journal of Agriculture, Food Systems, and Community Development* (Anderson et al. 2014), and the *Journal of Rural Studies* (Emery et al. 2017).

et al. 2010). Producer organizations have greater credibility in service delivery than individual providers, and may fill market voids through lowering transaction costs and benefiting from economies of scale, as well as supporting knowledge exchange among producers (Penrose-Buckley 2007). Producer organizations may facilitate producers' access to new production technologies and to capacity development on these new technologies (Shiferaw et al. 2011). Such production support include, for instance, the promotion of different sustainable production practices by informal producer collaboration (Wynne-Jones et al. 2020), through knowledge exchange and machinery sharing in formal cooperatives (Lucas et al. 2018), or through attracting external financial support for projects that promote sustainable practices (Iyabano et al. 2021).

Third, producer organizations *lobby for policy support* by operating as intermediaries between producers and institutional actors, such as national, regional or local governments. Producer organizations may lobby for favourable agricultural policies, such as market protection or subsidies for specific crops (World Bank 2007), or for policies to promote sustainable production practices. Lobby can be carried out at local scale by producer organizations themselves, or at national scale by unions and federations (Hanisch 2016). Producer organizations can also participate in political lobbying for social and environmental agendas, for instance as part of sustainability and food sovereignty movements (Fonte and Cucco 2017; Ajates Gonzalez 2017).

Fourth, producer organizations *contribute to community development* by operating as intermediaries between producers and other members of local communities in which they are embedded. This role of producer organizations may be based on formal legislation and on producers' intrinsic values (Emery et al. 2017; Forney and Häberli 2017). Through grassroots approaches, producer organizations may engage in providing social, economic, cultural and environmental benefits to communities. Through their activities and by using their local knowledge and social capital, producer organizations may provide employment, education, knowledge sharing and other welfare services (Tregear 2011; Tregear and Cooper 2016). De los Ríos et al. (2016), for instance, show how the multi-faceted strategy of an organic cooperative contributes to prosperity and development in communities. Producer organizations may also be part of wider grassroots approaches to sustainable rural development, for instance by engaging in communal natural resource management (Moragues-Faus and Sonnino 2012).

Since our aim is to explore what roles producer organizations fulfil in transitions, going beyond their classic intermediary roles, the next section explores the separate literature on transition intermediaries.

Transition intermediaries: roles and characteristics

The transition intermediary literature studies a great variety of intermediary organizations and transition contexts. As a result, this literature outlines the numerous roles that transition intermediaries can play (Gliedt et al. 2018; Mignon and Kanda 2018). In a meta-study on intermediary roles, Kivimaa (2014) distinguishes three main roles. First, transition intermediaries help *articulate expectations and visions*, such as strategy development, advancement and commercialization of new technologies, and advancement of sustainability aims. Second, they help *build social networks*, such as the creation and facilitation of networks, gatekeeping and brokering, configuring and aligning interests, managing financial resources, and identifying human resources. Third, transition intermediaries *facilitate knowledge exchange and support learning processes*, such as information gathering and dissemination, technology assessments and piloting, communication, and providing advice, training, and education.

Transition intermediaries typically differ from classic intermediaries in four characteristics: (1) Level of action; (2) Emergence; (3) Goal of intermediation; and (4) Normative position (Kivimaa et al. 2019). Transition intermediaries may fulfil multiple roles simultaneously at different *levels of action* within or across regime and niche. Their roles may be non-systemic, such as facilitating multiple bilateral relations for accessing resources or conducting activities, or take place at low aggregate system levels, such as connecting various local grassroots projects. Roles may also take place at high aggregate system levels, such as through brokering many-to-many-to-many relationships, for instance through agenda setting, and building legitimacy and coalitions across several networks of actors (Kanda et al. 2020).

Regarding their *emergence*, whereas some intermediaries are specifically set up to facilitate transitions, others are existing organizations that grow into an intermediating role during the transition process, or may even intermediate without being aware of it—for instance through day-to-day activities in projects (Kivimaa et al. 2019). Transition intermediaries pursue a transformative *goal of intermediation*, for instance promoting sustainability goals to maintain the status quo of a regime, to disrupt a regime, or to promote a certain niche (Matschoss and Heiskanen 2017). They do this by influencing opinions and advocating new policies, promoting an explicit system-level transition agenda, setting standards, scaling up local projects, or brokering partnerships beyond the niche (Hargreaves et al. 2013; Mignon and Kanda 2018). Hence, while transition intermediaries may sometimes be considered a neutral

broker, they are often associated with having a *normative position* regarding the system they intermediate, such as a strong intent to drive sustainability transitions (Klerkx and Leeuwis 2009).

We draw from this review that there are (potential) overlaps between classic intermediary roles of producer organizations and transition intermediaries' roles. For example, in view of the classic intermediary roles discussed in the previous section, activities such as lobby and community development support seem akin to transition intermediary roles.

Materials and methods

Research context

Uruguay's conventional vegetable systems have a long history and reflect a typical regime that is under high socio-economic and environmental pressures (Rossing et al. 2020). Over the past twenty years, production systems have experienced mechanization and intensification processes. Due to an increased use of external inputs, environmental problems arose, such as soil degradation, biodiversity loss, and water contamination (Colnago et al. 2021). Producers sell vegetables through traders to the wholesale market, after which the products are sold in domestic supermarkets, small retail outlets and street markets. With long and not transparent value chains and supply that exceeds demand, producers have a weak bargaining position and receive low and fluctuating prices (Groot Kormelinck et al. 2019). Institutional support is provided by the ministry of agriculture and other public agencies. Support is targeted at family producers and their organizations (MGAP-Opypa 2017), such as extension services for new crop varieties and public procurement by institutional buyers. Uruguay's cooperative law (2008) stipulates two types of agricultural producer organizations: rural support associations and agricultural cooperatives. Both type of organizations have their interests represented by unions and a confederation of unions (FIDA and CCU 2014).

Uruguay's organic vegetable systems are a sustainable alternative to conventional systems. Around 140 certified organic vegetable producers existed in 2017, which is around three percent of all vegetable producers. Nonetheless, actual numbers are likely to be higher due to the sector being largely informal (Gazzano and Gómez Perazzoli 2017).⁷

⁷ Not all organic farmers are certified, for instance because do they do not sell in a value chain that requires certification, or because producers farm organically by default (i.e. without being aware of it) (Gazzano and Gómez Perazzoli 2017).

⁸ Organic vegetable systems in Uruguay are often defined through the agroecology principles they are based on, which includes organic production, but entails wider environmental, economic and social

Besides omitting synthetic inputs, producers adopt a variety of sustainability practices (Rossing et al. 2020).⁸ A number of formal and informal producer organizations sell in different short food chains, such as through organic shops, street markets or boxing schemes, or in conventional supermarkets. Vegetables are sold for their sustainability value, and with demand exceeding supply, producers have a stronger bargaining position and receive higher and more stable prices compared to conventional producers (Groot Kormelinck et al. 2019). Since the turn of the century, institutional support arose from emerging niche actors. A key actor is the Agroecology network, a multi-stakeholder organization that provides participatory certification, lobbies for sustainability policies, and provides other social and networking functions in the niche. Other niche actors are sustainability-oriented NGOs and food movements, agroecological consumer associations, and creole seed networks. Despite interviewees indicating a lack of systemic and tailored support by regime actors, in recent years regime actors increasingly support the niche food system (Gazzano and Gómez Perazzoli 2017). A milestone was the approval of the national agroecology law in 2018 by the ministry of agriculture, which is implemented by a commission consisting of regime and niche actors, including representation of producer organizations.⁹ Besides national legislation, also at regional and zonal level, tailored sustainability policies emerge in response to local sustainability problems, and bridge across regime and niche.

Study design, data collection and analysis

A qualitative multiple case study design was applied, because our aim was to explore the diversity and multiplicity of intermediary roles that various producer organizations may fulfil within and across two food systems. Qualitative case studies are common in research on the contribution of producer organizations to conventional (e.g. De Herde et al. 2020; Forney and Häberli 2017) and organic food systems (Ajates Gonzalez 2017; de los Ríos et al. 2016). We followed an abductive approach through an iterative interplay between collecting and analysing data, developing the theoretical framework, and advancing findings and discussion (Thornberg 2012; Kennedy 2018).

Data collection occurred in two field visits. The first field visit was conducted in August 2016, with the aim to sample

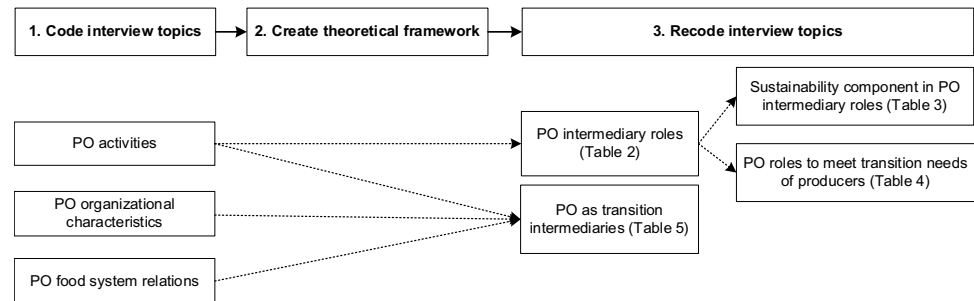
Footnote 8 (continued)

sustainability principles (Anderson et al. 2019). See Gazzano and Gómez Perazzoli (2017) for the evolution of organic and agroecological niche food systems in Uruguay.

⁹ For more information, see www.planagroecologia.uy and Gazzano and Gómez Perazzoli (2017). For more information about the Agroecology network, a key initiator behind the agroecology law, see www.redagroecologia.uy/.

Table 1 Interviews with producer organizations and food system actors

Food system	Producer organization (N=20)	N	Food system actors (N=15)	N
Conventional	Type 1. Rural Support Association	4	Ministry (2); Research institute (1); Buyers (1); Cooperative confederations (3)	7
	Type 2. Marketing cooperative with institutional contract	4		
Organic	Type 3. Informal producer group with direct sales	4	Ministry (1); Research institute (1); Buyers (1); Agroecology network (2); Creole seeds network (1); Agroecology consumer associations (1); Sustainability NGO (1)	8
	Type 4. Marketing cooperative with its own shop	4		
	Type 5. Marketing cooperative with supermarket contract	4		

Fig. 1 Three steps in data analysis and conceptualization

producer organizations cases. For a first exploration and for the identification of different producer organizations, we interviewed four representatives of producer organizations and two academic researchers on food systems (one focused on conventional, the other on organic food systems). Interviews (30–60 min duration) were complemented with information found in scientific articles and sector reports (Appendix Table 6). On the basis of this information, we developed a mapping of different types of producer organizations in the two food systems. The mapping served as a frame for maximum variation sampling, which is useful to describe a phenomenon in all its variations (Patton 2015)—in our case, to yield a broad understanding on various roles of producer organizations in different food systems. The mapping also helped to develop a typology of producer organizations, to explore organizational characteristics and challenges of producer organizations as transition intermediaries. We classified producer organizations into five types based on (i) the dominant production system of the members (conventional or organic), (ii) their legal status, and (iii) the value chain used by the producer organization. Appendix Table 7 shows the organizational characteristics of the types of producer organizations. We selected two cases for each of the five types. For type 2, 4, and 5, only two producer organizations were active at the time of sampling, and thus were automatically selected. For type 1 and 3, two producer organizations were selected based on information obtained in the first set of interviews; we particularly looked for variation in the activities and geographical location of the organizations.

In the second field visit, between November 2016 and March 2017, data were collected through semi-structured interviews with representatives of producer organizations

($N=20$) and food system actors ($N=15$). Interviews were held with two members per producer organization: one regular member and one coordinating member (for instance coordinating with buyers and institutional actors). Data from interviews with producer organizations were complemented with data from interviews with food system actors. Food system actors were selected based on the interviews with members of producer organizations that indicated their food system relations. These actors were the ministry of agriculture, research institutes and buyers in both food systems, cooperative confederations in the conventional system, and specific actors focused on sustainability support in the organic food system. Table 1 provides an overview of the interviews.

Producer organizations were asked about their (1) *Activities* (what activities, for whom, with what objective, and with which sustainability component); their (2) *Organizational characteristics* (general characteristics, sustainability objectives and values, and internal challenges to execute activities); and their (3) *Relations with food system actors* (which actors, type of relation, type of support). These topics were also used for food system actors, tailored to their relations with various producer organizations (Appendix Table 7 for the topic list). Interviews lasted between 1 and 1.5 h, whereby all interviewees gave verbal consent to record the interview and use the information for research purposes. Interview recordings were transcribed by a native Spanish speaker. Data from the interviews were complemented with secondary data, such as news articles, reports, and other documents on activities of producer organizations and support projects. Figure 1 shows the process of data analysis and conceptualization.

Following the principles of good abductive research (Dubois and Gadde 2002; Kennedy 2018), data analysis and conceptualization occurred in three steps. In the first step, interviews and secondary data were coded by the principal researcher, using Atlas.ti, through qualitative content analysis (Schreier 2012). Data were coded following the structure of the interview topic list, whereby topics for the interviews with producer organizations were categorized into three main groups: their activities, organizational characteristics, and their relations with food system actors (also see Appendix Table 8). Following the structure of the topic list, summary analysis reports were written in English, one for each producer organization case and two for each of the food systems, in which organizations were anonymized. In addition, a document was made containing quotes from interviews with producer organizations and food system actors. The quotes serve an illustrative purpose, i.e. to make this papers findings insightful by using examples from different cases. In the second step, a literature review was conducted to develop the theoretical framework.

In the third step, the theoretical framework was used to recode our data and generate findings tables (Tables 2, 3, 4, 5). First, the four classic intermediary roles of producer organizations were used to recode activities of producer organizations. Second, the literature on sustainability transitions in food systems was used to further assess the intermediary roles of producer organizations, focussing on (i) their sustainability component and (ii) how these roles address needs of producers in transitions. Third, the four characteristics of transition intermediaries were used to conceptualize producer organizations as potential transition intermediaries. Appendix Table 9 provides the coding rules that were used for both rounds of coding. The four tables that resulted from our analysis and conceptualization form the structure for the findings and discussion sections.

Findings

This section first describes the classic intermediary roles of producer organizations in food systems, followed by an analysis on the sustainability component in the intermediary roles of producer organizations. The findings end with the contributions and challenges of producer organizations in fulfilling such intermediary roles in food system transitions.

Classic intermediary roles of producer organizations in food systems

First, the roles that producer organizations fulfil in vegetable systems in Uruguay are presented. Activities of producer organizations are shown in Table 2, classified for the four classic intermediary roles of producer organizations in food

systems. Subsequently, roles are described for each of the five producer organizations.¹⁰

PO1, the rural support association, is the principal territorial organization that brings together all types of agricultural crop and livestock producers and their families, including conventional and organic vegetable producers. This producer organization is established based on public incentives. As institutionalized by law, this producer organization channels government funds to members, for instance for inputs provision, technical assistance, and capacity development. This producer organization does not commercialize members' products. Through their union, the organization lobbies for additional policy support, for instance for promoting family farms. In addition, the producer organization plays a role in rural community development, by organizing activities that improve social cohesion, such as activities for rural women or young farmers. As part of being a public support channel for its members, this producer organization has relations with conventional food system actors, such as the ministry, public extension, and research institutes, and with niche actors, such as the Agroecology network and organic producer organizations. Such relations are sometimes directly (e.g. at regional level, through membership in rural development boards), sometimes indirectly (e.g. at national level, through a union).

PO2, the marketing cooperative with institutional contract, consists of conventional producers that have been self-organized as part of a public procurement instrument to sell to institutional buyers, such as schools and prisons. The members know each other from PO1 and have created a formal cooperative as spin-off, in response to requirements of the public instrument. The producer organization has a three-party contract with institutional buyers and the government. For its market access role, the organization provides production support to its members by planning and coordinating production. The producer organization does not lobby, nor does it have a particular community development role. Beyond coordination with buyers and the ministry in the conventional food system, the producer organization does not have systemic relations with other actors in the conventional or organic food system.

PO3, the informal producer group with direct sales, consists of organic producers that sell to consumers in local organic street markets. The producer organization is self-organized to create short organic value chains that facilitate direct interactions with conscious consumers based on the principles of food sovereignty, fairness and equity. Producers know each other through informal networks of local organic producers or formal networks, such as the Agroecology

¹⁰ We present findings per producer organizations type, thus including two cases per type. We refer to these types as PO1, 2, 3, 4 and 5.

Table 2 Classic intermediary roles of producer organizations in vegetable systems in Uruguay

PO roles	POs in conventional food system	POs in organic food system
Market access	Commercialize to public institutions (PO2)	Commercialize in street markets, boxing schemes (PO3); own organic shop (PO4); conventional supermarket (PO5) Experiment with organic fruit import, making convenience foods and preserves (PO5) Produce organic inputs (PO5)
Production support	Coordinate production (PO2) Channel support funds from government (PO1)	Coordinate production (PO4, PO5) Exchange information, share machinery, buy inputs (all)
Lobby for policies	Indirectly through union that lobbies for family farm policies (PO1)	Indirectly through membership in organization that lobbies for sustainability policies (all)
Community development	Build networks of producer families (PO1)	Participate in research and knowledge sharing activities for sustainability (all) Communicate with consumers about sustainability principles (all)

network. The value chains require limited internal production planning and coordination, but members indicated they informally exchange production information and machinery, and sometimes they produce organic seedlings or pest control inputs together. Such exchange is not always limited to the organization, and producers are often member of several groups that sell in different markets. For instance, producers sell in an informal group in a weekly organic street market, sell as part of an organic cooperative in their own shop (PO4), and also sell organic vegetable boxes individually. When selling directly to consumers, the producer organization informs its consumers about the sustainability principles, which are based on agroecology. The producer organization occasionally participates in research and knowledge sharing activities, such as seminars, workshops and farm visits. The producer organization has received support from both conventional (e.g. ministry) and niche actors (e.g. sustainability NGO). As the social and relational nature of their participation in food system is part of their sustainability objectives, members discuss in which niche activities they want to participate, such as the Agroecology network, creole seed networks, and agroecological consumer associations.

PO4, the marketing cooperative with its own shop, consists of organic producers that have united formally to sell together and directly to consumers in a collectively-run organic shop in Montevideo. The producer organization is self-organized, based on producers knowing each other from PO1 and from selling in organic street markets (as part of PO3). Producers have opened a shop to have an outlet for their perishable vegetables on non-market days. The producer organization rents the shop and hires a manager as well as sales and administrative staff. The organization coordinates its commercialization and production planning with the shop manager. Members visit each other's farms, and discuss production information, for instance on where to purchase inputs. The producer organization buys part of its supplies from other producers. In addition, it also sells part of its vegetables in other

markets, as part of a PO3 group. For their establishment, the producer organization received support from actors in the conventional (ministry, research institute), and niche food system (sustainability NGO). The producer organization has sustainability objectives based on agroecology principles but also seeks efficiency in its operations. Initially, producers themselves were present in the shop to engage with consumers, but for efficiency reasons they hired a shop manager—which reduced their interaction with consumers. The producer organization has relations with various organic food system actors (e.g. the Agroecology network), and occasionally participates in research and knowledge sharing activities.

PO5 is a marketing cooperative with a supermarket contract. Organic producers have established a formal cooperative to sell organic vegetables to a conventional supermarket. Members knew each other from PO1, where they started with experiments in sustainable production practices—which eventually led to the establishment of their organic producer organization. The producer organization has a high level of coordination, both internally as well as with the supermarket, such as detailed production planning and coordination for an almost daily supply, with a wide range of crops and high visual quality. Producers sell most of their produce to the supermarket, whereas lower quality vegetables are sold in other value chains, often through informal relations with members of organic PO3 and PO4. The producer organization is experimenting with importing organic fruits, making and selling preserves from lower quality produce, and processing vegetables into ready-made salads. Additional activities entail buying inputs and materials, and the production of organic pest control inputs. For these activities, the producer organization often received temporal support from both conventional and organic food system actors. Engagement with conscious consumers is indirectly, for instance through consumers who call them or visit their farm. In its sustainability objectives, the producer organization has a

commercial orientation of organic as a sustainable business opportunity, but the organization increasingly moves towards agroecology principles. The producer organization engages with organic food system actors, such as the Agroecology network, and participates in research and knowledge sharing activities.

Roles of producer organizations to support sustainable production practices in food systems

While above we described the classic intermediary roles of producer organizations in food systems, in this section we explore how the roles of producer organizations support sustainable production practices. Table 3 shows the classic intermediary roles of each producer organization in its respective food system as well as cross-linkages, such as an organic producer organization supporting producers in the conventional food system and vice versa.

Support to producers from conventional producer organizations

Support to producers in each food system differs for the two conventional producer organizations. PO2 focuses on creating market access in the conventional food system and provides no activities that support sustainable production practices within the conventional or the organic food system (and is therefore not included in Table 3). The conventional PO1 supports sustainable production practices in both the conventional and organic food system through various roles. This producer organization contributes to the *conventional food system* through its production support projects, of which some have a sustainability component. For instance, projects experiment with sustainable production practices. Such support has led to conventional producers adopting

integrated pest management, which relies on fewer pesticides as compared to conventional production.

These support projects of PO1 also seem to contribute to the *organic food system*. Interviewees from both conventional and organic producer organizations indicated that PO1 has had several support projects, such as trials with organic production, the production of organic pest control inputs, or the development of a native seed bank. An example of this is the following statement of one member: “*We have mostly conventional members, but we conduct some projects related to organic and agroecology. These are small initiatives, but we try to work on sustainable production practices and build relations with organic producers.*”

Eventually, such projects led to spill-overs and led to the conversion of farms – resulting in the first organic producers in Uruguay. As this organic producer organization states in this regard: “*We were members of the local producer organization [PO1] and started a small project with trials on organic production. Only a few members were interested, but we saw the results and attracted more support projects. Eventually we converted to fully organic, and more and more conventional members wanted to follow.*” Several organic producer organizations have emerged from support projects by conventional PO1.

PO1 also provides support for producers in the organic food system in other ways. Because of their family farm character, organic producer organizations can make use of the support projects that the union of PO1 successfully lobbied for, such as experiments with more sustainable production practices within the niche. This is important considering the lack of structural support for the organic food system—as reported by organic producer organizations and organic food system actors. In addition, PO1 is open to all kinds of members, including organic producers. Interviewees indicated that networking and social activities as facilitated by PO1 promote exchange and learning between conventional and organic producers. In addition, conventional

Table 3 Roles of POs to support sustainable production practices in vegetable systems in Uruguay

	Conventional producer organizations	Organic producer organizations
Conventional food system	Production support: Experiment with sustainable production practices; produce organic pest control inputs (PO1)	Production support: Share knowledge about organic production and commercialization with conventional producers (all) Market access: Sell organic pest control inputs to conventional producers (PO3, PO5)
Organic food system	Production support: Support for organic production (PO1) Lobby: Participate in Agroecology commission; Facilitate support projects that are also used by organic producer organizations (PO1) Community development: Network and conduct social activities that promote interaction and exchange (PO1)	Market access: Create new organic markets (all) Community development: Share knowledge on sustainable production practices with consumers and other food system actors (all)

producer organizations exchange knowledge and experiences with organic producer organizations, sometimes formally through farm visits and workshops, sometimes informally among producers. Besides, some PO1 members have joined the Agroecology network, and the PO1 union is the only conventional representation of producer organizations in the commission to implement the national agroecology law.

Support to producers from organic producer organizations

Organic producer organizations support producers in the *organic food system* by creating new value chains for organic produce and by producing organic production inputs. The three organic producer organizations have been established bottom-up by members, to meet the needs of producers for inputs and output markets. This is illustrated by the following quote of an organic member: *“When we converted, we knew the need to commercialize directly. With a niche product, you can’t sell in the speculative wholesale market and wait for traders to come to your farm. So we united ourselves to get scale and opened our own shop.”* The three organic producer organizations created various value chains that are in line with different sustainability objectives, such as agroecology-oriented direct producer–consumer relations in short value chains, e.g. selling in street markets (PO3) and in their own shop (PO4), as well as more commercial-oriented sales of organic vegetables to conventional supermarkets (PO5).

Organic producer organizations have also started to produce organic seedlings and pest control inputs because such inputs were not available when they started. In addition, within the producer organization, producers exchange production experiences and techniques and collectively search for extension services, training, and certification. Knowledge about organic production is also shared with other actors in the food system, including consumers. For instance, producer organizations host farm visits, participate in diverse research and knowledge sharing events, and add information for consumers when selling their products. According to a conventional PO1 member, organic producer organizations have multiple relations with conventional and organic food system actors: *“Organic producer organizations are better than us in linking with others. They go beyond sustainable production, and build relations with consumers, with sustainability movements, with others (...) perhaps because they have a more holistic view on building relations collectively in the food system.”*

Organic producer organizations support producers in the *conventional food system*. For instance, they are members of the same PO1, or they participate in local networks of conventional and organic neighbours. Such interaction has led to sharing their knowledge about producing and commercializing organic vegetables. As this conventional producer in conversion to organic states: *“The local organic cooperative helps us a lot with our conversion. We already knew*

them, but when we started the conversion, we speak to them more frequently. This goes very informally; we just call them each time when we have a question.” Some of the organic producer organizations engage in knowledge generation and sell organic inputs to conventional producers, which is illustrated by this quote: *“We had a public research project to test which of our organic pest control inputs are most suitable for conventional production. Conventional producers said they had never heard of such inputs before, started to apply it, and saw the results. They got so convinced, that we now sell 95% of our inputs to conventional producers.”*

Contributions and challenges of producer organizations in fulfilling intermediary roles

The previous section has shown that in addition to their classic intermediary roles, producer organizations also support sustainable production practices in the current food system and create spill-overs across conventional and organic food systems. Interviews with members of producer organizations and food system actors revealed that producer organizations are considered legitimate to represent producer interests to other actors in the food system. As an organic member says: *“What other person would be more suitable to promote organic than the one who sows, who plants, who lives that life every day?”* However, producer organizations do not seem to pursue such sustainability support roles to non-members as part of their objectives. This is illustrated by the following quote of an organic member: *“We help when we are asked to do so, for example when a conventional producer approaches us, or to school talks. It gives us a lot of motivation. But as an organic cooperative, we don’t consider it our role to promote the conversion of conventional producers or promote wider changes. We don’t have it institutionalized in our cooperative activities.”*

Despite their contributions in providing sustainability support, producer organizations face several challenges. Members emphasize limitations in time and skills, as stated by this interviewee: *“We are primarily producers who need to earn our family income by producing and going out to sell. It’s difficult enough already to successfully produce and commercialize. We don’t have the time or skills to be also a generator of knowledge and to be political and promote organic. Other organizations are much better in doing that.”* Besides lack of time and skills, different interviewees indicated they do not have the interest to participate directly in more political and institutional arenas, because it lies outside their comfort zone. Members also indicate to face challenges in providing sustainability support because of their type organization. In the words of this interviewee: *“For commercializing our vegetables, we need to make quick decisions. It helps to be small and have high internal coordination. If we would need to lobby for organic policies, it would be much better to have a larger organization that represents more diverse interests.”* Another

organizational challenge is that organic members indicated the difficulty to have a united vision about the type of sustainability practices to promote. Organic producer organizations consist of members who converted from conventional production and consider organic as a business opportunity from which they earn a living, whereas other members have more values-based or politicized visions. Such heterogeneity leads to discussions, and several producer organizations have reported members leaving the organization.

Thus, even though producer organizations make several (unintended) contributions, as intermediaries that support sustainability practices, they are not without challenges. This leads to the next section, in which we discuss the potential of producer organizations to function as transition intermediaries in food systems.

Discussion

In this section, we move from our empirical findings to a broader discussion. We first discuss how classic intermediary roles of producer organizations may address transition needs of producers. Next, we explore the potential of producer organizations as transition intermediaries by assessing their roles and characteristics in transitions. We end with discussing the limitations that producer organizations face as (potential) transition intermediaries.

How classic intermediary roles of producer organizations address transition needs of producers

Classic intermediary roles of producer organizations address the needs of producers to adopt more sustainable

production practices within the regime (conventional), the niche (organic) and across systems to differing extents. Table 4 compares our findings on the classic intermediary roles of producer organizations in conventional and organic vegetable systems in Uruguay with the transition needs of producers to adopt more sustainable production practices. These needs of producers are based on the literature review on food system transitions in the theoretical framework, and are structured following the food system operationalization by Gaitán-Cremaschi et al. (2019) into three system components: production, value chain, and institutional support.

For the *production* component, the conventional PO1 and the three organic producer organizations, through their support projects and (informal) exchange of experiences within and outside the producer organizations, contribute to knowledge and skills of producers on sustainable production practices. Multiple organic producer organizations engaged in support projects, leading to production of organic inputs (seedlings, pest control products), which are sold to organic and conventional producers. This contributes to meeting needs of producers for non-synthetic production inputs (Lamine 2011; Therond et al. 2017).

For the *value chain* component, four out of five producer organizations (PO2–5) have self-organized to create output market access. Whereas the conventional PO2 does not play a transition role, the three organic producer organizations—with external support from regime and niche actors—have created value chains to fill a market void, as no organic value chain existed. Organic and conventional producer organizations also exchange experiences about commercialization, for instance on how to coordinate production internally and meet buyer requirements. This meets the needs of producers

Table 4 Exploring how producer organizations address transition needs of producers

System components	Transition needs of producers ^a	Producer organizations' classic intermediary roles in vegetable systems in Uruguay
Production	Knowledge on inputs substitution and other sustainable practices ^b Access to non-synthetic seeds, fertilizers, pesticides	Production support: Experiment with sustainability practices. Exchange knowledge among members Market access: Produce and sell organic inputs
Value chain	Access to value chains that differentiate sustainability of produce Knowledge on how to add sustainability value ^c	Market access: Create organic value chains in line with sustainability objectives Market access: Exchange information with value chain partners and other producers
Institutional support	Policies to support sustainability practices Certification and standards Sustainability-focused research and extension	Lobby: Participate in lobby organizations for enabling policies and support projects Production support: Participate in setting up certification schemes. Participate in projects that support the production and value chain components

^aBased on Morgan and Murdoch (2000), Smith (2006), Darnhofer (2014), FAO (2015), Shennan et al. (2017), Therond et al. (2017), Gaitán-Cremaschi et al. (2019), Anderson et al. (2019)

^bFor instance on crop diversification, biological pest control, management of soil, energy, water, biodiversity, landscape

^cFor instance on how to commercialize organic products successfully and comply with certification requirements

to successfully supply to various value chains that are built on different sustainability objectives, for instance the shift from selling in regime-oriented conventional supermarkets to selling to conscious consumers directly in niche-oriented organic shops and street markets (Anderson et al. 2019; Morgan and Murdoch 2000).

For the *institutional support* component, producer organizations do not lobby directly. However, their voices are represented by the union (conventional PO1) or by niche-oriented intermediaries, such as the Agroecology network (organic PO3—5). Membership of the union of PO1 in the honorary commission to implement the agroecology law advances policy and institutional support in the organic food system. Organic producer organizations participate in collective certification activities, which benefit all organic producer organizations. Besides, the organic producer organizations and conventional PO1 contribute to sustainability-oriented research and extension by participating in various support projects. These activities contribute to various needs of producers for institutional support (Laforge et al. 2017; FAO 2015), and also support the transition of the research and extension system to become more inclusive of organic and agroecological farming (Klerkx 2020; Wezel et al. 2018).

The roles of producer organizations seem to support different transition pathways within or across regime and niche. For instance, integrated pest management projects of conventional PO1 support incremental change of conventional producers within their regime through sustainability intensification pathways (Weltin et al. 2018), whereas the production of organic inputs (particularly PO5) supports ecological pathways of input substitution and facilitates transitions from regime to niche (Bommarco et al. 2013; Lamine 2011). Organic producer organizations (particularly PO3, PO4) support (agro)ecological intensification pathways in the niche, for instance through projects with biodiversity-enhancing production practices, and by creating short value chains with direct producer–consumer relations based on food sovereignty, fairness and other ethical principles (Forssell and Lankoski 2014; Wezel et al. 2020). Finally, we have found several regime-niche interactions (Bui et al. 2016; Smith 2007), for instance by joint policy lobbying of the union of the conventional PO1 and the Agroecology network, and by sales of organic inputs to conventional producers. These contributions of producer organizations to transition needs bring us to the next point in our discussion, how producer organizations can be positioned as transition intermediaries.

Positioning producer organizations as transition intermediaries

We will now discuss how producer organizations can be positioned as transition intermediaries by exploring how

their classic intermediary roles may function as (implicit) transition intermediary roles.

First, we assess how classic intermediary roles of producer organizations perform the three main transition intermediary roles, as identified by Kivimaa (2014), and as discussed in the theoretical framework. Producer organizations *articulate expectations and visions* to advance their own sustainability objectives, such as through creating market access. This is especially the case for organic producer organizations, which created various value chains and consumer relations in alignment with their sustainability objectives. The conventional PO1 has such articulation directed towards more general policy support for small family producers but may include sustainability objectives through projects and exchanges. In addition, producer organizations *build social networks* by connecting with other (groups of) producers and other food system actors within and across regime and niche, such as commercial service providers, institutional support actors and sustainability-oriented actors to attract knowledge, extension and financial resources. Moreover, producer organizations engage in *learning and knowledge generation* by experimenting with new sustainable production practices, exploring new business opportunities (e.g. with emerging niche actors), or sharing knowledge through seminars, school garden projects and farm exchange visits. Such learning and knowledge generation often extends membership of producer organizations and supports producers and other actors in both regime and niche. It may thus be argued that classic intermediary roles of producer organizations in Uruguayan vegetable systems also fulfil these three transition intermediary roles within and across regime and niche, though this may not be explicitly stated or recognized by the producer organization.

Second, in view of this implicitness in transition intermediation, we will now discuss the potential of producer organizations as transition intermediaries by exploring how they compare against the characteristics of a transition intermediary. Table 5 presents characteristics of producer organizations as transition intermediaries. The characterization is based on interviews with producer organizations and food system actors assessed for the four characteristics of transition intermediaries of Kivimaa et al. (2019), and as discussed in the theoretical framework.

Regarding their *level of action*, producer organizations perform rather actor-level than system-level intermediation. Producer organizations in our cases have multiple bilateral relations, for instance with retail buyers or consumers, national government or extension agencies, or sustainability-oriented NGOs and movements. Whereas conventional producer organizations mostly interact with regime actors, organic producer organizations interact with both regime and niche actors – thereby often deliberately building relations with sustainability-oriented NGOs, food movements,

Table 5 Producer organizations as transition intermediaries in vegetable systems in Uruguay

Characteristics	Producer organizations as transition intermediaries
Level of action	Operate mostly at actor-level, facilitating multiple bilateral relations or small networks Do not operate at system-level within or across networks of actors
Emergence	Not established as transition intermediary, nor given mandate nor funds for intermediation Exist already (conventional) or emerge in transition process as bottom-up, grassroots organizations (organic)
Goal of intermediation	No explicit transition intermediation goal at food system level Important contributions through classic intermediary roles
Normative position	High legitimacy to represent producer interests Low legitimacy to represent other food system actors

and consumer associations. At grassroots level, producer organizations are also part of community-level producer networks. Thus, producer organizations facilitate non-systemic bilateral or multilateral relations in small rural networks, which is in line with findings by studies on producer organizations as innovation intermediaries in different food systems in China (Yang et al. 2014), and Burkina Faso (Iyabano et al. 2021). This also aligns with the studies of Kilelu et al. (2017) on dairy hubs in Kenya and Ramirez et al. (2018) on mango clusters in Peru, where producer organizations—contrary to our study—were given a more central position amongst other food system actors, but in reality faced challenges to intermediate with actors beyond their producer networks. Producer organizations can be contrasted to transition intermediaries that operate at high aggregate system level with many-to-many-to-many relationships across several networks (Kanda et al. 2020), for instance among more systemic intermediaries, such as industry associations (Watkins et al. 2015).

Regarding their *emergence*, producer organizations are not explicitly established to operate as transition intermediary to foster food systems transformation, nor are they given the mandate nor funds to do so. Conventional producer organizations are established in response to direct support from the government—independent from any transition process. Thus the contributions that conventional producer organizations make to transitions in both regime and niche are based on their own initiative in taking up transition intermediation roles, rather than being mandated for it. This contrasts with transition intermediaries that are established, mandated or funded for transition intermediation in regimes (Kivimaa et al. 2019). Although they received some initial support by regime and niche actors, organic producer organizations have been self-organized by producers in the transition process and then act as bottom-up grassroots organizations that seem to be driven by internal motivations for change (e.g. to share their sustainability objectives through participating in organic school projects), or to fill certain voids in their food systems (e.g. to create organic input and

output market access). Grassroots organizations that emerge in the transition process rather than being established specifically for intermediation are a recognized type of transition intermediary (Seyfang and Smith 2007) and have also been identified in the food systems literature (e.g. Rossi 2017).

Regarding their *goal of intermediation*, producer organizations in our study did not pursue explicit transition intermediary goals at food system level. Conventional PO1 traditionally has most of their roles focused on the regime, but does not seem to take an anti-niche position. On the contrary, various roles of conventional PO1 contribute to inducing sustainable production practices in both regime and niche. Our findings have shown that whilst intermediary roles of organic producer organizations have important transition effects, such efforts are often undeliberate. Yet we found that organic producer organizations often do have sustainability objectives, but these manifest mostly in the design of their classic intermediary roles. As an example, differences in sustainability objectives among the three organic producer organizations are reflected in the design of their production systems, the type value chains, and their relations with consumers and other food system actors—from regime orientations based on organic, to niche orientations based on agroecology. Nonetheless, organic producer organizations seem to leave their sustainability objectives aside in their relations with conventional producers, focusing on pragmatic support. This makes producer organizations differ from more activist-type grassroots intermediaries regarding their goal of intermediation (Hargreaves et al. 2013; Seyfang and Smith 2007). Hence, it can be argued that producer organizations act more as implicit than as explicit transition intermediaries.

Regarding their *normative position*, because of their producer-member nature, producer organizations are highly legitimate to represent interests of producers towards external actors in the food system. Interviews with food system actors revealed that producer organizations are associated with high member knowledge about production and commercialization, and with being well-embedded in rural

networks. Our findings are in line with Ramirez et al. (2018), who conclude that producer organizations in mango clusters in Peru have high legitimacy due to their embeddedness in local producer networks. However, our findings seem to suggest that producer organizations have low legitimacy to represent interests of other food system actors, such as value chain actors (e.g. input providers, processors, retailers) and institutional support actors (e.g. policy-makers, researchers, lobby groups, sustainability movements). They are not considered neutral and have been established to focus on improving the position of their producer members in food systems. Perhaps this is why producer organizations do not lobby directly, but have their voices represented through policy-oriented intermediaries, such as unions and intermediaries in the niche. This is in line with Yang et al. (2014), who found producer organizations in China to be taking a gate-keeping position for farmers in relations with other actors. Other types of transition intermediaries may be less associated with representation of one actor group, for instance those that are established to provide brokering roles at higher levels of system aggregation in food systems and manage broader dedicated transition programmes (see Klerkx and Leeuwis 2009; Betzold et al. 2018). Nonetheless, transition intermediaries are rarely considered fully neutral, as there is always some degree of agenda setting (Kivimaa et al. 2019).

Limitations of producer organizations as transition intermediaries

Finally, we discuss three limitations that producer organizations face as transition intermediaries. These limitations emerged from the interviews with producer organizations and food system actors and are discussed from the perspective of transition intermediary roles and characteristics. The limitations of producer organizations relate to all three intermediary roles distinguished in the previous section, being the articulation of expectations and visions, building social networks, and engaging in learning and knowledge generation.

First, when producer organizations want to act as transition intermediaries, they face conflicts with the *time, interest and skills* of producer organizations members. This is particularly the case for intermediary roles that focus on lobby and advocating policies at higher aggregate system levels. This finding is in line with literature on producer organizations, which emphasizes that different roles require different skills of members or managers. For instance, producer organizations need good networking skills for lobbying and commercial skills for commercialization (Bijman 2016; Francesconi and Wouterse 2019). This makes producer organizations different from intermediary organizations who dedicate their time, interest and skills for lobby and advocacy at higher system levels.

Second, transition intermediary roles may conflict with the *organizational design* of the producer organizations. In our cases, four out of five producer organizations commercialize collectively and therefore are small, have a homogenous membership and apply strict requirements on member investment and internal coordination (see Appendix Table 6). These characteristics are common to be found among producer organizations with a focus on market access (Bijman and Wijers 2019). Effectively performing transition intermediary roles usually requires a large organization. Whereas producer organizations have become smaller and with more homogeneous membership as they shift towards commercialization (Bernard et al. 2008; Shiferaw et al. 2011), a large size and a more diverse membership increase voice in the policy domain (Penrose-Buckley 2007). Whilst different authors acknowledge that producer organizations may combine multiple roles, the complexity of the organizational design for producer organizations when combining various intermediary roles is acknowledged (Bijman 2016; World Bank 2007). This makes producer organizations differ from what have been called systemic or process intermediaries, whose organizational design is directed toward intermediation of transitions, for instance as reflected in a large size multi-stakeholder membership and specific coordination across various system levels (Kivimaa et al. 2019; Klerkx and Leeuwis 2009; Betzold et al. 2018).

Third, to have the producer organizations operate as transition intermediary, the members need a *shared vision* about which sustainability practices to promote. Creating such vision easily leads to disagreements among the members, which hampers the roles in which they focus on market access and production support. The difficulty to create a shared sustainability vision reflects the classic and inherent tension within producer organizations—due to their nature as producer-owned and controlled organizations—to navigate between democratic decision-making on the one hand and efficiency in the execution of their roles on the other hand (Ortiz-Miranda et al. 2010; Forney and Häberli 2017). Whereas some literature emphasizes that tensions are good to strengthen innovation and flexibility (e.g. Mooney 2004), other authors consider heterogeneous interests to be problematic in collective decision-making (e.g. Höhler and Kühl 2018; Poteete and Ostrom 2004). Particularly in the context of sustainability transitions, tensions related to creating a harmonized sustainability vision may hamper efficient operations as transition intermediary.

Conclusions and implications

Calls for sustainable agri-food systems have led to a rise in studies on intermediaries that facilitate sustainability transitions. This paper explored the (potential) roles of

producer organizations as transition intermediaries in supporting producers to adopt sustainable production practices. Ten qualitative case studies were conducted in organic (niche) and conventional (regime) vegetable systems in Uruguay. We provide theoretical implications and contributions, give recommendations for practice and policy, and discuss limitations and directions for future research.

Theoretical implications and contributions

The first conclusion is that the *classic intermediary roles of producer organizations also address the needs of producers to adopt more sustainable production practices*. Producer organizations facilitate production support, produce organic inputs, and create various organic value chains that are built on different sustainability objectives. To a lesser extent, producer organizations participate in lobbying for sustainability policies and engage in sustainable community development activities. Although producer organizations were initially established for classical economic and socio-political reasons, four out of five producer organizations increasingly take up sustainability-enhancing roles—which addresses needs of producers in their transition to sustainable food systems. We found that conventional producer organizations support sustainable production practices in the regime and form the basis for the emergence of organic producer organizations in the niche. We found that organic producer organizations take up additional roles to fill market and institutional voids in the niche and contribute to more sustainable production practices in the regime. These findings add insights, for instance to Bui et al. (2016) and Smith (2007), on regime-niche interactions in conventional and organic food systems. Our findings also bridge the two main literature streams on producer organizations and respond to pleas for converging rather than diverging perspectives on producer collective action (Forney and Häberli 2017; Stock et al. 2014).

The second conclusion is that *producer organizations mostly function as implicit transition intermediaries*. We contribute to the rapidly growing literature on transition intermediaries in agri-food system (e.g. El Bilali 2020; van Lente et al. 2020) by showing how classic intermediary roles of producer organizations also function as transition intermediary roles (Kivimaa 2014). In addition, based on an exploration of transition intermediary characteristics of producer organizations (Kivimaa et al. 2019), we argue that the potential of producer organizations lies in their ability to operate as implicit transition intermediaries, facilitated by their embeddedness in rural networks and

high legitimacy in representing producer interests. Due to the diversity in their roles and by refraining from taking a strong normative position, producer organizations align several pathways of food system transitions. For instance, producer organizations align with incremental sustainable intensification pathways in the regime (Struik and Kuyper 2017), as well as with more transformative (agro)ecological pathways that support transitions within the niche or from regime to niche (Tittonell et al. 2016; Wezel et al. 2020).

The third conclusion is that *producer organizations have the potential to be more explicitly positioned as transition intermediaries, however this position comes with limitations*. While there are diverse types of producer organizations, each playing its own transition intermediary role, producer organizations may not be well-equipped to fulfil the role of the systemic transition intermediary that promotes transformative change at the level of the overall food system. Such systemic intermediation would require producer organizations to bridge within and across large networks of actors (Kanda et al. 2020), take a stronger normative position, and have the legitimacy to represent the interests of all food system actors (Mignon and Kanda 2018). We found that formulating a shared sustainability vision may lead to internal tensions in the producer organization. We also found that a systemic intermediation role conflicts with the organization's current organizational design as well as with the time, interests and skills of the members. These limitations contribute to literature on producer organizations with regards to organizational design and performance—for instance when dealing with group size, member heterogeneity and conflicting visions (Poteete and Ostrom 2004; Mooney 2004). Finally, by applying the literature of transition intermediaries to producer organizations, we gained insights into the potential and limitations of producer organizations as specific transition intermediaries in food systems.

Recommendations for practice and policy

We provide three recommendations for producer organizations and policymakers. First, we encourage leaders of producer organizations to acknowledge the (new) roles they have to play in supporting their members in transitions to sustainable food systems. With the increased sustainability challenges in food systems, producer organizations need to rethink their support to members and add activities that help members to adopt sustainable production practices. At the same time, producer organizations may not be well equipped to take up too many different roles. The democratic decision-making structure and the reliance on members for board and staff functions entail limitations on the range of activities that a producer organization can effectively carry out.

Heterogeneity in membership poses governance challenges (Höhler and Kühl 2018), while a broad range of activities in the producer organization presents management challenges (Bernard and Taffesse 2012).

Second, we advise producer organizations as well as policy makers to acknowledge the complementarity of different producer organizations for the transition towards sustainable food systems. Our findings showed the diversity among producer organizations, with each organization making an idiosyncratic contribution to the transition. Producer organizations may provide specialized extension, certification, input provision and other services (World Bank 2007; Kilelu et al. 2017), which give structural and tailored support for diverse sustainability practices of producers (Hinrichs 2014). For leaders of producer organizations this implies maintaining focus in the main activities of the organization; for policy makers this implies acknowledging that different types of producer organizations may need different public support or regulation.

This brings us to our third recommendation, specifically for policy makers, to promote an institutional landscape that allows the development and growth of different types of producer organizations, each of them performing a specific but complementary role as transition intermediary. Public policies may provide direct financial and technical support to producers making a sustainability transformation within their regime or niche. Public policies may also furnish an institutional environment in which different producer organizations can prosper, each with its specific intermediary role. In addition, policy makers, or more likely administrators, may perform coordination roles among the various policies and different producer organizations that all promote sustainability transitions.

Limitations and future research

This paper has not been without empirical limitations. Interviews have focused on roles and characteristics of producer organizations in food systems, without detailing on topics

such as the perceptions of respondents on the roles producer organizations should play – for instance, on the extent to which they consider themselves as transition intermediaries. Besides, our data is cross-sectional. Although our data revealed implicit time dimensions, for instance showing how support from conventional producer organizations led to the rise of organic producer organizations, we did not include process questions to measure how roles of producer organizations changed over time. Considering that intermediary roles are likely to change during transition processes (van Lente et al. 2020), we recommend future research to collect process data (Langley 1999), for instance in a longitudinal study design.

Another topic that was out of the scope of this study was the positioning of producer organizations as different types of transition intermediaries (for instance, following the typology of Kivimaa et al. 2019). Our data seems to suggest that whereas characteristics of producer organizations do not fit one archetype transition intermediary, conventional producer organizations resemble mostly regime-type intermediaries, whereas organic producer organizations resemble mostly grassroots intermediaries. Some organic producer organizations thereby seem to fit incremental fit-and-conform intermediation, whilst others seem to pursue more radical stretch-and-transform intermediation to the existing regime (Smith and Raven 2012). Such positioning of producer organizations as different types of transition intermediaries in regime and niche food systems is an interesting venue for future research. Finally, we encourage future research to study producer organizations as transition intermediaries in different country and commodity food systems—as to further advance our understanding on their potential and limitations in facilitating sustainable food system transitions.

Appendix

Table 6 Data sources in the first step of data collection

Topic	Primary interviews (N = 6)	Secondary data
Producer organizations	Union of rural support organizations (1) Union of agricultural cooperatives (1) Agroecology network (1) PO advisor (1)	Latest cooperative census data (INE 2009) Cooperative sector report (FIDA and CCU 2014)
Food system	Public research institute (1) University researcher (1)	Conventional (Ackermann 2014; Aldabe and Dogliotti 2014) Organic (Dogliotti et al. 2014; Santos and Perazoli 2015)

Table 7 Organizational characteristics of producer organizations in conventional and organic food system

Organizational characteristics	POs in conventional food system		POs in organic food system		
	Rural support association	2. Marketing cooperative with institutional contract	3. Informal producer group with direct sales	4. Marketing cooperative with its own shop	5. Marketing cooperative with supermarket contract
Size (members)	Large (30–100)	Small (10–20)	Small (6–15)	Small (5–12)	Small (8–9)
Formalization	Semi-formal	Formal	Informal	Formal	Formal
Member type	Various	Vegetables	Various	Vegetables	Vegetables
Member investment	No	Yes	No	Yes	Yes
Internal coordination	Low	High	Medium	High	High

Table 8 Topic list of interviews

Interview topics	Producer organizations	Food system actors
Activities	Outlining activities of POs Objectives in activities Target group in activities (producer organizations members/other actors from current system/producers from other system/other actors from other system) Sustainability component in activities	Support activities to POs (to which PO, in which system) Objectives behind activities
Organizational characteristics	General characteristics (reason for establishment, size, formality, type members, member investment, year establishment) Sustainability objectives and values Internal challenges in executing activities	Perceived internal challenges of POs in executing activities
Food system relations	Relation with food system actors (which actors, type of relation, type of support)	Relations with POs Relation with other actors in systems General institutional support to system transitions

Table 9 Coding rules for data analysis and conceptualization

Theoretical framework	Recoding interview topics
Sustainability support	Target group in activities; Sustainability component in activities—Table 3
Producers' needs	PO activities—Table 4
Production	Support production practices; create production inputs; exchange production knowledge; exchange tools and machinery
Value chain	Create output market access; exchange knowledge about commercialization
Institutional support	Participate in lobby activities; participate in certification activities; Participate in research and extension activities
Intermediary roles	PO activities—Table 2
Market access	Create input (e.g. produce organic seedlings or pest control inputs) or output market access (e.g. collective commercialization of produce)
Production support	Support production practices (e.g. provide information, training, extension on more sustainable production practices; share machinery and equipment)
Lobby for policies	Establish, promote, or improve current or new policies, regulations, support instruments (e.g. lobby for more sustainable legislation)
Community development	Support non-producers in the food system (e.g. participate in educational activities for schools, attend research seminars and workshops, provide welfare services in the community)
Transition intermediaries	Interview topics—Table 5
Level of action	Relations of POs with food systems actors; target group in activities
Emergence	Objectives in activities; reason for establishment
Goal of intermediation	Sustainability objectives; internal challenges in executing activities
Normative position	Values; relations of POs with food system actors

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