A soft systems approach for innovation in the fruits and vegetables market in Uruguay

Uma abordagem de sistemas flexíveis para a inovação na cadeia de frutas e hortaliças no Uruguai

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ABSTRACT

"Systems thinking" approaches include some techniques and methods developed by social scientists to encourage debate, recognising that their practice is inevitably full of value and that research is a part of intervention. In general, systems theories explain the need to transcend disciplines to increase our understanding of a situation by considering different levels of impact, especially through visualisation tools. In a very complex environment such as the fruit and vegetable market in Uruguay, especially focusing on the roles of agents and the interactions between them, "soft systems methodologies" contributed to building a representation integrating different perspectives with consensual and conflicting aspects, delving into the particularities and opportunities for technological innovations and collaborative management for the fruit and vegetable chain, ending in important reflections on opportunities for positive change and the risks of marginalisation or social exclusion.

Keywords: Systems thinking. Farmers. Markets. Innovation. Sustainable development.

RESUMO

Abordagens de "pensamento sistêmico" incluem certas técnicas e métodos desenvolvidos por cientistas sociais para promover o debate, reconhecendo que sua prática é inevitavelmente cheia de valor e que a pesquisa é parte de uma intervenção. No geral, as teorias de sistemas explicam que é preciso

transcender as disciplinas para aumentar nossa compreensão de uma situação considerando diferentes níveis de impacto, especialmente fazendo uso de ferramentas de visualização. Em um contexto muito complexo, como o do setor de frutas e hortaliças no Uruguai, principalmente em respeito à atuação dos agentes que participam e às interações entre eles, as "metodologias de sistemas flexíveis" contribuíram para construir uma representação que considera diferentes perspectivas com consensos e conflitos, aprofundando-se nas particularidades e oportunidades de inovação tecnológica e gestão colaborativa da cadeia, finalizando com importantes reflexões sobre as oportunidades de mudança positiva e sobre os riscos de marginalização ou exclusão social.

Palavra-chave: Pensamento sistêmico; Produtores; Mercados; Inovação; Desenvolvimento sustentável.

1 INTRODUCTION

The low consumption of fresh fruits and vegetables in Uruguay (311 gr/person/day) in relation to what is recommended by the World Health Organization (400 gr/person/day, 2018), together with the country's commitment to an advanced set of policies and mitigation plans to cope with climate change by 2030 (CORTELEZZI, 2019), reaffirms the necessity of working on the promotion of healthier lifestyles. This might represent an opportunity for rural farmers who are not ready to face transformations in their systems to achieve food quality stably: sustaining natural resources and reducing food waste throughout the production and distribution chain to the final consumer (FAO, 2012; ZOPPOLO; COLNAGO, 2021).

Fruit and vegetable production in Uruguay involves 7,056 rural farms and occupies 0.36% of the total land, 12% of the total number of permanent workers linked to agricultural activity and 63% of temporary workers (ranking second in employment importance after the beef cattle industry). More than 85% of the horticultural and fruit farms are family farms. Therefore, added to its importance in food production (674,320 tons of fruit and vegetables produced per year) and security, the fruit and vegetable sector represents the means and livelihood of many rural families, fulfilling an important social role by creating roots in the rural area, contributing to sustainable rural development (ACKERMAN *et al*., 2017).

Trying to understand the particular situation of Uruguayan participants of traditional and new rural marketing channels for fruits, vegetables and other farm products (honey, cheeses, crafts, etc.), we gather information during a four-month internship (November 2022 to February 2023) at the research institute *Instituto Nacional de Investigación Agropecuaria* (INIA) "Las Brujas" in Uruguay, gaining insights about recent innovations.

Based on the literature, technological innovations, in a broad sense, result from exogenous events that temporarily disturb the state of balance (LUNDVALL, 1992). We intended to consider the perception of risk, including an analysis of how the participating actors face double exposure to environmental and socioeconomic risk: including technical innovations, shocks of prices, barriers to commercialisation, problems with family labour, public policies that are not always friendly, pressure for land use and price increases due to competition, etc. (O'BRIEN; LEICHENKO, 2000). We arrived, then, at a wider vision of innovation (BIANCO, 2020; GOULET *et al*., 2019): a result of a social process in which learnings and skills are produced and useful solutions to specific problems are implemented in the areas of goods and services production, marketing and logistics, social organisation and institutions, territories and communities (that can be valued). The nature of innovation is social and technical simultaneously (sociotechnical), so the analysis implies understanding interactions between several organisations and social groups (technicians, researchers, producers, merchants, intermediaries, and other organisations).

Nowadays, information technologies or telematics open up a whole new perspective regarding labour and the forms of capital valorisation. However, although the concept of value addition has evolved with innovation (and increasingly includes productive, social, cultural, identity and environmental aspects), it still keeps a predominantly economic character (PALERMO *et al*., 2020). Including environmental aspects in the reflections on value-adding would consider preserving value more than just creating and capturing value (CASTELLANO; GOIZUETA, 2015). Social aspects would consider conflictive and contradictory processes, social positions, claims of traditions, representations of nature and how local society relates to them (CHAMPREDONDE; BORBA, 2015; IRIARTE, 2013). These facts, together with the permanence of problems of distribution, poverty and productive structure in Latin America and East Asian countries, bring again the importance of supporting value addition through development and productive diversification and the need to have new instruments that allow us to understand the dynamics of these challenges (LÓPEZ; MUÑOZ, 2015).

In this sense, Champredonde and Cosiorovski (2016) propose the idea of "integral valuation" beyond "value adding", where projects are not conceived based on pre-established objectives –to capture value- but on the objectives, motivations and limitations of the actors involved, and the direction of actions result from power struggles. Thus, a more comprehensive concept is proposed, placing people in the foreground and estimating the multiplicity of intrinsic aspects of human activity (CARENZO, 2007).

Seeking to illustrate the richness and variety of perceptions according to Soft Systems Methodology in action (CHECKLAND; SCHOLES, 1999; MIDGLEY, 2001), the data were obtained mainly from interviews with semi-structured questionnaires to several actors in the fruit and vegetable chain (farmers, traders, intermediaries, consumers, private and public technicians), as well as from participatory workshops and relevant bibliographic material.

The main aspects of this exercise allowed us to promote discussion around: alternative distribution channels, collaborative management and other innovations, for whom?

2 SOFT SYSTEM METHODOLOGIES

System Thinking includes a variety of methodologies to analyse problems that implicate complexity, risk and uncertainty by considering the 'whole' of a system and the behaviours and interactions of its parts. These methodologies include Soft Systems approaches such as Checkland's (1999), which aims to build a "rich picture" to understand a situation by illustrating the variety of perceptions, and Midgley's (2000) 'Systemic Intervention', generally used to tackle very complex problems involving social aspects with unclear objectives.

In local situations, the usefulness of Systems Thinking is proven when the interconnection between ecological, social and personal problems demonstrates that none of these would be possible to solve if the problematic situation is not taken as a whole (MIDGLEY, 2000). The "systems thinking" approach invites researchers in the natural sciences to employ some of the techniques and methods that social scientists have developed before to encourage discussion because, whether in the natural or social sciences, scientific practice it is inevitably full of value (it is not neutral, and research is a part of intervention). In general, systems theories, such as Von Bertalanffy's (1968), explain the need to transcend disciplines to increase our understanding of a problem or situation, considering different levels of impact, especially through visualisation tools (Figure 1).

Within a picture of the situation, the integrity between socio-cultural, economic, organisational and ecological spaces is necessary to understand regional sustainable development. Therefore, each of the spaces should be taken into account (FAGGIAN; SPOSITO, 2009).

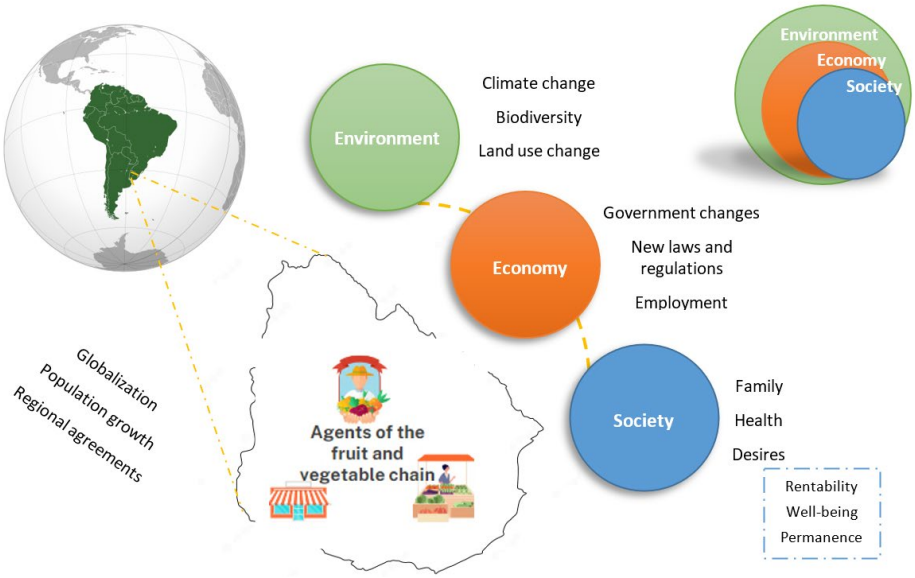

Figure 1| Application of "systems thinking" to the study

Source: Adapted from Faggian and Sposito (2009).

The influence of an external environment or a 'vulnerability context' should also be contemplated, represented by trends (national or economic, macro-policies, population changes, etc.) and shocks (particular challenges), which mediate the strategies that people undertake to achieve their livelihood objectives (ELLIS, 2000).

Midgley's approach also suggests theoretical pluralism (MATURANA, 1988). Therefore, a balanced variety of theories may be useful to gain an understanding if a variety of values or objectives are pursued in diverse contexts. "Why seek a unitary explanation at all? Within a group of people who accept the existence of a phenomenon (say, pluralism of viewpoints), isn't this acceptance sufficient to co-ordinate actions?".

Systemic Intervention is, then, basically founded on exploring boundaries (with the engagement of stakeholders to understand the wicked problems), using mixing methods and taking action for improvement from where you are.

With this approach, we gathered information from 48 actors in the Uruguayan fruit and vegetable chain: farmers, traders, intermediaries, consumers, and private and public technicians who represent several organisations, with different years of experience, different roles in the chain, and linked to different types of marketing systems.

The interviews were developed through semi-structured questionnaires (JIMÉNEZ *et al*., 2006) and "snowball" sampling: a technique to find the research object where a subject gives the researcher the name of another, who provides the name of a third, and so on. This method is usually associated with exploratory research, especially in studies that require a high level of confidence (ATKINSON; FLINT, 2001).

When selecting the interviewees, we intended to represent all types of agents in the different farming areas of the country according to the typical categorisation (Figure 2). Ethical considerations on vulnerability in qualitative research were taken into account (LOUE; MOLINA, 2015), establishing prior agreements of respect with the participants regarding the information they wanted or not to share.

"Attitude towards innovation" was conceptualised as a subjective or endogenous factor related to uncertainty (PANNELL *et al*., 2000) and risk aversion: a variable that represents a psychological propensity that can not be studied through direct experience but through observable indicators (ALLUB, 2001). At first, categorical values were assigned between "highly positive" (indicating a positive evaluation of the innovative proposals discussed) and "highly negative" (indicating a negative evaluation of the innovative proposals discussed), based on discussions about identified benefits, level of confidence and commitment for the future. The questionnaires then gave rise to a collective analysis of attitudes towards technological and social innovation and the strengths and weaknesses of the innovation systems we integrate. In addition, at an organised workshop in INIA Las Brujas, participants gave their opinions (especially as consumers) to enrich the debate and knowledge about the vegetable and fruits sector, providing diverse perspectives from different disciplines, genders, socioeconomic levels, roles within the company, etc.

3 CHANNELS AND COMMERCIAL AGENTS OF FARM PRODUCTS

To start understanding the Uruguayan fruits and vegetables chain, it is essential to characterise the main agents who participate. Figure 2 shows a simple representation of the actors involved, following more traditional ways of describing the vegetables and fruits market (LAMARCA *et al*., 2009):

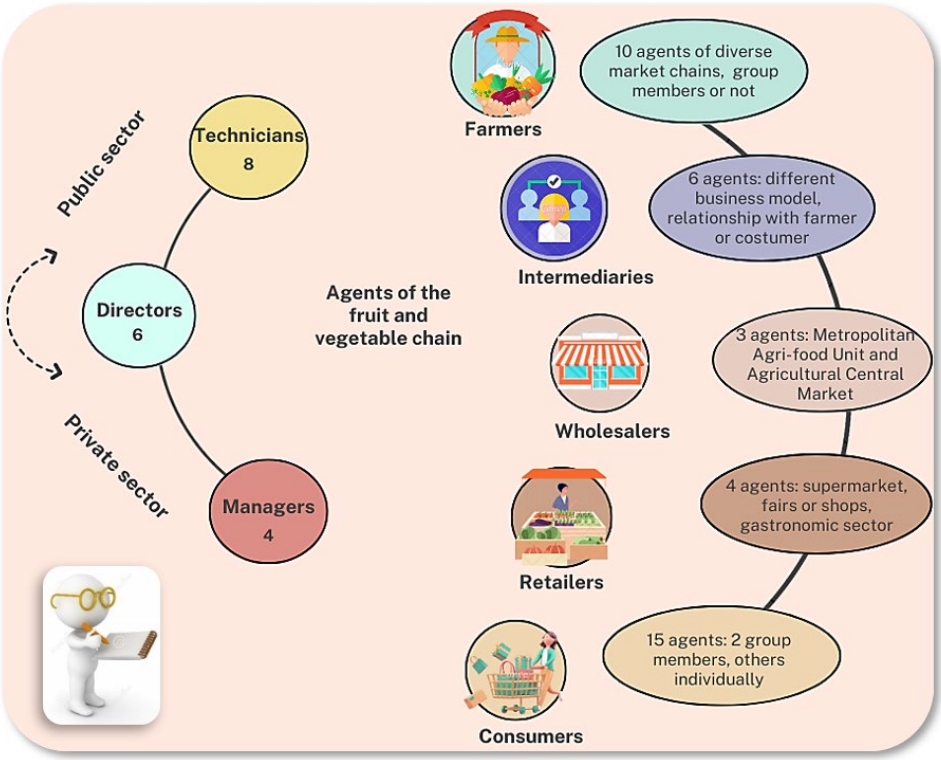

Figure 2| Representation of the fruit and vegetable chain and its participants

Source: Prepared by the authors

3.1 FARMERS (PRODUCERS)

"Intensive farming" in Uruguay (which includes plant production such as vegetables, fruit trees, vineyards, citrus, fruit, horticultural and flower nurseries, and also specialised animal production or for self-consumption including rabbits, pigs, birds, and bees, among others) historically occupied three

regions: south, the north coast and other specific areas with different relative participation in the offer (Figure 3). Currently, fruits and vegetables production involves a total of 58,354 ha and involves 7,056 rural farms. Despite using only 0.36% of the land, horticulture still employs 12% of the total number of permanent workers linked to agricultural activity and 63% of temporary workers (MGAP; DIEA, 2014). Considering the total direct employment (permanent and temporary), the fruit and vegetable sector ranks second in importance after beef cattle. According to MGAP and DIEA (2021), 674,320 tons of fruits and vegetables are produced annually, and imports represent 13% of the total sales. Most of the farms involved are family farms: 88% in horticulture and 86% in fruit growing (MGAP; DIEA, 2020, 2021), so the fruit and vegetable sector represents not only great importance for food production and security but also the means and livelihood of many rural families, fulfilling an important social role given by a sense of belonging in the rural area and contributing to its development (ZOPPOLO; COLNAGO, 2021).

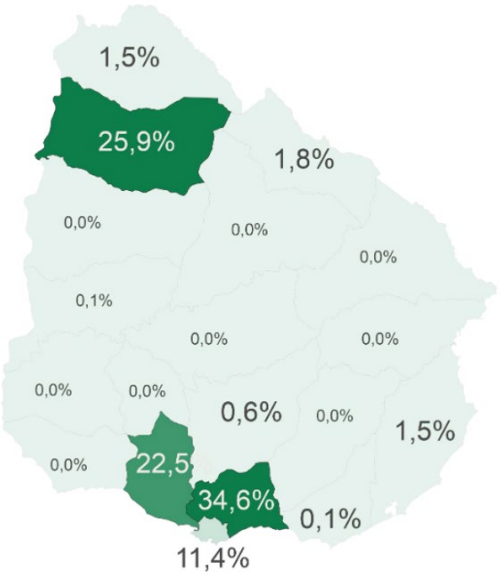

Figure 3| Relative importance of different areas in the supply of fresh fruits and vegetables

Source: Observatorio Granjero (2021)

3.2 INTERMEDIARIES

Intermediaries are located between producers (farmers) and wholesalers and between these and retailers. Generally, wholesalers acquire ownership of the products they sell, but in the fruits and vegetables marketing chains, there is a group of intermediaries who handle large volumes of products which may or may not be their own. These are commonly called commission agents: “brokers”, commercial agents or representatives, distributors, etc.

3.3 WHOLESALERS

The *Mercado Agrícola* (Agricultural Market) arises as the first experience in the country of an organising structure of supply and demand. Later, for better capacity and transit facilities, it was replaced by the *Mercado Modelo* (Model Market), although there is currently a reopening project, and it is an alternative source of supply for small and medium-sized merchants in Montevideo. The *Mercado Modelo* currently works as the most important fruit and vegetable market in Uruguay. It is governed by a co-management system (gathering representatives of the municipal government, the department of agriculture, producers, wholesalers, retailers, and workers). In 1995, approximately

75% of the total production of vegetables and fruits was sold there. In 2021, that value was estimated as 63% by Observatorio Granjero (2021).

3.4 RETAILERS

"Retailers" category includes large surfaces (supermarkets), warehouses or self-service stores and municipal fairs. In general, the main chains organise purchases from the fruit and vegetable section, which have supply, conditioning and redistribution centres, maintaining high-quality standards, as well as strict rules for marketing with producers, such as formalities in the documentation of transactions (obligation of invoice sales for tax deduction, etc.). These standards mean that certain producers are not able to sell all their production to the supermarket and must look for alternative channels to market the remaining to avoid permanent losses. In that sense, fairs are alternative channels where the farmer chooses to deliver his or her production more directly to the customer, sometimes presenting advantages such as lower prices, greater variety, the possibility of bargaining, etc. In general, the free fairs sell basic fresh products. They are organised and regulated by the municipal authorities and often provide directly from the wholesale markets. This could mean that, individually, the stallholders have little bargaining power against the suppliers (wholesale market operators) due to the low volume acquired by each one.

There are also mobile markets, where the merchant has specially adapted vehicles to transport, store, display the products and even make the sale. Sometimes neighbours get together to construct small stores to present the local product to buyers from more distant areas. They often provide other services, such as granting credit to producers and supplying agricultural inputs and other products.

3.5 CUSTOMERS

MGAP and DIEA (2021) estimated an apparent consumption of fruit and vegetables of 510,579 tons per year by the entire Uruguayan population and 395 g per inhabitant per day. The consumption of fresh fruits and vegetables was 311 g/inhab/day and is less than the 400 g per day recommended by the World Health Organization (2018). The weight of food can represent up to 26% of the income of an Uruguayan household.

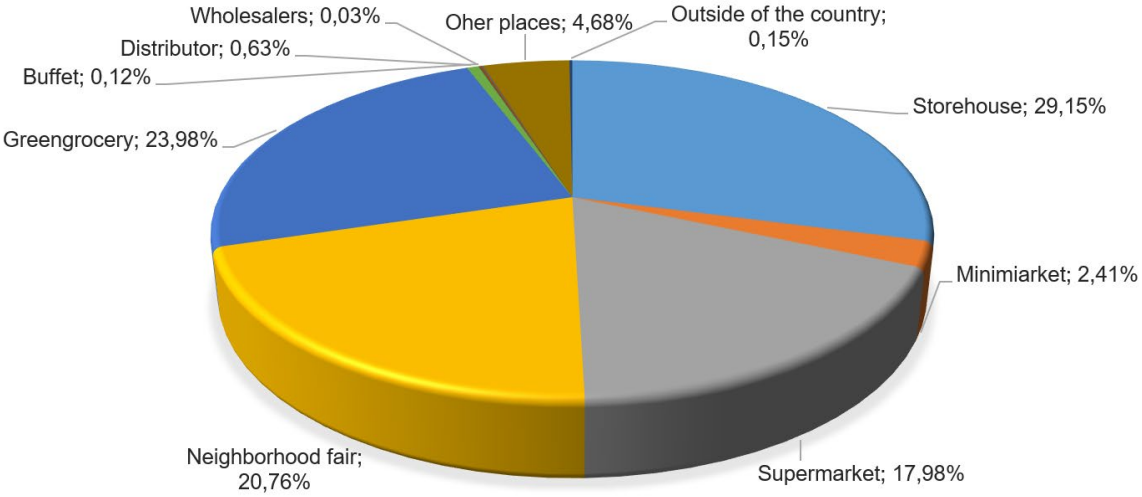

Figure 4| Household consumption by commercial channel

Source: Bove and Cerruti (2008)

Ackerman *et al*. (2017) and Bove and Cerruti (2008) observed that the participation of fairs, greengrocers, and self-services (called "other retailers") prevailed in marketing (between 50% and 68% depending on the product); while supermarkets channelled between 18% and 29% of the available offer for consumption. The gastronomic sector demanded between 1% and 16% of the supply for consumption, with significant growth potential. Meanwhile, the State absorbed between 2% and 4% of the available volume. According to the *Instituto Nacional de Estadística* (INE, 2017), in 2016-17, in other regions of the country, the store was the most important place of purchase (43.7%), while in Montevideo, that place was the supermarket (46.4%).

Within other places of purchase, initiatives such as the formation of "purchasing groups" have also emerged. This is the case of the popular market *Mercado Popular de Subsistencia* (MPS), founded in 2017 by a host of neighbourhood organisations, cooperatives, unions, and others, who met without profit, supported by voluntary work so that each family acquires what is needed at relatively low prices through a list system (MPS, 2022).

Although in 2020 the economic context was severely affected by the pandemic (with a reduction in the employment rate and income), Uruguayan researchers of Id Retail (2021) identified that customers did not fully restrict their consumption to basic categories and low-price brands. In addition to concerns about insecurity and unemployment, they added health and environmental care. Thus, depending on the occasion, the consumer sometimes chooses saving or selecting "premium" and value-added consumption. This context came with a leading role of local and specialised stores. According to the study by Impulsa Industria (2020), 36% of the Uruguayan population changed their consumption and food preparation habits with the arrival of the pandemic. Currently, 13% of them return to the former situation of consumption.

3.6 PUBLIC AND PRIVATE INSTITUTIONS

The whole Uruguayan fruit and vegetable chain is susceptible to policies and interventions from many public and private institutions with decision-making power and different articulation levels. Some of them are the department of agriculture *Ministerio de Ganadería, Agricultura y Pesca* (MGAP), particularly the *Dirección General de la Granja* (Digegra); the national research institute *Instituto Nacional de Investigación Agropecuaria* (Inia); the referent public agency for land policy *Instituto Nacional de Colonización* (INC); the institute for extension, technology transfer and training *Instituto Plan Agropecuario* (IPA); the department of social development *Ministerio de Desarrollo Social* (Mides), the public university *Universidad de la República* (Udelar); the public bank *Banco República* (Brou); as well as private banks, other private financial institutions, research and education agencies and service companies.

In addition, in Uruguay in 1915, rural development societies *Sociedades de Fomento Rural* (SFRs) founded a national commission *Comisión Nacional de Fomento Rural* (CNFR), projected as the main representative organisation of small and medium farmers in rural areas, influencing the development of unions, cooperatives, colonisation, agro-industries, production plans, etc. (ROSSI; NOTARO, 2016). SFRs are civil associations, entities with legal status approved by the department of education and culture *Ministerio de Educación y Cultura* (MEC). Fruit and vegetable farmers often assembled into cooperatives or networks, such as the agroecology network *Red de Agroecología* (RAU).

3.7 INTERCONNECTIONS

The use of Soft Systems Methodologies allowed for deepening into the representation of the actors involved when the interactions and shared roles between them were observed to a greater extent. Some actors occupy more than one role at the same time (for example, being a farmer and also an

intermediary or a technician and a farmer), a market in more than one "way" and offer more than one "type of product or service" to more than one "sale destination". This is illustrated in Figure 5: a more complex scheme also wanting to show the role of researchers as participants who must be considered in the analysis since they will inevitably bring subjectivities to the situation (MIDGLEY, 2000).

Visualisation tools helped to build a holistic vision of the situation that facilitated our understanding of the commercial circumstances for fruits and vegetables in rural Uruguay (CHECKLAND, 1999). Along with a diversity of issues discussed between actors, the notion of innovation, and an evaluation of how they position themselves in relation to it, was discussed together. We discussed traditional commercial channels for farm products with the main agents, some particularities of Uruguayan consumption and innovations such as alternative channels for sale and collaborative management. In particular, we discuss innovations promoted by the recent crisis due to the start of the Covid-19 pandemic in 2020 and the challenges posed by climate change, questioning the idea of value-adding.

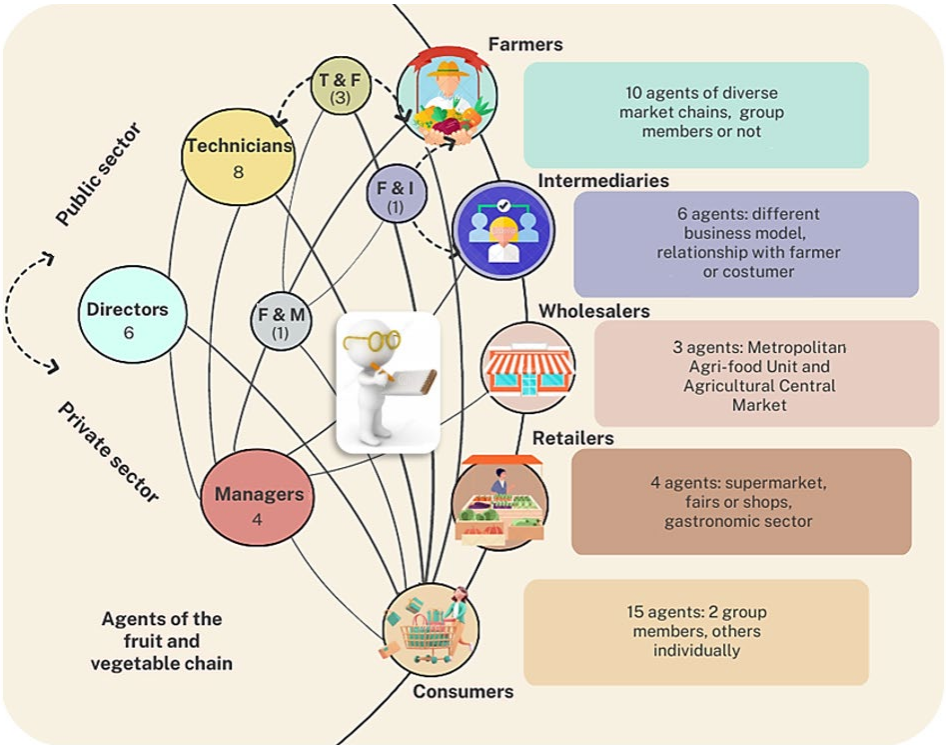

Figure 5| Representation of the identified relationships within the fruit and vegetable chain

Source: Prepared by the authors.

Clearly, it could be recommended to extend this study to other areas if the objective was to have a representative national sample, but we still consider these opinions enrich the debate and knowledge of the sector qualitatively.

4 A VIEW ON INNOVATION IN THE AGRICULTURAL SECTOR

At the beginning of this research, to study innovation processes, we observed the predisposition to "technological innovation" and "social innovation" separately for practical purposes. The first variable would be linked to the use of computers and/or digital tools in business management, communication and, to a lower extent, production (since it is not the main focus of this study), while "social innovation" referred to the predisposition to integrate new levels of social and financial organisation, strategic alliances with other actors in the chain, and cooperative strategies.

At an exploratory level, the majority of actors (50%) expressed a positive (P) attitude towards technological innovation; while the attitude towards social innovation presented more controversies: 38% expressed a highly positive (HP) attitude and almost the same proportion a moderate (M) attitude (Figure 6).

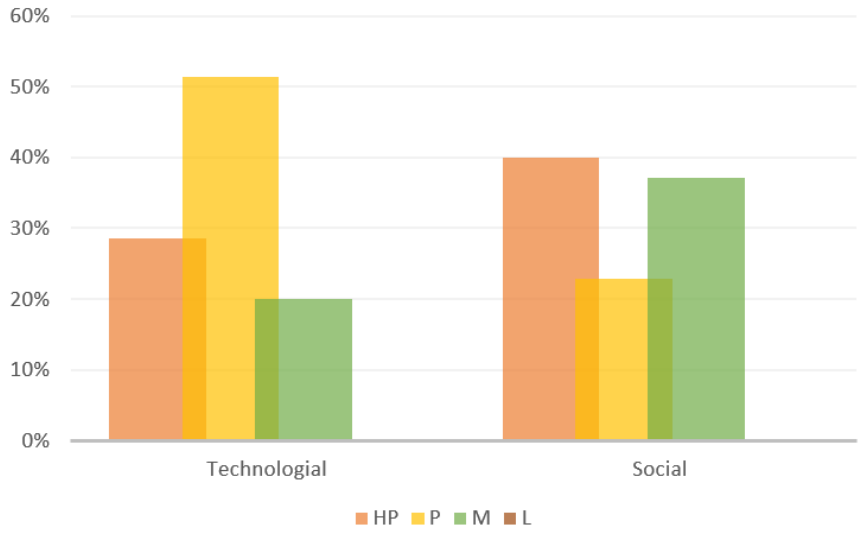

Figure 6| Attitude towards innovation according to actors in the chain

Source: Prepared by the authors.

Some common patterns were observed according to each actor's role in the chain: most of the technicians reflected a moderate attitude towards innovation, and the directors were highly positive. Farmers are more positive regarding incorporating the new material technology than the new social organisation (between positive and moderate attitude), and managers, on the contrary: highly positive regarding the social organisation and positive regarding the technology.

We perceived this way of discussing or studying innovation would be bringing us closer to a linear or rigid notion of innovation, according to Bianco's (2020) study, as the ones conceived in the sixties and seventies according to the rural sociologist Rogers (1983): with the focus on the relationship between the characteristics of individuals, their attitude towards innovation and the factors linked to the relative complexity of technologies and the risk involved in their eventual adoption. Making use of the theoretical pluralism allowed by the selected methodology, we then evolved towards more qualitative analysis, arriving at a criticised version of the Schumpeterian concept of innovation by Suarez (2004), where technological and social aspects exist only integrated, and we must avoid falling into a technological determinism by isolating the socio-cultural element from economic development. Bianco (2020) also defends innovation's simultaneous social and technical (sociotechnical) nature. Her research also frames our research into a systemic vision that has been applied in Latin America, including analysis of the dynamics in the farms, appreciation of specific practices as a relevant aspect and promotion of active participation of the actors involved in research processes.

This systemic and qualitative vision allowed actors to express themselves in a comfortable environment (ATKINSON; FLINT, 2001). Technicians of the private and public sector mentioned as positive innovative aspects: state support to farmers organisations through resources and public projects such as *Proyecto Rural Uruguay* (PUR); funds that promote public-private articulation and with academia towards the Sustainable Development Goals (UNITED NATIONS, 2018); strengthening of connectivity in rural educational centers by Ceibal (the public center of innovation), programs such as "computational thinking", "youth to program"; together with MGAP; policies for innovation and participatory research

and promotion of agroecological groups, as well as for rural women, focused on technical support and technology ("AgroTICS", "Mujeres de la granja", "Más tecnología", "Más valor"); law 19,292 on public purchases for family farming offers a new commercial possibility; Laguna del Sauce protection project within a collaboration of the environmental department and the MGAP; financial incentives have been received from the World Bank and business strategies are being planned; public "development roundtables" where farmers have a voice; openness of the Uruguayan population to collaboration (especially in times of crisis). At the same time, they pointed out negative aspects, such as: late or non-arrival of funds from the state to the territory, concentrated incentives in a small group of farmers; warranty and tax returns issues for small farmers; projects that are not sustained beyond the period of public financing; the difficulty of measuring social processes and pressure to achieve economic growth; "territorial interventions on demand" from the MGAP that have not yet been formally implemented; the law for public purchases is sometimes not complied due to high-quality requirements or lack of products; disparity in digital literacy, connectivity or electricity and social factors of exclusion of the digitisation processes that remain; coexistence of very different lifestyles, land values and challenges; lack of regulations for new farmers regarding the use of territory; lack of awareness of available public educational opportunities.

Directors shared contradictory opinions such as: "It would be interesting to generate spaces where people could access information or advice, but also motivate them to go to the sources of knowledge (instead of them asking for resolution, postponing adoption or losing opportunities)". "The rural context is very diverse and complex: there are people who still do not have electricity despite being close to the city, there are still problems of signal or connectivity in elevated areas, even if today's education depends on it; this requires articulation with public companies but it is necessary to approach it from the territory". "There is a lack of knowledge or misinformation about the public educational opportunities available, even in a scenario where we are apparently all connected; there is competition with other sectors for labor and technology, and farmers can not afford them", "there are people who rely on technology and others do not (they do not prioritise it), farmers' organisations need collaborative policies between the state and the productive sector for a better situation for everyone".

We noticed that, in public and private institutions that influence the fruit and vegetable market, different concepts of innovation mentioned by Bianco (2020) still coexist: from a narrow vision based on the farmer conceived as an adopter of technology towards comprehensive approaches that overlap the social and the technical in processes of a systemic nature but, as pointed by the author, in some cases, the change from one approach to another is not discreet but can be noticed.

In this sense, wholesalers argued about access to positions in the metropolitan agrifood unit. "The *Unidad Agroalimentaria Metropolitana* (UAM) was originally designed for companies with infrastructure and technology out of access for many (based on foreign market models), farmers still have difficulty to adapt and negotiate", others defend "it represents a model infrastructure for storage and subdivision, where established norms for new members are flexible and the business fair due to transparent information about fruit and vegetable prices and food safety".

For supermarkets' representatives, "the trend is toward reducing staff, even if the products' management becomes more difficult", and "there is little opportunity for value-adding because small farmers do not reach the volumes with required standards". Apparently, recent changes in the internal policy of the companies bring conflicts in the relationship or agreements with farmers.

The work with commission agents or intermediaries is usually perceived as a limitation. This type of agent also senses low confidence and vulnerability, especially during recent times of management changes in the wholesale market or department stores. Many agree: "the intermediary has a lot of work and many costs that are not always acknowledged", and "our most important job is to

communicate, convey the importance of consuming certain types of products, and to maintain an honest relationship with farmers".

Controversial discourses were also observed regarding the vulnerability of family farmers in the face of free supply and demand and the need for capacity development. Many expressed that the price they receive is sometimes less than the cost of production. They also express problems of scale in relation to family economic needs.

Despite the agent's role on the chain, some repeated issues were: currently restricted certification for differentiated products, indebtedness to face the pandemic, public support for small businesses considered insufficient, and laws not adapted to the Uruguayan reality.

4.1 A PERSPECTIVE FROM URUGUAYAN CONSUMERS

To keep considering perceptions regarding innovations, barriers to commercialisation, etc., in the workshop, we discussed the main problems for customers. The participants repeatedly identified: high prices; high cost of local versus imported fruit; scarce variety; distance from the farmer and consumer (reflected in the range of established prices); quality: appearance and taste; sector poorly adapted to changes; lack of basic regulation; lack of technology adoption; difficult access to organic or agroecological products; competence; meeting the demands of production standards; lack of initiatives; valuation of local production.

It is clear that when we talk about agents' perceptions of innovations, there is a gap between discourse and practices (like the ones shared by Ackerman *et al*., 2017 and Bove and Cerruti, 2008). However, we still consider that having thought and shared solutions from the different roles that challenge actors in daily life contributes to the social function of scientific research (BERNAL, 1939). This analysis allowed us to reflect further on the path towards sustainable innovation for the farming sector.

Some identified opportunities were: direct sales or less intermediation; varying species (importing seeds, varying soils, diversifying plantations); improving quality (improving transportation, storage, organoleptic quality); alternative forms of trade; reducing waste; supporting innovators; promoting more consumption; maintain traceability of organic and agroecological products; free trade; exclusive sale of seasonal products; communication improvements between all parties; guide the consumer into the use of local products; promoting local markets; offer for sales channels with delivery options; more stores. Uruguayan researchers of Id Retail (2021) and Impulsa Industria (2020) also pointed out the last four ideas.

Other participants shared some of their initiatives that were aligned with costumers' ideas: pilot experience in cooperative exportation by a group of farmers in the east of the country; cooperatives with their own brands, packaging and certification systems and diversification of products: sweets, preserved food, honey, soaps, organic eggs and others with higher value; successful cases of direct sales to customers; conduction of workshops and events for education and customer awareness; achievement of value-added gastronomic projects; close relationship of the gastronomic sector with farmers and consumers; diversification of sales channels; direct link between farmers and supermarkets; political organisation and volunteer work to achieve fair prices (such as MPS's); collective sale of local products supported by the state; innovation in delivery scheme at home and stores; carrying out market studies; in the Montevideo market, meeting the demand for healthy products; new ways of communication through social networks; closer link of the intermediary with farmers and consumers.

Today's tools for building new relationships include everything from websites, blogs, live events and video presentations, online communities and social networks such as Facebook, Youtube, Twitter or

the companies' own social networking sites. Currently, customers give as much as they receive in the form of two-way relationships, with a more active role in providing ideas, funding (with crowdsourcing) and creating new products, with marketing content generated by themselves, with the dissemination of brand messages and interaction in customer communities, among other advances (KOTLER; ARMSTRONG, 2012). In Uruguay, these ideas coexist with the still very strong "word of mouth", which has a powerful impact on consumer purchasing behaviour. Words and personal recommendations from trusted friends, colleagues and other consumers often carry more credibility than those from commercial sources, such as advertisements or salespeople.

4.2 ALTERNATIVE CHANNELS, COLLABORATIVE MANAGEMENT AND OTHER INNOVATIONS: FOR WHOM?

Since the beginning of the 1990s, an ideology of virtuality began to take shape with certain ideas of technological futurism and a liberal excitement around the individual's potential. This was added to the rapid expansion of the Internet, a virtual territory that promised full freedom, horizontality, liberation from hierarchies, etc. (PALERMO *et al*., 2020). However, it is still observed how these ideals are connected with the powerful contemporary discourses about entrepreneurship and meritocracy. In some environments, conditions of workforce disadvantages and tensions between the "economy platform" and the logic of collaborative organisation are replicated.

Analysing the fruit and vegetable chain, we could observe that the projects of different participating actors can be divergent and contradictory (IRIARTE, 2013). Some actors still consider that "taking charge of the marketing of their products would be neglecting production, which is what we know and want to do". Others are focused on accessing better infrastructure first and then on attending sales. One farmer stated: "direct marketing requires a lot of work, we launched with enthusiasm, and then we get tired... it must be made economically viable for us as well".

Many would like to implement more technology in the productive sector to reduce labour, although it requires a large investment: "We would like to have more support or publicity, but we prefer not to get involved in credits, even if low-interest alternatives are offered".

Many of the mentioned innovations were triggered by the pandemic or other crises. "During the pandemic, consumers were diverse in terms of profile. The interest was in direct delivery". Most farmers join, but do not necessarily carry out, communal activities except in specific initiatives for sale. Those who share sales agree on the need to plan collectively to avoid overproduction and overlapping items. "Our challenge will always be the gradualness of production: we need to stagger to sell fresh products". They also identify competition problems related to the allocation of products.

Inside cooperatives, in certain cases, a recent drop-in communal activity can be attributed to external achievements discouraging internal organisation. In others, the functioning of farmers' organisations is threatened because they were born from political imposition. Similar issues are reported for Uruguayan livestock farmers (COURDIN, 2021).

These facts, together with the permanence of problems of distribution, poverty and productive structure in Latin America and East Asian countries, bring again the importance of implementing public policies that support value addition through territorial development and productive diversification (as suggested by the interviewees), and the need to have new instruments that allow us to understand the dynamics of these challenges (LÓPEZ; MUÑOZ, 2015), also contemplating the vulnerability of the positions that are no longer filled in this reorientation, as suggested by Midgley (2000), facilitating their transition process.

"Territorial development" should be considered as a conflictive and contradictory process that is not limited to productive or material aspects but also comprehends social positions, claims of traditions, representations of nature and the preserved links by local society (IRIARTE, 2013). This notion is aligned with systemic concepts of innovation (BIANCO, 2020; MIDGLEY, 2021) and value-adding (CARENZO, 2007; CHAMPREDONDE; COSIOROVSKI, 2016), and together they allowed us to place people in the centre of this intervention, bearing in mind the multiplicity of aspects inherent to human activity, appreciating the diversity of objectives, motivations and limitations of the actors involved, and understanding that the direction of actions results from power struggles.

5 FINAL REFLECTIONS

This research aimed to study the Uruguayan fruit and vegetable market with its main actors; delving into particularities and opportunities for technological innovations and collective management. Seeking to illustrate the richness and variety of perceptions, Soft Systems methodologies were implemented in action. It could be recommended to extend this study if the objective was to have a representative national sample, but we prioritised quality debate and knowledge around the sector.

We consider that this approach contributes to building a rich image, a holistic vision of the fruit and vegetable chain and its actors, that allowed us to observe and reflect on the complexity of the roles that actors adopt and the interactions and exchanges that happen, as well as to question the role of researchers and decision-makers.

This intervention enabled the generation of a discussion around the role of technological-social innovation for the sector, in which controversial discourses on strengths and weaknesses are observed, ending in important reflections on the opportunities and challenges for positive change and on the risks of marginalisation or social exclusion.

In particular, we discuss the appearance of alternative channels and other innovations promoted by the recent crisis linked to the start of the Covid-19 pandemic in 2020 and the challenges posed by climate change management, questioning the idea of "value addition".

Participants share their realities, delving into the vulnerabilities that each one faces from their part in the fruit and vegetable chain, explaining how they conceive power relations, and the stories behind their choices or innovations. Some peculiarities of the Uruguayan fruit and vegetable market could be observed: relationships of trust and transparency with intermediaries are highly appreciated but also questioned; there are concerns about the threat of price competition from regionally smuggled products. The benefits of remaining in informal businesses are often discussed, as well as the need for government support to meet the requirements of the formal market. Different profiles of entrepreneurs are seen: farmers that seem content with integrating a single role in the chain and maintaining their level of technology and those who constantly seek to occupy new places in the chain and implement novelties in their businesses. The search to integrate collective networks as a resilience mechanism stands out, especially in moments of crisis, but is also sometimes forgotten.

Having thought and shared solutions from the different roles that challenge us in daily life is perceived as a way of contributing to maintaining the social function of scientific research.

We arrive at notions of innovation and development that consider the diversity of aims of each project, placing people who plan them in the foreground, considering actions as a result of power struggles that occur in a territory, not only accounting for economical processes but also for 'non-material' dimensions linked to the social and environmental development of cultures.

Thus, this research continues by studying integral valuation initiatives in the rural sector through specific collaboration with farmers' groups who wish to innovate in marketing with the co-construction and implementation of digital platforms and other communication resources for their sustainable development (starting from their own notion of what this means), trusting that it can be a positive learning experience for the region.

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