How to “flip the tortilla”: Exploring opportunities for a more sustainable food system in Spain through TEK-driven innovation

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ACKNOWLEDGEMENTS

I would like to thank my supervisors, Laura, Federica and Albert, for your helpful advice and feedback, trust and motivation during the last nine months. Thank you, Laura, for always being there, despite the many miles between us, and especially for your spot on comments. Gràcies, Federica, for being such a great support in the field, this was so much more than what I could have expected.

Special thanks to my interviewees for inspiring me and taking the time to participate in this study. Without you, this thesis would not have been possible.

Many thanks also to my class for creating a better ‘future’, my thesis group for the help and constructive feedback throughout the year and Sara, for proofreading my thesis.

I am grateful for all the hospitality I have experienced in Spain. Thanks to the many people that I encountered during my journey for sharing stories, meals and sometimes even your house with me.

Finally, I would like to thank my family for the unconditional support. Vaida and Paloma, for being my second family in Stockholm and Alessio for the motivation and love and ensuring my work-life balance during the final sprint of the thesis.
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ABSTRACT

The modern global food system is a main driver of the Anthropocene: Food production entails profound global environmental changes from greenhouse gas emissions to biodiversity loss. Shifting diets further impact planetary and human health. Innovative approaches are needed to shift towards more sustainable, equitable and healthy food systems. Following the ‘Seeds of Good Anthropocenes’ project, this thesis analyses innovative initiatives that have the potential to make the food system more sustainable. More specifically, building on the increasing recognition of the importance of traditional ecological knowledge (TEK) in sustainable food systems, this thesis explores initiatives that are using TEK to improve food systems in Spain. This study conceptualizes the food system as a complex social-ecological system and builds on transformations theory, the concepts of social-ecological innovation, leverage points and TEK. It uses a case-study approach and is set in three different regions in Mediterranean Spain, where I conducted and analyzed 12 semi-structured interviews with food seed initiatives. I found that the initiatives’ main drive was towards enhancing food values that are linked to traditional food production, which are not currently widely appreciated. The presence of TEK can inspire different innovations within the food system, whereas the absence of TEK can present barriers to innovation. Most importantly, the absence of gastronomic knowledge among consumers on how to process and prepare local varieties and species was found to hinder the implementation of shorter value chains, that are recognized as an efficient approach for sustainable food systems. By reintroducing gastronomic TEK, direct consumer-producer links were strengthened. Such innovative applications of TEK can help to safeguard biocultural diversity that is crucial for the transformation of food systems towards sustainability. I suggest that taking into account the presence of TEK can enhance the success of conventional systems of innovation that emphasize scientific and technological knowledge.
1 INTRODUCTION

We have entered the Anthropocene, a geological epoch characterized by humans being the dominant force shaping the Earth System (Crutzen 2002; Rockström, Stordalen, and Horton 2016). The advent of the Anthropocene brings with it high uncertainty, as human activities are set to trigger irreversible environmental change and thus undermine human wellbeing (Rockström et al. 2009).

The current food system, comprising all food related activities from production to consumption and disposal of food (FAO 2014), is one of the main drivers of the Anthropocene (Rockström, Stordalen, and Horton 2016). Thus, it is a key sustainability challenge (Allen and Prosperi 2016). Dietary habits and consumption patterns are increasingly shifting towards a diet high in animal- and low in plant-based products, putting further pressure on the planet, as the former are generally less calorie-efficient, more resource intensive and emit more greenhouse gases (Garnett 2016; Gordon et al. 2017; West et al. 2014).

Other scholars also highlight the role of food production as a predominant driver of global environmental change; e.g. agriculture is the single largest source of greenhouse gases accounting for 20-35% of global emissions (West et al. 2014; Vermeulen, Campbell, and Ingram 2012); land clearance for crop cultivation is causing habitat loss (Allen and Prosperi 2016) and overexploitation of commercial fish species are pressuring coastal ecosystems (Jackson et al. 2001). Gordon et al. (2017) have found that food production has significant impact on climate change, biogeochemical flows, biodiversity, and land system change. These are four out of nine planetary boundaries that indicate a safe operating space for humanity (Gordon et al. 2017; Rockström et al. 2009). The planetary boundaries of biodiversity and biogeochemical flows have already entered the zone of high risk, mainly due to food production (Gordon et al. 2017). However, there are regional differences to this observation.

One example of an extant biodiversity hotspot is the Mediterranean region and, in particular, Spain. Today, Spain is one of the countries with the highest biodiversity in the European Union (MAGRAMA 2014; Myers et al. 2000; Sánchez et al. 2013). Agrobiodiversity, referring to all components of biological diversity within agricultural ecosystems, is a prerequisite for a sustainable food system (Bioversity International 2017; Johns et al. 2013). Nevertheless, agricultural intensification and land-use changes are increasingly degrading its (agro-)biodiversity (Burlingame and Dernini 2011; Otero, Boada, and Tàbara 2013; Johns et al. 2013). Biodiversity is tightly coupled to cultural diversity (Pretty et al. 2009). In relation to Spain’s food system, the loss of agrobiodiversity and cultural landscapes is accompanied by the erosion
of traditional practices and knowledge that fostered this bio-cultural diversity in the past (Otero, Boada, and Tábara 2013; Burlingame and Dernini 2011). Moreover, biodiversity loss also has implications for culinary culture: it is an important pillar for food products that are used as ingredients for traditional recipes of the Mediterranean diet (MD) (Dernini 2011). The MD, a diet that has synergies with both sustainability and human health, is under further stress. In Spain, changes in lifestyle have triggered profound dietary changes (Gracia and Albisu 1999; Dernini and Berry 2015; Padilla 2008). Consumption patterns have shifted towards a very high fat intake, high dairy and moderate vegetable intake (Moreno, Sarria, and Popkin 2002; Bach-Faig, Fuentes-Bol, et al. 2011). More specifically, an increased consumption of animal food products such as meat and dairy (Muñoz-Pradas 2011), as well as a decrease in the consumption of staple foods such as cereals, potatoes and legumes has been observed (Bach-Faig et al., 2011). Refined products were found to be replacing these staple foods and fresh products (Bach-Faig, Fuentes-Bol, et al. 2011; Varela-Moreiras et al. 2010). This nutrition transition brings with it obesity and health risks (Moreno, Sarria, and Popkin 2002; León-Muñoz et al. 2012) that manifest themselves in form of increased food-related chromonic diseases (Dernini and Berry 2015), decreased life expectancy and increasing health costs (Rodríguez-Rodríguez et al. 2016; van Dooren and Kramer 2012). Due to these multiple challenges, the Spanish food system is in need for transformative solutions towards sustainability – in other words: we need to ‘darle la vuelta a la tortilla’ (‘flip the tortilla’).

This thesis is framed by the “Seeds of Good Anthropocenes”\(^2\) project (SOGA) that identifies and collects so-called ‘seeds’ that are potentially transformative. Seeds are defined as small-scale, experimental projects and initiatives that exist at the margin of the current system, employing new ways of thinking or doing (Pereira et al. 2018; Bennett et al. 2016). The project’s goal is to counterbalance current dystopian future visions that may be inhibiting our ability to move towards a positive future.

### 1.1 AIM & RESEARCH QUESTIONS

Considering the multiple synergistic linkages between traditional ecological knowledge (TEK), biodiversity and sustainable food systems (FAO 2009; Téllez-Muñoz and Zografos-Johnsson 2014), this thesis explicitly focuses on food-seed initiatives in Mediterranean-continental Spain that emphasize the use of TEK with regard to natural resources and their management, the

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1 The Spanish saying ‘flipping the tortilla’ refers to a fundamental change.

2 For more information visit: [https://goodanthropocenes.net/om/](https://goodanthropocenes.net/om/)
practices and techniques of food production and processing, and the skills of preparation of food and its entrepreneurship. Some scholars suggest that innovative applications of TEK can help tackle today’s food system challenges, especially by contributing to the conservation and improvement of genetic seed diversity (FAO 2009; Téllez-Muñoz and Zografos-Johnsson 2014). Therefore, the primary aim of this thesis is to further explore the linkages between social-ecological innovation and TEK by answering the wider research question:

**(How) are food seed initiatives using TEK to innovate for a more sustainable Spanish food system?**

More specifically, this will be done by answering the following research questions:

1) *What dynamics characterize Spain’s food system?*

2) *What ‘seeds’ exist that could contribute towards a more sustainable and culturally appropriate Spanish food system (referred to as ‘food seed initiatives’)?*

3) *What opportunities exist for TEK-driven innovation in local food systems in Mediterranean Spain?*

Overall, this thesis contributes to current research by investigating food systems, which are a key challenge for sustainability. More specifically, the case-study approach allows analysis of concrete examples of TEK-driven innovations that can be regarded as ‘seeds’ for a potential transformation of Spain’s food system.
BACKGROUND: MEDITERRANEAN DIET AND NUTRITION TRANSITION

Over centuries, the Mediterranean diet (MD) has shaped both the ecological and the social dimensions of Spain’s food system. Indeed, the Mediterranean landscape and the diet are tightly linked (Zurayk 2012), or with the words of the Catalan writer Josep Pla “cooking is the landscape in a pan” (Fava et al. 2016). The history of Mediterranean Spain is a history of constant responding to cultural and environmental changes, transmitting and recreating knowledge and cultural identities from generation to generation (Otero, Boada, and Tàbara 2013; Ansón and Postigo 2014). The cultural landscape in Spain is thus a result of the presence and influence of different cultures and traditions, from different parts of the world, that have influenced and enriched the region with different food products and culinary techniques contributing to a unique bio-cultural diversity (Ansón & Postigo 2014; Farina et al. 2003). In this co-evolution between humans and nature, a large body of TEK underpinned largely by biodiversity and respect for the land has been generated (Johns et al. 2013; Pardo de Santayana et al. 2014). Among the former are farming practices and other production related knowledge (Berkes 2008). In Spain, such traditional farming practices are tightly linked to food products that belong to the so-called MD. According to UNESCO and the Fundación Mediterranea, the MD is more than a diet, it is considered a philosophy and a life-style based on the way of eating, cooking, caring for and connecting with the environment (Ansón and Postigo 2014). Following this logic, food constitutes an important part of the Spanish cultural heritage and identity (Medina 2005). Tribute is paid to the territory and environment via the consumption of regional and seasonal products from sustainable cultivation (Ansón and Postigo 2014; Burlingame and Dernini 2011). Therefore, the MD has been claimed to be particularly recommendable from a sustainability perspective (Medina 2011; Dernini and Berry 2015). With recognition of the environmental and social perks UNESCO declared the MD as an Intangible Cultural Heritage of Humanity in 2010 (UNESCO 2014).

Despite the widespread use of the term MD, there is not a unanimous definition. Definitions vary according to the historical time, nationality of the authors and geography, but there are certain features inherent to most interpretations of the MD (Trichopoulou et al. 2014). Davis et al. (2015) have synthesized that the ‘typical’ MD is characterized by high intake of vegetables and fruits, cereals, legumes, nuts and (cold pressed) olive oil, a moderate consumption of fish, meat, dairy products and red wine and low intakes of eggs and sweets. Besides the mere nutritional components, Davis et al. (2015) point out that various studies emphasize traditional practices on how food is prepared and in which circumstances it is prepared.
Until the 1960s, the Spanish diet was characterized as such a typical Mediterranean Diet (MD) (Gracia and Albisu 1999). However, nowadays, eating habits are changing and the MD is less and less present in the everyday life of the Spanish population (Varela-Moreiras et al. 2010). Instead, a “nutrition transition” towards ‘westernized’
1 dietary habits (sometimes also referred to as modern or northern dietary habits) can be observed. The nutrition transition is characterized by more processed food, such as ready-made sauces and refined cereal products, implying more sugar and fat, higher consumption of meat and less cereals, legumes and fresh vegetables (Bach-Faig, Fuentes-Bol, et al. 2011; Varela-Moreiras et al. 2010; Moreno, Sarría, and Popkin 2002; León-Muñoz et al. 2012). Since the MD is increasingly being abandoned, this study uses the term MD to refer to the traditional diet before 1960 (Davis et al. 2015; Trichopoulou et al. 2014).

These dietary changes are accompanied by changes in cooking habits and skills: a study on food agency found that cooking skills among younger women are decreasing in comparison to women in older generations, whereas more men in younger generation cook than in older generations (García-González et al. 2018). The study also found that men prefer ‘quick’ cooking techniques, such as deep frying and microwaving, whereas women tend to use more ‘slow’ cooking techniques, e.g. stews, that are considered to be more traditional (García-González et al. 2018). Generally, slow cooking techniques are less common nowadays and have been replaced by the purchase of ready-made dishes or simpler recipes (Medina 2005).

This dietary shift is contributing to environmental degradation (biodiversity loss and climate change), loss of cultural heritage (Ansón and Postigo 2014) and health problems and obesity among the Spanish society (FAO and CIHEAM 2015; WHO 2013; Ansón and Postigo 2014). In 2011 62.0% of the Spanish population was overweight and 26.6% obese (Dernini and Berry 2015). Consequences are food-related chromonic diseases, decreased life expectancy and increasing health costs (Dernini and Berry 2015; Rodríguez-Rodríguez et al. 2016).

The dynamics leading to the loss of the traditional food culture are of various, often intertwined, social and ecological nature and will be further explored through RQ1. In RQ2 and 3 food seed initiatives and their innovative responses to the dynamics of RQ1 will be analyzed.

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3 The term westernized diet often refers to U.S. food consumption patterns and not per se to the geographical local. Therefore, when using the term ‘westernized’ it does not imply that Spain does not belong to the West.
3 THEORETICAL AND CONCEPTUAL FRAMEWORK

This thesis theoretically and conceptually builds on three bodies of literatures: firstly, the object of this study, food systems are conceptualized as social-ecological systems (SES); secondly, social-ecological transformation theory and the related innovation and leverage points concepts are used to analyze potential changes within the food system. Finally, the concept of traditional ecological knowledge is applied to shed light on the cultural dimension of the food system and to assess what elements from the past can be conceptualized as potentially innovative.

3.1 FOOD SYSTEMS AS SOCIAL-ECOLOGICAL SYSTEMS:

This thesis uses a social-ecological systems (SES) approach whereby humans are an integrated part of nature (Folke et al. 2016). Consequently, humans are “shaped by, dependent on, and evolving with” the capacity of the biosphere to sustain mankind, at the same time, as “people, communities, economies, societies, cultures” shape the biosphere (Folke et al. 2016, 1). System’s thinking is characterized by taking a holistic and systemic view and paying special attention to the interconnectedness of elements and the emergent properties of the system as a whole (Meadows 2009; Richardson and Midgley 2007). As such, it can help to capture and further understand intertwined dynamics of social and ecological change (Meadows 2009; Richardson and Midgley 2007; Abson et al. 2017).

The food system is just such a complex, adaptive SES, with multiple interactions between humans and nature (Allen and Prosperi 2016; Marshall 2015; Gordon et al. 2017; Schipanski et al. 2016). According to Ericksen (2008) the food system can be defined as:

- The chain of activities within the food system: production, processing and packaging, distributing and retailing, consumption;
- the interactions between and within bio-geophysical and human environments, determining the above-named food activities;
- the outcomes of these activities.

For example, food production both impacts and is dependent on a well-functioning ecosystem (Allen et al. 2014). Moreover, food is an important component of human culture and diets are ultimately related to human health (Gordon et al. 2017; Murcott 1982). Ericksen (2008) highlights that not all links between the social and ecological components within the food system are as apparent as in the example above. Thus, the conceptualization of the food system as a SES can serve as an analytical tool to better capture and understand the interconnectedness
3.2 SOCIAL-ECOLOGICAL TRANSFORMATIONS: INNOVATION AND LEVERAGE POINTS

Food systems, and in particular agriculture, are main causes of economic, social and environmental unsustainability and therefore central to debates over sustainability (Allen and Prosperi 2016). Consequently, a transformation of the food system towards sustainability is necessary in order to stay within planetary boundaries (Kahiluoto et al. 2014). Social-ecological (SE) transformations are defined as processes that fundamentally alter human and environmental interactions and feedbacks and thus reorganize SES structures, properties and controls (Andrachuk and Armitage 2015; Chapin et al. 2010; Biggs, Westley, and Carpenter 2010). Building on this notion, Folke et al. (2011) claim the necessity to reconnect people to the biosphere, and understand humans and nature as an “integral whole”. Therefore, SE transformations should ensure planetary health, which is fundamental for human wellbeing today and in the future (Olsson, Galaz, & Boonstra 2014; Pereira et al. 2015).

To achieve this, there is the need for creative solutions and innovation (Olsson and Galaz 2012). Innovation can be a key mechanism supporting transformations to sustainability, if it is able to alter the current system’s path and open up new trajectories towards sustainability (Olsson et al. 2017; Olsson and Galaz 2012). Innovation has always been of great importance for society, as it is fundamental for adaptation to novel changes that humans are facing. Yet, the questions remains what innovation is and what type of innovation is needed, as there are many different definitions of innovation (Gupta, Tesluk, and Taylor 2007).

Following the etymological origin of the word, ‘novus-‘ deriving from Latin meaning ‘new’, the concept of “newness” is central to almost every definition of innovation (Gupta, Tesluk, and Taylor 2007). Although innovation is often conceived as something positive, the past has shown that innovations can start or even reinforce unsustainable trajectories when not taking into account social and ecological dimensions (Olsson and Galaz 2012). For example, the use of mobile technology in Bangladesh to inform pregnant women about healthy practices is desirable from a social perspective. However, the spread of mobile technology is causing significant use of non-renewable resources and environmental degradation (Olsson et al. 2017). Therefore, this study engages with social-ecological (SE) innovation. SE innovation based on
the definition of social innovation and includes the “reference to new technology, strategies, concepts, ideas, institutions, and organizations that enhance the capacity of ecosystems to generate services and help steer away from multiple earth-system thresholds” (Olsson and Galaz 2012, 240). SE innovation differs from other innovation studies by emphasizing that the innovation needs to improve human wellbeing and ensure environmental sustainability, which follows the acknowledgement of the interdependence of social and ecological systems (Olsson et al. 2017).

To understand how innovative, small-scale initiatives can induce change in SES, the SOGA theory of change, which integrates the socio-technical transitions framework (Geels 2002) and the stages of social-ecological transformations (Moore et al. 2014; Olsson et al. 2006), is applied. According to Pereira et al. (2018) change occurs in three phases; the preparation, the navigating the transition, and the consolidation phase. The former can be subdivided into three sub-phases of sense-making, envisioning and gathering momentum. Sense-making, which is the focus of this thesis, is characterized by a growing awareness of a systemic problem at a macro level that inspire innovative small-scale experiments emerging as responses. However, SE innovations do not always lead to large-scale transformations (Westley et al. 2011). Moore, Riddell, & Vocisano (2015) developed a framework to explain how changes at the micro- and meso-level can lead to macro-scale change by scaling up, out, and deep, complementing social entrepreneurship studies that largely focus on scaling out. By scaling out, the authors refer to replicating and impacting greater numbers, following the notion that many innovations never spread. Scaling-up refers to affecting everyone in need of the SE innovation or to impacting law, policy and institutions in order to address the root causes of social problems. Scaling deep involves changing underlying values and culture, as change needs to be “deeply rooted in people, relationships, communities and cultures” (Moore, Riddell, and Vocisano 2015, 4).

Nevertheless, Pereira et al. (2017) noted that the understanding of how macro-scale change can occur is still somehow limited. This understanding can be advanced by the concept of leverage points that analyses where to intervene for successful system transformation. Leverage points are places in the system where a small change can result in a large shift in behavior and are therefore also referred to as “points of power” (Meadows 2009). However, the effectiveness of

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4 According to (Westley and Antadze 2010) social innovation is defined as: “a complex process of introducing new products, processes or programs that profoundly change the basic routines, resource and authority flows, or beliefs of the social system in which the innovation occurs.”
interventions within a system is dependent on where they are placed in a system. Meadows (2008) has identified 12 different leverage points which were grouped by Abson et al. (2017) into four different characteristics: intent, design, feedbacks and parameters. Parameters are defined as relatively mechanistic characteristics. Feedbacks are the interactions between those parameters. Design refers to social structures and institutions managing them and intent to values, goals and worldviews, design to. The degree of effectiveness of a leverage point typically decreases with feasibility of implementation. “Parameters” and “feedbacks” are considered shallow leverage points, whereas places representing a “design” or “intent” intervention are regarded as deep leverage points. Abson et al. (2017) and Meadows (2008) argue that most interventions for sustainability have focused on tangible, but weak leverage points and that the effectiveness of these is constrained by the hierarchy of the four system characteristics.

Innovation and leverage point scholars have both pointed out that interventions must challenge the system that has created the problem in the first place, especially considering the structures, values and goals underpinning the complex problems (Westley and Antadze 2010; Abson et al. 2017).

### 3.3 TRADITIONAL ECOLOGICAL KNOWLEDGE

Traditional ecological knowledge (TEK) is defined as “a cumulative body of knowledge, practice and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relation of living beings (including humans) with one another and the environment” (Berkes 2008). It is especially relevant when relating to food systems, as it underpins agrobiodiversity and contributes to human wellbeing by sometimes positively impacting nutrition and health (Berkes, Colding, and Folke 2000). There is growing evidence that biodiversity and cultural diversity (including TEK) are positively linked (Pardo-de-Santayana et al. 2014; Pretty et al. 2009). Traditional knowledge is central to maintaining and managing ecosystems because cultural practices are often dependent on specific elements of biodiversity. Despite the increasing recognition of TEK, the word “traditional” is often still associated with antiquity, inefficiency and stagnation and regarded as outdated and obsolete (Nugraha 2005; Cannarella and Piccioni 2011; Mgbeoji 2010). This notion does not capture that TEK is dynamic, constantly evolving body of knowledge based on transmission and continuity (Berkes, Colding, and Folke 2000). The Latin etymological roots “tradere” which means “to transmit” or “to send”, do not only link traditions to the past, but also to the future (Cannarella and Piccioni 2011). This is the interpretation used in this study.
Some scholars highlight that deliberately overlooking past problems can lead to romanticizing and idealizing the past and point out that returning to the “traditional” way of living is no longer feasible, as society has changed with the time (Briggs 2005; Wane, Kempf, and Simmons 2011; Matsui 2015). TEK should therefore not be regarded a panacea and should be complementary rather than replace scientific knowledge and modern techniques (Berkes, Colding, and Folke 2000). In line with this thought is the idea of applying TEK in innovative ways in the food system to provide solutions both within and outside the communities that hold the critical traditional knowledge (Téllez-Muñoz and Zografos-Johnsson 2014; FAO 2009). Cannarella and Piccioni (2011) point out that innovation has limited success when the specific cultural environment is not taken into account. Thus, building a link between TEK and innovation might enhance the success of the SE innovation. Moreover, Cannarella and Piccioni (2011) suggest that re-inventing and the re-appropriation of cultural heritage and traditions are especially crucial for future sustainable agriculture. Yet, literature on the relationship between the two concepts is scarce. Therefore, this thesis aims to further explore the link between innovation and TEK by answering the question: How are food seed initiatives using TEK to innovate for a more sustainable Spanish food system?
4 METHODS

This thesis is based on the view that humans and nature are deeply intertwined. This ontological belief aligns with SES systems thinking, where humans and nature are regarded as interconnected (Levin et al. 2013; Folke et al. 2016). There are causal relationships between the elements that compose a SES (McGinnis and Ostrom 2014; Midgley and Richardson 2007). Therefore, as outlined in the theory section above, this thesis analyses the Spanish food system through a system’s lens. Systems thinking is well-suited for sustainability science, as it has the capacity to acknowledge complexity and enable integration across often disparate aspects of sustainability (economic, social and environmental), rather than taking a disciplinary and compartmentalized approach trying to address each element separately (Abson et al. 2017; Liu et al. 2015).

However, due to its complexity, our ability to understand the interconnections within SES remains limited (Midgley and Richardson 2007). Therefore, following a qualitative research strategy and an interpretivist epistemology, I focus on how individuals, or – in this study – the people running, managing and starting the seed initiatives, make sense of the world, their perceptions and experiences of the dynamics within the Spanish food system. Human behavior, including the interventions of the initiatives, is regarded as a product of how people interpret the world (Bryman 2012). The qualitative approach enables to get rich, qualitative data allowing for contextual understanding of the food seed initiatives in Spain and their approaches to address perceived problems within the food system (Bryman 2012).

4.1 DATA COLLECTION

4.1.1 SAMPLING

A two-step sample method was employed for the identification of food seed initiatives (Bryman, 2012, 460): In a first step, a sampling of context was performed, choosing the regions where the study was carried out. In a second step, initiatives per region were sampled.

Due to the limited scope of this thesis and restrictions concerning time, logistics and resources, the study focused on three autonomous communities as study sites within the Mediterranean-continental Spain:

1. Catalonia (north-east Spain)
2. Madrid (central Spain)
3. Andalusia (southern Spain)
The choice was based on networks in place due to existing research cooperation with the chair of Agroecology of the University of Vic-Central University of Catalonia (UVic-UCC) and aimed at offering a wide geographical diversity within continental Spain. Such diversity entails biophysical and climatic diversity as well as culinary and socio-economic diversity (see Figure 3). Both Catalonia and Andalusia have a Mediterranean climate, with relatively mild winters and very warm summers, while Madrid has a Mediterranean-continental climate, which is also characterized by very warm summers, but has colder winters (Instituto Geográfico Nacional 2018). Economically, Madrid is the wealthiest of the three regions, with the highest GDP per capita, followed by Catalonia, whereas Andalusia has one of the lowest GDP per capita within Spain. Moreover, Andalusia has Spain’s highest unemployment rate with approximately 29% in 2016, whereas both Madrid and Catalonia are below the Spanish average (ca. 20%) with approximately 16% of unemployment (Instituto Nacional de Estadística 2018). Moreover, the importance of the primary sector varies among all regions: In Madrid, the service sector is the most important, whereas Catalonia’s economy relies on industry. Andalusia is the autonomous community with the biggest share of agriculture of the GDP (see Figure 1).

**FIGURE 1: CLIMATIC MAP OF SPAIN, SHOWING THE ROLE OF AGRICULTURE, REPRESENTED AS THE SHARE OF GDP FOR THE THREE DIFFERENT AUTONOMOUS COMMUNITIES. MAP ADAPTED FROM IHMC PUBLIC CMAPS. DATA FOR PIE-CHARTS IS FROM 2015 FROM THE REGIONAL STATISTICAL INSTITUTES (CATALONIA, MADRID AND ANDALUSIA).**

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4.1.2 IDENTIFICATION OF FOOD SEED INITIATIVES

Generic purposive sampling, which is a type of non-probability sampling selecting participants because they meet pre-determinant criteria by the researcher, was employed for the selection of food seed initiatives (Given 2008). This sampling strategy suits the design of a Master’s thesis...
as it is very time and cost-effective (Bryman 2012). More specifically, a deviant sampling strategy way chosen to identify initiatives that diverge from the norms of the current food system and challenge the current world by employing new ways of thinking or doing, aligning with the SOGA project (CST-GRAID 2017; Bennett et al. 2016). There is a variety of perspectives on what constitutes a desirable future and there are no means to objectively determine what actually constitutes a ‘good’ and responsible Anthropocene due to the high uncertainty that the Anthropocene brings with it (Preiser, Pereira, and Biggs 2017). Therefore, the SOGA project aims to be inclusive involving initiatives from a wide range of diverse disciplines, worldviews, values, and regions. Such diversity can enable more robust and resilient innovation responding to our current and future needs (Leach et al. 2012). Following this reasoning, the inclusion of the initiatives was based on the following a-priori criteria:

- Diverse small-scale initiatives, employing new ways of thinking or doing and existing at the margin of the current system.
- Place-based, meaning that they operate on a local and not on a national scale.
- Emphasize TEK.
- Address social-ecological issues around agri-food systems and fisheries.

To evaluate if TEK is emphasized, a key word search on the website of the initiatives was performed. The following key words were used: “tradicional” (traditional), “artesano” (artisanal), “popular” (popular), “patriomonio (cultural)” (cultural) heritage, “dieta mediterránea” (Mediterranean Diet), “saberes campesinos” (farmers’ knowledge). For the identification of a sample of food-related seeds in Spain, keyword web search on Google was conducted. I then expanded the sample consulting expert opinions from local researchers and policy actors within the fisheries department, revising grey and white literature and browsing the database “EcoZoom” 6 of social movements in Spain. Moreover, annual awards for innovation for rural women 7 provided by the ministry of agriculture, fisheries and food and the environment, Ministerio de Agricultura y Pesca, Alimentación y Medio Ambiente (MAPAMA), were examined. Finally, interviewees were also asked to provide information about other potential initiatives that might be worth including in the study. This method, called

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5 Livestock was excluded from this study, as a PhD student from the research team in Spain is already covering this aspect of the food system.

6 http://ecozoom.mapunto.net

snowball sampling, was a useful way to complement the initial sample of initiatives, as there are no pre-existing lists of initiatives matching the criteria described above and thus makes them difficult to find (Given 2008). If the suggested initiatives matched all criteria listed above they were also included. From the initial list of initiatives, four were excluded either as they were not available for an interview during my stay in the field, or because during the interview it was not possible to obtain the information requested for including them in the analysis. See Figure 2 for the final list of initiatives included in this study. The categories are not mutually exclusive and were derived from a first clustering before conducting the interviews by looking for common themes among the initiatives. These categories were reorganized after the interviews (see Appendix III for attributes that were used in the clustering).

**FIGURE 2: MAP OF SEED INITIATIVES IN SPAIN WITH ID CODES OF THE INITIATIVES. CLICK [HERE](#) FOR ACCESSING AN INTERACTIVE MAP CREATED WITH BATCHGEO.**

### 4.1.3 INTERVIEWS

A series of semi-structured interviews were conducted with key informants of the seeds allowing for refining the focus of inquiry and the emergence of new, unexpected topics (Srivastava and Hopwood 2009). Key informants were chosen, as the initiatives in most cases involve various people and it was important to interview a person with specialist knowledge about the initiative, the historic development and the current state of it as well as other people involved. Moreover, this approach was preferable from an ethical point of view; members of the initiatives that are more directly involved with the production activity or who work within...
food service have very busy working schedules, therefore I avoided asking them to give up time for the interview. This research project follows the Ethical Guidelines from Stockholm University and UVic-UCC. All interviewees explicitly agreed to participate and be named in the study, as well as being recorded during the interviews.

Before each interview, a literature search on the initiative was conducted in order to have a comprehensive understanding of the initiative. The interview was divided into four blocks; first, exploring the biophysical and organizational aspects and then following a chronological order covering the past (foundation and development of the initiative) and present (current activities, innovative features and use of traditional knowledge) and finally, as a component of the SOGA method, exploring future visions. Due to the limited scope of the study, the later was not used in the analysis. All interviews were conducted in Spanish. The translated interview guide is attached in Appendix I. The interviews lasted between 45 minutes and 2 hours 20 minutes, with an average of 1 hour 30 minutes. A table with the description of the key informants and length of the interviews can be found in Appendix II. All the interviews were transcribed verbatim (Gibbs 2007). In one case the audio file was unusable due to very bad audio quality and thus analyzed only with the help of notes taken during the interview. Each transcript was compared with the original recording to ensure accuracy and minimize potential bias introduced while transcribing.

**4.2 DATA ANALYSIS**

**METHODS & ANALYSIS PER RQ**

<table>
<thead>
<tr>
<th>RQ1</th>
<th>INTERVIEWS</th>
<th>Attributes for clustering</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Interview guide structure</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Part 1: Background</td>
<td></td>
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<tr>
<td></td>
<td>Part 2: Past trends &amp; dynamics</td>
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<tr>
<td>RQ2</td>
<td></td>
<td>Literature search on dynamics</td>
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<td></td>
<td>Part 3: Present</td>
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<tr>
<td>RQ2&amp;3</td>
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<td></td>
<td>Self-definition of innovation</td>
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<tr>
<td>RQ3</td>
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<tr>
<td></td>
<td>TEK</td>
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</tbody>
</table>

**QUALITATIVE CONTENT ANALYSIS**

Mixed inductive-deductive coding approach using the following concepts:

- Food values (Luk & Briggerman 2009)
- Scaling of SE innovations (Moore, Riddell, and Vociamo 2015)
- SE innovation (Olsson & Galaz 2012)
- TEK (Berkes 2008)
- Leverage points (Abson et al. 2017)

**FIGURE 3: OVERVIEW OF METHODS AND ANALYSIS IN RELATION TO THE DIFFERENT RESEARCH QUESTIONS. COLOUR CODES: BLUE STANDS FOR METHODS AND GREEN FOR ANALYSIS.**
As presented in Figure 3, the main method for data collection were interviews. After conducting the interviews, the data was organized according to attributes (see Appendix III). The interviews were consequently analyzed with qualitative content analysis. This analysis method, which involves the process of categorizing and clustering qualitative textual data, was used to identify patterns and categorize the data into fitting themes around dynamics of the food system, innovation and the use of TEK. This approach provides openness and the ability to deal with complexity, taking a holistic and comprehensive approach that allows to cover the complexity of the social situations of the initiatives and additionally is well-suited for theory-guided analysis (Kohlbacher 2005; Given 2008). Consequently, a mixed, inductive and deductive coding approach was chosen; SE innovation and leverage point concepts were used to create broad, initial code categories, that were refined during the process, as well as keeping flexibility for the emergence of new themes (Srivastava and Hopwood 2009; Bryman 2012). The categories were refined iteratively by drawing out recurring themes and key words during the coding process and comparing them to the concepts. The interviews that were used for the first coding round were re-coded after the last interviews had been coded to ensure consistency of coding. For the coding, the qualitative coding software, Atlas.ti, was used. All interviews were coded in the original language, Spanish, in order to minimize potential bias. Only the illustrative quotes used in this thesis were translated. All translations were aligned with an independent translation from a Spanish-English speaking person and sent to the initiatives for approval.

In the following sections, the analysis of each research question is unpacked in more detail.

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4.2.1 RQ1: WHAT DYNAMICS CHARACTERIZE SPAIN’S FOOD SYSTEM?
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In order to answer the first research question, in a first step, I openly coded for trends and dynamics that emerged during the interview. This was done by asking about and synthesizing factors shaping the development of the initiative (see Appendix I, for questions in the interview guide).

In a second step, the emergent themes were compared to the findings of a literature search on dynamics of the food system using Google Scholar and Web of Science. The starting point for this literature search were the key trends mentioned during the interviews. Hence, it was possible to a) assess if the perceived trends are supported by literature, and b) get more detailed information about possible causes of the trends mentioned, that were not evident during the interview.
4.2.2 RQ2: WHAT 'SEEDS' EXIST THAT COULD CONTRIBUTE TOWARDS A MORE SUSTAINABLE AND CULTURALLY APPROPRIATE SPANISH FOOD SYSTEM?

In a first step 12 food seed initiates were identified (see section ‘sampling strategy’ for more detailed information). Then, I openly coded the interviews for values regarding the food system. Later, I aligned them with Lusk & Briggeman (2009) food values framework in order to compare how the values the initiatives promote differ from the mainstream values among Spanish consumers that were identified by Gómez-Cantó, Martínez-Ruiz, & Izquierdo-Yusta (2018). For this purpose, after coding for the food values of the food value framework, I ranked the values according to the number of initiatives that were promoting the value. If more than one food value was promoted by the same number of initiatives, the total frequency of how often the theme was mentioned in all documents was decisive for the ranking.

In a next step, I clustered the initiatives according to their attributes in order to understand what themes were especially frequent among initiatives that share that same attribute. In the results section I only present the themes that all, or all but initiative within the same attribute group named. If the attribute group consists of less than four initiatives, all initiatives needed to bring up the theme.

Moreover, to answer both the second and the third research question, I coded for themes around the question what the initiatives self-defined as their most innovative features. After a first coding round, I coded all interviews again, specifically looking at whether the emergent innovative features were mentioned in other parts of the interviews, as, in some cases, other initiatives shared ‘innovative’ characteristics but had mentioned them in a different context. For answering the second research, I then aligned the themes that emerged with existing literature about scaling strategies of social innovations by Moore, Riddell, and Vocisano (2015).

4.2.3 RQ3: WHAT OPPORTUNITIES EXIST FOR TEK-DRIVEN INNOVATION IN LOCAL FOOD SYSTEMS IN MEDITERRANEAN SPAIN?

In order to answer the third research question, I aligned the themes that emerged with existing literature on leverage points, classifying the interventions according to the type of characteristics (intent, design, feedbacks, parameters) (Fischer et al. 2017).

Next, I coded the documents for traditional ecological knowledge. More specifically, I analyzed and coded questions from the third part of the interview guide dealing with TEK. Subsequently, the different practices, values and beliefs were organized according to the different stages of activities within the food chain. Moreover, I assessed why (e.g. what problems could be
addressed) and how the initiatives were using TEK, linking it to innovative features that had emerged.

### 4.3 LIMITATIONS

This study has several limitations:

- It has limited generalizability because examined initiatives are a small-scale non-probability sample that focuses on Spain and are therefore context-specific.

- Due to ethical consideration, key-informants instead of knowledge holders (e.g. farmers, fishers or chefs) were interviewed. Consequently, it was difficult to get nuanced information about the nature of the TEK employed in each initiative. Instead, key informants were often talking about knowledge on an abstract level. Embedded methodology with knowledge holders would have been better suited to elicit tacit types of knowledge.

- In some cases, the interviewees were researchers themselves. Hence, they were familiar with the jargon and sometimes even theories that are relevant to this thesis, which might have influenced their answers.

- The starting point for the literature search were the interviews, therefore not all important dynamics characterizing the Spanish food system are captured.

- The study can only suggest what aspects of the initiatives are potentially innovative: the interviews could only capture what the initiatives try to innovate, not if it has been successful, as the duration of a Master’s thesis is typically too short to assess the long-term durability needed for innovation. Additionally, innovations require critical review for social-ecological integrity (Olsson, et al. 2014).

- This study has focused on innovative applications of TEK for sustainability. However, it has not looked at the use of TEK that entail potential trade-offs with sustainable food systems. Such trade-offs have been identified in other parts of the world. For example, traditional fishing techniques, such as fishing by poisoning fish used in Kenya, can be destructive for the environment (Munyi 2009).
5 RESEARCH FINDINGS

In the following section, both the results and discussion will be presented for each of the research questions in order to aid the flow of the argument. Section 6 will provide a more in-depth discussion of the research findings.

5.1 RQ1: DYANAMICS OF THE SPANISH FOOD SYSTEM

During the interviews five main drivers that characterize the dynamics of the current Spanish agri-food systems emerged: the changes in lifestyle, the specifically changes in food waste management, the globalization of food markets, the consequent intensification of primary production sector and finally, the growing interest in food and gastronomy.

5.1.1 CHANGES IN LIFESTYLE

The changing lifestyle in Spain has strongly influenced consumer preferences and choices (Ansón & Postigo 2014; FAO & CIHEAM 2015; Moreno et al. 2002; interview 8, response 1 & interview 11, response 1). With less time available, many people prefer buying food in supermarkets rather than going to various small shops (interview 3, response 1). Supermarkets compete with the latter by offering a wide variety of products from all over the world and out of season, often at lower prices (Díaz Méndez 2013; Gracia and Albisu 1999). Hence, supermarkets shape consumer preferences respectively. Especially low-income households base their purchase decision on price rather than on the quality or origin of the product (FAO & CIHEAM 2015; Gómez-Cantó, Martínez-Ruiz, & Izquierdo-Yusta 2018; interview 12, response 2).

Moreover, the time available for cooking is decreasing, which led to an increased demand of processed, ready-made food, with negative implications for health. This can partly be explained by present-day high-speed lifestyles and has also been enhanced by the integration of women to the labor market (Florensa & Aragall 2012; Varela-Moreiras et al. 2010; interview 12, response 1; interview 8, response 1). Besides, the time for other food-related activities is becoming scarce; e.g. the time for sharing the meal and the traditional “sobremesa”, sitting together after the meal. In traditional Spanish food culture it does not only matter what they eat, but how they eat and the pleasure associated with eating (Burdese 2012; Díaz Méndez 2013; 8 See Appendix IV for a table with all quotes referred to in this section.}

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8 See Appendix IV for a table with all quotes referred to in this section.
interview 3, response 2). This form of relating to food enhances the appreciation and interest in traditional food culture (Burdese 2012; interview 3, response 2).

Another important development is that fewer generations live together, fewer meals are shared within the family and more processed food is consumed. Thus, especially young people often do not learn to appreciate the traditional food culture (FAO & CIHEAM 2015; Padilla 2008; interview 12, response 3). Moreover, intergenerational knowledge transmission, which is crucial for safeguarding traditional knowledge and practices around food, e.g. via cooking together, though still named as the most important source of cooking skills, has less and less importance (García-González et al. 2018).

Children often eat in school canteens. Therefore, their taste formation and formation of dietary habits takes place mostly outside the family (FAO & CIHEAM 2015; Varela-Moreiras et al. 2010). However, also in school canteens the food culture is lost, as highlighted by the following quote:

“Let's see, the problem is that the food culture was lost. And in the end, what is happening in schools is a reflection of what is happening in families. How many people cook at home? Every time less [people]. Fast rhythms, impossible working hours, activities ... And then people get used to dine fast, microwaved food. Pam pam and that's it. I just have to open a bag and eat. Well, that's what is also happening at school [canteens].”

This is because the majority of school canteens procure the products from large retailers and rarely prioritize local and seasonal products that are the base of the Mediterranean Diet (FAO & CIHEAM 2015; Soares et al. 2017; Soler 2011).

5.1.2 FOOD WASTE

The current food system brings with it a waste problem; Spain is the sixth largest producer of food waste within the European Union (Ministerio de Agricultura, Alimentación y Medio Ambiente 2013b). The largest share of food waste along the food chain occurs at the household level and during production and processing (Ministerio de Agricultura, Alimentación y Medio Ambiente 2013b). At a household level the main reasons for food waste are left-overs from meals (Ministerio de Agricultura, Alimentación y Medio Ambiente 2013b). The increase in household food waste can partly be explained by the erosion of food preparation and storage knowledge, as many traditional recipes deal with the utilization of left-overs, which is not necessarily true for globalized/modernized food culture (Hudson & Messa, 2015; interview 8, response 2).
As reflected by the following quote (Interview 11, response 1) there are various reasons for food waste within food production and distribution:

“Because you throw away food for a couple of reasons; because of aesthetic reasons, due to overproduction, because of falling prices of the products, or because the fruits or vegetables are already ripe.”

One major reason for waste within the primary production stage is overproduction on a farm level; especially when farmers, due to power structures, have binding contracts with retailers and try to balance out uncertainty due to adverse events like bad weather, currently aggravated by climate change, with needing to meet contractual obligations (Hudson and Messa 2015). Other reasons can be that the harvest does not meet the market’s procurement standards concerning size, quality, color, ripeness, etc. or that, due to price volatility the harvest is untenable for the farmer, as the selling price does not cover the production costs and consequently, products are left on the field. For the above-named reasons, it is difficult for the farmers to adjust supply to demand (Ministerio de Agricultura, Alimentación y Medio Ambiente 2013b; interview 11, response 1). In Spain, food waste and loss occurring within agriculture ranges between 22,5% and 28,4% depending on the product (Ministerio de Agricultura, Alimentación y Medio Ambiente 2013a). Food waste contributes significantly to the usage of natural resources and specifically to climate change, as energy, land and water are needed for the production of food that is ultimately wasted (FAO and UN 2011). Therefore, food waste further pressures the environment.

5.1.3 GLOBALIZATION OF FOOD MARKETS

The liberalization and globalization of the food market has significantly shaped the agro-food market. The entire food chain, from seed companies to food retailers, is characterized by concentrated market power exerting pressure on the producers (Gamboa et al. 2016; Gracia & Albisu 1999; Ruiz de Alda 2014), as exemplified by the quote “[…] the free market dynamics, when neither the producer nor the consumer have power, but only the intermediary” (Interview 12, response 4).

Big retailers have set procurement standards and requirements that producers need to meet. This drive low food prices, which especially puts pressure on small-scale farmers (Soares et al. 2017; interview 5, response 1; interview 12, response 5). Together, this change leads to a model of agricultural production that is no longer quality oriented, i.e. focused on the taste and sustainability of the production process (Burdese 2012; interview 3, response 3).
Moreover, food-miles, the distance the products travel between producers and consumers, increase steadily and, as a result, the emission of greenhouse gases related to the transportation of food also increase, impacting climate change (López et al. 2015; Soares et al. 2017; interview 12, response 6).

5.1.4 INTENSIFICATION OF PRIMARY PRODUCTION: AGRICULTURE AND FISHERIES

Driven by the globalization of the food market, production processes and techniques have changed to favor intensified agriculture, often in the form of monocultures and at the expense of small-scale and subsistence farming. There are less, but bigger farms; from 2000 to 2010 the number of agricultural households dropped by 23.1% and the average farm size increased by 18% (Eurostat 2012; Interview 12, response 7). This development can be explained by the decreasing profitability and the consequent marginalization of primary production (Cebolla-Cornejo, Soler, and Nuez 2007).

The decrease of family and subsistence farming moreover contributes to the genetic erosion of various local varieties. These farmers typically cultivated and exchanged local varieties, whereas intensified agricultural practices employed by industrialized farms that are oriented towards higher yields, usually grow standardized varieties for which seeds are bought rather than saved (Cebolla-Cornejo, Soler, and Nuez 2007; Pereira, Wynberg, and Yuna 2018; interview 6, response 1). Standardized practices are replacing traditional practices and thus trigger a loss of production related to TEK (Gómez-Baggethun et al. 2010).

Due to these drivers of change, biocultural diversity is declining and the Mediterranean diet heritage, with its healthy and nutritious food recipes that is dependent on the availability of traditional, local varieties, is endangered (FAO & CIHEAM 2015; interview 3; response 4). A further difficulty is the lack of appreciation of agricultural activities and the rural world by consumers, while cities, offering more and more diverse job perspectives and education, are regarded very attractive (Morán Alonso et al. 2017; interview 6, response 2). This explains the lack of young workers in food production activities (both in agriculture and fisheries) and the trend towards an aging rural population (Molina García 2013; Soares et al. 2017; interview 9, response 1). Moreover, agriculture in peri-urban areas faces challenges such as urban sprawl, spatial fragmentation, high land prices and in some cases land abandonment (Morán Alonso et al. 2017).
The fishing sector, a sector with a long tradition in Spain and an important element of the cultural heritage, is characterized by similar dynamics as the agricultural sector (Molina García 2013; interview 9, response 2); the traditional fishing sector suffers from raising costs of fishing equipment, especially fuel, on the one hand and stagnating prices for fish on the other hand, which together diminish the economic return margins from fishing. Traditional fishers have fewer possibilities to compensate for this, resulting in a trend towards big fishing fleets and less artisanal fishermen. Both artisanal fishers and large fishing industries contribute to overfishing: due to the high diversification of fishing techniques, gear and targeted species, monitoring efforts of artisanal fishers are mostly ineffective (Gupta 2017). The large fishing industry is problematic for two reasons: firstly, due to targeting already exploited large pelagic species that are favored by consumers, but are close to collapse, and secondly due to the use of unselective fishing methods, which lead to catching less valuable species that are then discarded (FAO & CIHEAM 2015; Greenpeace 2013; interview 4, response 1). The discard of less valuable species is enhanced by the fact that consumers often lack (traditional) knowledge on how to prepare less known species and therefore will not buy them (interview 9, response 3). This phenomenon is likewise true for certain native crop varieties and seasonal fish (interview 2, response 1).

All in all, the above-named dynamics have led to a loss of biocultural diversity in the form of biodiversity loss, the loss of TEK and, more broadly, the loss of food culture and therefore undermine the sustainability of the Spanish food system. These dynamics reflect to a certain extent trends of the global food system. For example, in their analysis of the global food system Ericksen (2008) and Gordon et al. (2017) have highlighted distancing of producers and consumers, concentration of market power of the retail sector, intensified production, lowered food quality, growth of processed food and health impacts of new dietary habits. Also the loss of biocultural diversity when replacing traditional foods by modern feeding habits has been reported in other parts of the world, e.g. in Kenya (Maundu 1996).

However, in Spain, there are also case-specific dynamics that potentially entail opportunities for making the food system more sustainable, especially through the increasing interest in food and gastronomy.

5.1.5 INCREASING INTEREST IN FOOD & GASTRONOMY

Both the interviews and academic literature suggest that food and cooking have become popular, which is reflected through the variety of social media posts and TV shows around food (García-González et al. 2018; interview 8, response 3). One important reason for this
development might be the rise of the “Spanish revolution”, led by Michelin-star chefs that combine creativity and tradition on their plates (Ansón and Postigo 2014). One strand of this movement is the vanguard (‘forefront’) cuisine. There are seven ‘laws’ of vanguard cuisine: surprise, dishes are eaten in small portions, all products have the same value, no limit between main course and desert, mix of different textures and temperatures, integration of sauces and garnish in the dish structure, and respect for primary products and flavor (Tortosa 2012; Club Gourmet Style 2008). As such, vanguard cuisine offers an opportunity for bricolage, by bringing in the traditional in the new cuisine. One example of this creative reinvention of traditions is the Aponiente restaurant, where many dishes have reference to the traditional cuisine. Some initiatives perceive that there is big interest in the Spanish revolution and vanguard cuisine (interview 8, response 3), (although not for its traditional base), while others report a tiredness with vanguard cuisine and a return to the traditional cuisine (interview 3, response 5):

“... a rising interest of the people for gastronomy. In Spain, we lived this effervescence of the vanguard cuisine. But then there came a moment when the people got tired of it and needed to comeback to something more authentic and familiar.”

Moreover, the interest in local and organic food is growing, although some initiatives are uncertain how long this interest will prevail and denounce the commercialization of the concept “organic” (interview 12, response 8; interview 2, response 2).

In the following section of the results, I will present 12 food seed initiatives that have innovative approaches to meet these challenges and make the food system more sustainable.

http://www.juntadeandalucia.es/institutodeestadisticaycartografia/iea/resultadosConsulta.jsp?CodOper=64&codConsulta=96413
5.2 RQ2: FOOD SEED INITIATIVES FOR A MORE SUSTAINABLE AND CULTURALLY APPROPRIATE FOOD SYSTEM IN SPAIN

In this section, I will first give a short description of each food seed initiative and their innovative approaches. Consequently, following the SOGA approach, the values that constitute a desirable food system for the seed initiatives are explored (Bennett et al. 2016). These values are particularly relevant, as they can jointly fuel articulation of new meta-narrative and values (Pereira et al. 2018). Finally, the potential for diffusion of the ideas and innovative approach is presented, as a transformation of the food-system cannot emerge from isolated small-scale experiments but requires scaling of the innovative approaches.

5.2.1 PRESENTATION OF THE FOOD SEED INITIATIVES

This thesis looked at 12 local, small-scale food seed initiatives in order to shed light on innovative aspects of TEK that can potentially make Spain’s food system more sustainable. See Table 1 (following page) for a short description of the initiatives. Following the variety of existent dynamics of the food system, the food seed initiatives cover a wide range of topics including education, biodiversity-management, gastronomy, fisheries, food waste, health and nutrition and short-value chains (see ‘Attributes’ in Table 1).

These food seed initiatives have diverse innovative approaches to make the Spanish food system more sustainable and culturally appropriate. However, not all of the innovative approaches can be presented in detail in this thesis. Here is a brief overview of the cross-cutting approaches that are shared by more than one initiative and that will be explained in more detail in the following sections:

- Introduction of novel algae-products [Suralgas, Aponiente] – discussed in section 5.2.3 and 5.3.2
- Creation of job positions for TEK-holders [Veta La Palma; Club Gastronómico KM0] – discussed in section 5.2.3 and 5.3.1
- Seed-banks and exchange (bio-cultural diversity) [La Troje; AgroLab; Montaña y Desarrollo; Gallecs] – discussed in 5.3.3
- Short-value chains [La Plateja; Menjadors Ecològics; Gallecs] – discussed in 5.3.4
## Table 1: Description of the Initiatives.

**Legend:** 📚 Education ⚓ Biodiversity Management 🍽️ Gastronomy 🔥 Fisheries 🍅 Food Waste 🍓 Health & Nutrition 🛍️ Short-Value Chains

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Description</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Madrid</strong></td>
<td><strong>Agrolab Madrid</strong>&lt;br&gt;Offers practice oriented agricultural training, including both traditional and modern farming practices, for people interested in working within agriculture and establishing urban-rural connections.</td>
<td>Public-private partnership</td>
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<tr>
<td></td>
<td><strong>Asociación La Troje</strong>&lt;br&gt;Tackles the loss of local seed varieties in Madrid and fosters the reappraisal of traditional knowledge.</td>
<td>Grassroot</td>
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<tr>
<td><strong>Andalusia</strong></td>
<td><strong>Alimentación Sostenible</strong>&lt;br&gt;Promotes local consumption by establishing alliances between small-scale farmers and consumers; safeguarding traditional recipes and disseminating the local culinary culture.</td>
<td>Grassroot</td>
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<td></td>
<td><strong>Apuntes</strong>&lt;br&gt;A 3-Michelin star seafood restaurant. Dishes often have reference to the traditional cuisine and are based on discarded fish, less valued species and phytoplankton to reduce fishing pressures.</td>
<td>Social entrepreneur</td>
</tr>
<tr>
<td></td>
<td><strong>Suralgas</strong>&lt;br&gt;Private company that harvests algae for human consumption incorporating it into the traditional cuisine.</td>
<td>Social entrepreneur</td>
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<td></td>
<td><strong>Veta la Palma</strong>&lt;br&gt;Organization that fosters educative projects and seed banks in rural areas focusing on popular culture with a feminist approach.</td>
<td>Grassroot</td>
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<td></td>
<td><strong>Fernando Calleja</strong>&lt;br&gt;Fish farm within the Doñana National Park, which functions as a shelter for migrating birds and has significantly increased biodiversity. Moreover, they “import” traditional fishing techniques by employing local fishers.</td>
<td>Public-private partnership</td>
</tr>
<tr>
<td><strong>Catalonia</strong></td>
<td><strong>La Cuina a Sils</strong>&lt;br&gt;Collective of grandmothers trying to preserve the traditional cuisine of Sils, the city where they are located. Promoting left-over recipes.</td>
<td>Grassroot</td>
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<td></td>
<td><strong>La Platjeta</strong>&lt;br&gt;Offers fish baskets with seasonal fish that are delivered to the home of the consumers. The sub-organization Cap a Mar offers activities related to fishery to promote the cultural heritage of the artisanal fishers in Barcelona.</td>
<td>Grassroot</td>
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<tr>
<td></td>
<td><strong>Consorti de Gallegos</strong>&lt;br&gt;New form of an agroecological park, managed by a consortium of different municipalities, putting in practice short value chains and the reconversion of the area to organic farming with a focus on old crop varieties.</td>
<td>Public-private partnership</td>
</tr>
<tr>
<td></td>
<td><strong>Espigoladors</strong>&lt;br&gt;A non-profit organization targeting food waste, making healthy diets accessible for people in risk of social exclusion and creating new job opportunities by: establishing cooperation with farmers and gleaning fruit and vegetables that otherwise would remain on the field, donates 90% of the gleaned food to soup kitchens and elaborate marmalades and cream with the remaining 10% for which people in risk of social exclusion are employed.</td>
<td>Social entrepreneur</td>
</tr>
<tr>
<td></td>
<td><strong>Menacors Ecològics</strong>&lt;br&gt;An organization consulting school canteens to establish direct links and helping them to shift towards a traditional diet based on local, organic products.</td>
<td>Grassroot</td>
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</tbody>
</table>
The transformation of the food system towards sustainability requires scaling of the impact and approaches of the initiatives presented above. The following two sections will discuss different scaling strategies for SE innovations, following Moore, Riddell, and Vocisano (2015). This section will focus on strategies for scaling deep – and section 5.2.3 will emphasize strategies for scaling out.

Various strands of transformation literature highlight the importance of changing values, among other, SE innovation and leverage points scholars (Moore, Riddell, and Vocisano 2015; Abson et al. 2017; Olsson, Galaz, and Boonstra 2014). According to Moore, Riddell, and Vocisano (2015, 12) long-lasting change can only be achieved “when people’s hearts and minds, their values and cultural practices, and the quality of relationships they have, are transformed”, which is referred to as ‘scaling deep’ within SE innovation. As mentioned above, according to the SOGA theory of change, the values of the initiatives fuel the articulation of new meta-narratives and values. Therefore, I analyzed the underlying values of the initiatives. I found that the initiatives’ main drive was towards enhancing food values that are linked to traditional food production.

The different values that were brought up during the interviews indicate what the initiatives consider to be a sustainable and culturally appropriate food system: local production and consumption links, environmentally friendly production and the preservation of traditional consumption patterns. Moreover, the initiatives envision a food system that dynamizes rural areas and places value on food producers. They believe that a sustainable food system should moreover promote human health and is therefore based on natural products instead of processed convenience food that aims at optimizing the ease of consumption. Finally, the initiatives have highlighted the importance of food for social relationships and the capacity of food to connect people when sharing meals. Thus, the elements that constitute a sustainable food system does not only guarantee food security for present and future generations as e.g. proposed by FAO and UNEP (2012) but also includes a cultural dimension and the importance of the concept of local food.

Consequently, this initial definition of a sustainable and culturally appropriate food system aligns with the narrative of the MD, which promotes local production and consumption, eco-friendly production standards and economic dynamization of local communities (Ansón and Postigo 2014; Dernini and Berry 2015). Therefore, I suggest that the changes the initiatives are
working towards are not standing alone, but are part of a bigger narrative. Such meta narratives are important for transformations on higher scales (Pereira et al. 2018).

However, the initiatives’ values and ideas are not the only future vision. A more robust definition of what elements and values constitute a sustainable and culturally appropriate food systems needs to involve broader stakeholder engagement in order to ensure a plurality of values and worldviews. The challenge lies in reconciling ideas with potentially conflicting values, such as local food production using TEK and technological innovations. I suggest that participatory processes in the form of visioning workshops or other interactions could contribute to the creation of a broader definition of sustainable food systems. Particularly, values and ideas that exist at the margin of the current system are interesting to explore (Pereira et al. 2018). The use of TEK and the associated values are such an alternative perspective to the current dominant food system, that is not widespread. This is also perceived by the initiatives, as reflected by the quote:

_We are placing value on activities that the farmer's life comprises - we are placing value on it, since a great majority [of the population] does not do [value] it” [Interview 6]_

A previous study by Gómez-Cantó et al. (2018) that assessed food values among consumers in Spain using the food values framework developed by Lusk & Briggeman (2009) supports the perception of the initiatives that the values they are promoting are currently not regarded as very important by Spanish consumers. The study determined taste, safety, price and appearance of the product as the most valued attributes of food among the Spanish consumers. When comparing their finding with the values the food seed initiatives are seeking to promote it becomes evident that the initiatives are trying to revalorize those values that are currently the least important for the consumers (see Table 2 on the following page). Such values are e.g. origin, environmental impact and tradition, which are linked to traditional food production.
<table>
<thead>
<tr>
<th>Current food values in Spain according to Gómez-Contó et al. (2018)</th>
<th>Food values promoted by the food seed initiatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very important:</td>
<td>Values that the initiatives seek to enhance:</td>
</tr>
<tr>
<td>Taste (consumption of the food is appealing to the senses)</td>
<td>Origin</td>
</tr>
<tr>
<td>Safety (consumption of food will not cause illness)</td>
<td>Environmental Impact</td>
</tr>
<tr>
<td>Price (the price that is paid for the food)</td>
<td>Tradition</td>
</tr>
<tr>
<td>Appearance (food looks appealing)</td>
<td>Taste</td>
</tr>
<tr>
<td>Relatively less important:</td>
<td>Nutrition</td>
</tr>
<tr>
<td>Nutrition (amount and type of fat, protein, vitamins, etc.)</td>
<td>Fairness</td>
</tr>
<tr>
<td>Naturalness (produced without modern technologies)</td>
<td>Naturalness</td>
</tr>
<tr>
<td>Convenience (ease with which food is cooked and/or consumed)</td>
<td>Price</td>
</tr>
<tr>
<td>Tradition (preserving traditional consumption patterns)</td>
<td>Convenience</td>
</tr>
<tr>
<td>Least important:</td>
<td>Appearance</td>
</tr>
<tr>
<td>Fairness (all parties involved in the food production of the food benefit equally)</td>
<td>Not mentioned: Safety</td>
</tr>
<tr>
<td>Environmental impact (effect of food production on the environment)</td>
<td></td>
</tr>
<tr>
<td>Origin (where the agricultural commodities where grown)</td>
<td></td>
</tr>
</tbody>
</table>

Figure 4 shows the importance of different values that were brought up during the interviews. The selection of the initiatives tried to capture a broad spectrum of innovative approaches along the food chain, which explains why the different food values are named by only 75 – 25% of all initiatives.
When clustering the seed initiatives according to the attributes, it becomes evident, that the focus of the values they promote is mainly influenced by the topic of work and the place (urban to rural) where the initiative is situated. In table 3 the values the initiatives are promoting are grouped according to those attributes. For other attribute categories no patterns were found.

**TABLE 3: VALUES PROMOTED BY THE INITIATIVES ACCORDING TO THE CLUSTERS OF ATTRIBUTES.**

<table>
<thead>
<tr>
<th>Category</th>
<th>Attributes</th>
<th>Working toward the appreciation of…</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gastronomy</td>
<td>Production, naturalness &amp; quality of the products</td>
<td></td>
</tr>
<tr>
<td>Fishery</td>
<td>environmental-standards of the product</td>
<td></td>
</tr>
<tr>
<td>Short marketing</td>
<td>producers and production, quality &amp; environmental-standards of the product</td>
<td></td>
</tr>
<tr>
<td>Nutrition and</td>
<td>cook and production, quality &amp; naturalness of food products</td>
<td></td>
</tr>
<tr>
<td>health</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>food production, producers, quality, naturalness &amp; environmental standards</td>
<td></td>
</tr>
<tr>
<td>Food waste</td>
<td>food production</td>
<td></td>
</tr>
<tr>
<td>biodiversity</td>
<td>food production, taste &amp; quality</td>
<td></td>
</tr>
<tr>
<td>Urban to</td>
<td>quality, food producers &amp; production</td>
<td></td>
</tr>
<tr>
<td>rural</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban &amp; peri-urban</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marine &amp; coastal</td>
<td>environmental-standards of the product</td>
<td></td>
</tr>
</tbody>
</table>
Despite the wide recognition of the importance of values when envisioning a transformation towards sustainability, the impact of the promoted values might be limited due to two reasons: Firstly, whether the promotion of these values by the initiatives is successful is hard to assess. Some initiatives connect the consumers’ willingness to pay a higher price for the product to the successful shift of food values:

“A greater appreciation and respect for the traditional cuisine and for its products. A disposition/willingness of the consumer to search for and pay the local product. If it is more expensive, I am willing to pay more, as I value it. It’s an appreciation.” [Interview 3]

Secondly, despite the importance of the underlying values of the food system, it remains uncertain that pro-environmental values and attitudes will lead to sustainable lifestyles (Abson et al. 2017). When exploring food choices, some studies have found that values increase the likelihood to buy products that are consistent with these values, whereas other have reported a so-called attitude-behavior intention gap (Aschemann-Witzel and Niebuhr Aagaard 2014). Such an attitude-behavior gap describes behavior that is not consistent with verbal claims (Kaiser, Byrka, and Hartig 2010). Therefore, a shift in values alone is not sufficient, but needs to be combined with institutional structures that make it easy for people to make sustainable food choices (Abson et al. 2017; Kaiser, Byrka, and Hartig 2010). An example of such an easy and accessible commercialization scheme for consumers are the fish baskets with seasonal fish varieties that are delivered to people’s homes by La Platjeta.

5.2.3 SCALING OUT: IDEAS LIKELY TO SPREAD IF CULTURALLY SENSITIVE

In this section, emphasis will be on strategies for scaling out (Moore, Riddell, and Vocisano 2015). Traditions and culture are important in relation to food systems: diets need to be culturally sensitive and appropriate, as they constitute an important part of our cultural identity and trigger emotions, memories, pleasure (Johnston, Fanzo, and Bogil 2014). Moreover, taste is culturally constructed; whether we like foods or not is influenced by what we are used to eating (Allen and Prosperi 2016). Thus, cultural preferences determine the acceptance of food and general wellbeing (Allen and Prosperi 2016).

This has implications when aiming to transform the food system, e.g. when introducing novel products. An example of such novel products in Spain have been plant-based substitutes for animal protein, which have been increasingly proposed as a necessary substitute to reduce the high consumption of animal proteins (Varela-Moreiras et al. 2010) as such consumption patterns have negative effects for human and planetary health (Boland et al. 2013; Aiking 2011).
Therefore, two initiatives are working with novel algae products as alternative protein sources. They reported that their products have a great potential to be accepted by a large number of people, as the taste of the algae is compatible with the taste of the traditional cuisine and the traditional cooking practices, the “architecture of the cuisine”. Novel products thus enrich the traditional cuisine, although its essence remains the same. This aligns with Hunn's (1993, 13) notion that enriching and innovating traditions is possible, but requires to follow certain rules: “[n]ew ideas and techniques may be incorporated into a given tradition, but only if they fit into the complex fabric of existing traditional practices and understandings.” It is important that these changes are understood as an enrichment rather than a replacement of the tradition, as pointed out in one of the interviews:

“In the beginning, some people were saying: Look at him. What does he try to set up with marine ingredients, here where we have such good fried fish and seafood dishes. What does he pretend to innovate?” (Interview 4)

Interestingly, one initiative reported that the acceptance of algae as a new product varied in different regions in Spain, which was explained by the different regional culinary cultures. According to the interview, there is an opportunity for the introduction for algae in regions that are more used to the ‘taste of sea’ and are familiar with culinary techniques that could be adapted to the preparation of algae, as consumers in those regions show a higher acceptance. In regions where the culinary culture is not linked to sea products, the absence of the culinary knowledge was found to be a barrier. Thus, the presence of gastronomic TEK among consumers determines the acceptance and the success of scaling out of the novel products.

Another scalable innovation, presented in this study is the fish farm, which is beneficial for the ecosystem and furthermore creates employment for TEK-holders. However, the replication of this model is dependent on the acceptance by the local community of the activity. During the interview, it was emphasized that the acceptance was significantly increased by employing people from the community and making use of their TEK, which they perceived as a valuation of their knowledge. This supports the findings of previous studies which have identified an opportunity for SE-innovations to take into account the potential of accessible and applicable TEK for livelihood generation (Domfeh 2007; Jauhiainen and Hooli 2017).

More generally applied to the field of innovations this could suggest that if there is presence of TEK, innovations are more likely to be successful if they are culture sensitive. This is of high relevance, as currently the majority of innovation systems emphasize scientific and technological knowledge (Jauhiainen and Hooli 2017). The following section therefore further explores opportunities and barriers for TEK-driven innovations within Spain’s food system.
5.3 RQ3: OPPORTUNITIES AND BARRIERS FOR TEK-DRIVEN INNOVATION AMONG ACTORS OF LOCAL FOOD SYSTEMS IN MEDITERRANEAN SPAIN

This section will explore how TEK contributes to the innovative aspects of the seeds initiatives presented above. Moreover, it will link back to the dynamics presented in RQ 1 by presenting opportunities in addressing the dynamics of Spain’s food system. Five key conclusions from the analysis of opportunities and barriers of TEK-driven innovative approaches to change dynamics of the food system are presented:

- Creation of jobs for currently marginalized TEK-holders is an opportunity to revitalize marginalized rural areas and validate TEK
- The insertion of novel algae products that are compatible with the taste and the techniques of the traditional cuisine and that can substitute seafood offer an opportunity to decrease fishing pressures
- Traditional seed selection and exchange processes offer an opportunity to maintain agrobiodiversity needed for future adaptations
- The absence of gastronomic TEK among consumers can be a barrier to shorten value chains, as well as change school menus to a healthier and more sustainable diet
- “Espigar”, the harvest of products that are not profitable for the farmer is an opportunity to reduce food waste

5.3.1 PRESENCE OF PRODUCTION RELATED TEK: AN OPPORTUNITY FOR SOCIAL INCLUSION

The interviews show that the presence of TEK can lead to the creation of jobs for marginalized TEK holders. With TEK holders I refer to people that are knowledgeable about and make use of traditional practices. By utilizing TEK in the workplace, TEK-holders can qualify for jobs even without having high formal education. The lack of formal education is often a barrier to the labor market and makes those lacking it susceptible to social exclusion. This mechanism for social inclusion was found within both primary production and gastronomy.

By creating employment for which traditional skills and knowledge is a requirement, TEK is valued and, additionally, it helps to maintain this knowledge because it is recognized as being relevant:

“We import from here the knowledge that the people have and their capacity concerning the activities related to aquaculture [...] We use people for labor that are already familiar, if not with the same, with similar activities [...] we make people see that the knowledge they are holding, fishing knowledge, how to braid nets, knowledge of whatever, really can be applied e.g. within aquaculture. If traditional fishing has been in detriment due to the changes in the
river, we can still grow/cultivate fish. And we can grow them in the same environment, with good, reasonable principles and moreover, we can grow them using ancestral knowledge.”

[Interview 7]

The creation of jobs that have future prospects (such as aquaculture) can furthermore support the revitalization of currently marginalized rural areas.

5.3.2 PRESENCE OF CONSUMPTION RELATED TEK: AN OPPORTUNITY FOR INTRODUCING NOVEL PRODUCTS

The presence of gastronomic TEK entails an opportunity for introducing novel products that are compatible with the traditional taste and cooking techniques. An example is the incorporation of algae and phytoplankton to the traditional cuisine in Andalusia. Until recently, in (southern) Spain, algae and, above-all, phytoplankton were not regarded as edible and tasty. However, the introduction of these products is likely to be successful:

“[…]such an innovative product in the Andalusian diet or the Mediterranean gastronomy is becoming a proper product of the diet.” [Interview 5]

The high acceptance of these products is because the traditional recipes and cooking skills used in Andalusia make it easy to substitute animal protein from the sea with algae, as neither the cooking procedure nor the taste is altered substantially.

The case of algae and phytoplankton is particularly interesting from a sustainability perspective as they do not require high inputs of water and land for their production, are plant-based, high in protein and moreover species with a high reproduction rate that therefore allow a low impact harvest:

“With phytoplankton we are promoting/fostering the consumption of a species with a very high reproduction rate” [Interview 4]

Thus, the consumption of algae instead of seafood can possibly decrease the fishing pressure on overfished species.

5.3.3 OPPORTUNITY TO MAINTAIN AGROBIODIVERSITY BY USING TRADITIONAL SEED SELECTION AND EXCHANGE PROCESSES

There is an opportunity to respond to the erosion of biocultural diversity via safeguarding local seed varieties, as well as the knowledge and practices related to seed production, selection and exchange processes. The erosion of biocultural diversity is driven by intensified agriculture, the related missing generational renewal and the consequent loss of production-related TEK, as well as a lack of knowledge among consumers on how to prepare these varieties (as identified in RQ1). By actively collecting and using traditional farming and seed selection practices, that otherwise are increasingly being lost, agricultural production initiatives take over the role of
knowledge holders and contribute to the maintenance of agrobiodiversity. Such diversity is central for future adaptation processes to a changing environment, which – in the face of climate change – become more and more important:

“they [seed varieties] have all the history of selection and they can still be adapted to new necessities. Those varieties have a large genetic diversity/richness.” [Interview 2].

Through traditional seed selection processes, the local seed varieties are creatively adjusted to the environment and climate in order to be suitable for today's necessities:

“Apply all these seed varieties and the traditional knowledge that we have collected to agriculture so that it makes sense at present. Adapt it... select it for the necessities we have today. A mix of the legacy that we have collected, but also using it without leaving it [the knowledge and the seeds] static.” [Interview 2].

Here, adaptation refers to seed selection processes and the exchange of seeds with other similar initiatives in other regions, e.g. via the national seed-exchange network, called “Red de Semillas”. It is a mechanism to respond to the changing environmental conditions and, in particular, the experienced climate change with the available, often scarce resources. It implies to modify or find traditional varieties from other regions that are better suited for the environment. These initiatives are following the principles of Agroecology, where seeds and knowledge is regarded as collective and therefore there is a high level of knowledge and seed exchange (Pereira, Wynberg, and Yuna 2018; Ezquerra, Rivera-Ferre, and Álvarez 2017). Additionally, the adaptation processes take place with scarce resources.

5.3.4 ABSENCE OF GASTRONOMIC TEK: A BARRIER TO SHORTER VALUE CHAINS AND HEALTHY AND SUSTAINABLE DIETS

The interviews revealed that the lack of gastronomic TEK among consumers on local varieties can present a barrier for shorter value chains that commercialize these local varieties and species. Shorter value chains were pursued by the initiatives on the one hand as a means to successfully bypass intermediaries that concentrate market power and therefore pressure producers, and on the other hand to reduce food miles. Moreover, the focus on local varieties within agriculture provides synergies with biodiversity conservation. Within fisheries, the reintroduction of local species aims at shifting the consumption away from currently highly exploited species. Due to these opportunities, short value chains are argued to be an important contribution to more a sustainable food-system (Canfora 2016).

However, local varieties, though tasty, are not very profitable or easy to sell through conventional markets due to their appearance or simply the unfamiliarity of consumers with them and the lack of knowledge and skills to prepare them. The initiatives needed to reintroduce
TEK to consumers on how to prepare local products for consumption, as highlighted by the quote:

“We realized that the people did not know what fish to order, therefore, we invented the fish baskets, so that the people that did not know what to order could have/buy seasonal fish. Then, following this, we realized that the people needed information. Know what type fish, how to fillet it, how to cook it. And in a lot of cases they did not even know what type of fishermen exist and how you fish” [interview 9].

This indicates that consumption related TEK is holistic and composed of different steps that are often linked (also see section 6.1). The interconnectedness of consumer related knowledge, not only applies to fish but also to agricultural products: in order to consume local products, consumers first need to know what products are seasonally available. Consequently, they need to assess the quality and freshness of the products. Consumers also need to know how to process the primary product they have purchased, e.g. how to fillet a fish or what type of tomato is best suited for what purpose, e.g. for salads or for tomato sauce. The purchase of processed products (e.g. filleted fish) makes it impossible to assess the quality of the primary product. However, by responding to the needs of consumers, this step can potentially be substituted. For example, initially ‘La Platjeta’ started by offering fish filleting workshops, but as not all consumers were responsive to the workshops, they are now also offering filleted fish in their fish baskets. Finally, cooking skills are important: only if consumers know how to cook the food themselves can they buy fresh produce direct from fishers and farmers rather than ready-made meals. Several initiatives aim to provide this knowledge via cooking workshops, cooking books, and online recipes.

The importance of culinary skills in order to promote sustainable and healthy diets has been claimed by previous studies, especially in relation to decreasing meat-consumption (García-González et al. 2018; Jallinoja, Niva, and Latvala 2016). Da Rocha Leal, De Oliveira, & Pereira (2011) suggest that cooking skills and habits potentially impact food choices positively. However, the role of culinary knowledge among consumers in order to promote local production has largely been overlooked, especially those skills that are more related to ecological knowledge (seasonality and quality). For example, in his book ‘Sacred Ecology’, Fikret Berkes (2008) synthesizes that existing literature about TEK largely focuses on:

- Traditional Knowledge for Biological Information and Ecological Insights
- TK for Resource Management
- TK for Conservation of Protected Areas
- TK and Stewardship for Biodiversity
- TK for Environmental Monitoring and Assessment
• TK for Development
• TK for Environmental Ethics

Consumption or gastronomic related traditional knowledge is not captured by the existing topics. Moreover, Howard-Borjas & Cuijpers (2013) point out that “little investigates the specialized ethno-botanical knowledge and related skills underpinning domestic post-harvest and culinary practices, how these are transmitted, why and how they change, and how these changes affect biodiversity conservation, food security, nutrition, and women’s status.” Therefore, this thesis suggests that there is a need to study TEK holistically within all food chain activities from production to consumption. The understanding of the role of consumption-related traditional knowledge and specifically how a lack of TEK can hinder local consumption-production links needs to be further explored.

A similar example is the lack of taste formation among children. Taste can be understood as knowledge built through experience (Kwik 2008; Jung and Sternsdorff Cisterna 2014). If children are not used to the taste of local products, this can be a barrier to changing school menus. Today, many children are served ready-made meals at home and therefore not used to eating plates based on lots of fresh, seasonal vegetables and might not like these at first:

“Of course at school, in the canteen, when you want to change tastes [it is difficult], people are not used to the taste of, for example, beetroot.”

Therefore, Menjadors Ecològics, an initiative that connects school canteens with local producers and helps to adjust the menu to the MD, reports that changing the children’s tastes is pursued gradually. This means that the school menu only adopts step-by-step products that are unfamiliar for the children. If the taste is of the children successfully accustomed to local varieties and the dishes prepared with them it can influence the food culture within the family:

“It’s interesting to work with schools, if the children like the food, they will ask their parents to cook it.”

5.3.5 ESPIGAR: A TRADITION WITH THE OPPORTUNITY TO TACKLE FOOD WASTE

Originally, “espigar” (in English gleaning) referred to the ‘second harvest’, meaning the harvest of leftover grains. Landowners gave permission to poor people to look for vegetables after the main harvest was done. The initiative Espigoladors (or ‘gleaners’) adjusted this concept to the present: They contact with farmers and ask them the permission to harvest their fields whenever the harvest is not profitable and would remain unused on the field due to low prices on the market or because the food is a bit too ripe. For this activity, volunteers are recruited. The products are then donated to soup kitchens. Thus, the tradition of gleaning was adapted in a
process of bricolage to fit today’s challenges of the food system. However, the aim remained
the same: providing healthy quality food for marginalized people. Moreover, gleaning offers
an opportunity to significantly reduce food waste within primary production.
6 DISCUSSION

In this section, I will discuss the findings of this study more broadly. In section 6.1, I will focus on the implications of TEK in different stages of the food system. In section 6.2, the opportunities of values as a leverage point for transformations of the food system are discussed.

6.1 THE TEK ‘TOWER’

In the first three sections of this subchapter (5.4.1-5.4.3.) producer-related TEK was explored. Section 5.4.4 instead focused on consumption-related TEK. Here, I aim at connecting both dimensions and show their interdependencies. As exemplified in the knowledge tower (Figure 5), TEK in form of practices, beliefs and values sits in different stages of the food system – from consumption to production – and can be held by both producers (green) and consumers (yellow). The knowledge-tower is a metaphor saying that TEK within different parts of the food system is relevant to sustain a sustainable food system. Such a food system is characterized by a sustainable and healthy diet that respects the ecosystem and cultural values. The knowledge at the base, production related TEK, is fundamental to give stability to the food system by safeguarding biodiversity. However, consumption-related TEK ‘blocks’ in the upper part of the tower are equally important to support the ‘roof’ of local production and consumption, as well as, local heritage and values.

This consumer knowledge is composed of various interconnected parts (seasonal, processing, assessing quality, cooking – see Figure 5). Ultimately, gastronomic knowledge on how to prepare food is needed to support the use of local varieties and species, the use of less valuable parts and leftovers, and to insert new products that fit the traditional cuisine. Therefore, focusing on maintaining production related TEK is not sufficient to promote local markets and safeguard the local heritage and the associated values (see Figure 5).

FIGURE 5: TRADITIONAL KNOWLEDGE TOWER. PRODUCTION RELATED KNOWLEDGE IS MARKED GREEN, CONSUMPTION RELATED KNOWLEDGE IS MARKED YELLOW.
6.2 VALUES AS A LEVERAGE POINT

A barrier for the innovative approaches presented above and therefore for SE transformation of the food system in Spain is the existing legislation in different domains. One example of such legal barriers is public competitions that are price and not quality oriented. This restricts the initiative’s work when aiming at changing school menus. Changing menus and basing them on local produce was found to be necessary due to unhealthy diets and pressure of producers from retail sector. Another example is legal requirements for seed production that are designed for large seed companies. These are hindering the produce and commercialization of traditional seed varieties. As mentioned before, such varieties are crucial to maintain agrobiodiversity.

Altering the above-named legislations so that they would support the innovative activities was found to be difficult, as policy makers do not share the values that are driving the initiatives. Although the initiatives are trying to enhance certain food values, the value shift has a limited reach and is targeted more towards consumers than towards policy makers. Thus, the actions taken by the initiatives are very fragile and can be easily reconverted when not being backed up by the legal framework, as illustrated by the following quote:

“It’s a battle with the administration. It’s a battle because the administration does not believe in this process and the entire process that we […] are doing can be destroyed in a moment. How? With a public competition.” (Interview 12)

Therefore, changing the values of people within the administration and legislation could be a leverage point for sustainability transformation. According to Meadows (2008) and Abson et al. (2017), values are among the most powerful leverage points for changing the dynamics within the system.

There is further a potential leverage by strategically using ‘present’ values: Although the adherence to the MD patterns is decreasing, it is still a part of the Spanish identity (Medina 2005), thus shaping people’s values. Many food campaigns and organizations are therefore picking up on the term MD in order to promote a sustainable and healthy diet, as people might be more open to the narrative of the need to preserve ‘their’ traditional diet. However, among consumers there is a common misconception about what constitutes the MD: when thinking about the traditional diet people often refer to dishes that are prepared for celebrations or feast days, that are e.g. more meat heavy, and not those dishes that, traditionally, were consumed on a daily basis (Serra-Majem et al. 2004). Therefore, in order to promote the healthy, sustainable MD this narrative needs to be complemented by nuanced information that differentiate between the special occasion plates and the “every day” diet. For example, the initiative “La Cuina a Sils” reports that when they are booked for an event, they are asked to cook special occasion...
plates that contain a lot of meat. Jallinoja, Niva, and Latvala (2016) suggest that we need to challenge the value and perception that meat and fish are the only "sources of festive, fulfilling and satisfying food". The vanguard cuisine of the Aponiente restaurant might be a first step in that direction, as it is increasingly working with plant-based ingredients from the ocean, such as phytoplankton, algae and bioluminescent plankton. Nevertheless, future research is needed to dismantle the socially constructed institutions and culture that shape eating habits and consequently better understand why and how we consume food.
The Spanish food system needs to ‘flip the tortilla’ or transform in order to give response to the current sustainability challenges and preserve the traditional MD. It is well researched that the transformation towards more sustainable, just and culturally appropriate food systems is highly dependent on biocultural diversity. This study indicates that the use of TEK in SE-innovations for sustainability can ensure the relevance of traditional and local knowledge, thus maintaining both TEK and biodiversity for future generations.

In a world of accelerated loss of biocultural diversity, this not only holds true for Spain, but is globally relevant: many of the current dynamics of the Spanish food system likewise characterize the global food system. Therefore, the innovative approaches presented in this study might shed light on possible solutions for other regions. Specifically, this study showed that gastronomic TEK is important for the successful implementation of shorter value chains, which are argued as an efficient approach for sustainable food systems. Novel plant-based protein sources, such as algae, that will be necessary to satisfy the rising demand of protein, can be successfully introduced if they are compatible with the taste and techniques of the traditional gastronomic cuisine. Traditional seed selection and exchange processes can maintain agrobiodiversity needed for future adaptations and specifically climate change. Finally, TEK can enhance inclusiveness which is crucial in relation to food systems characterized by marginalization. Nevertheless, if the innovative approaches presented in this study are to scale, they need to be adapted to the context, as TEK is embedded in the local culture. Thus, rather than a manual for a step-by-step replication, this study can be an inspiration on how TEK can be relevant for present and future food systems in diverse contexts.

This study suggests that cultural sensitivity – by taking into account current TEK – can enhance the scalability and acceptance of SE innovations. It argues that SE innovation should take into account a diversity of knowledge systems, equally engaging with traditional, scientific and technological knowledge. However, this study provides only an initial understanding of the role of TEK for SE innovations. I therefore advocate the necessity of future research. More specifically, the findings of this study could be strengthened by a long-term study that assesses whether the innovative approaches of the ‘seeds’ do grow and contribute to a transformation of the Spanish food system over time. Secondly, a scenario workshop could further explore how TEK might play out in the future food system and what innovations could be derived. Following on the understanding of SOGA radical novel visions where disparate ideas coexist might be necessary for transformations towards ‘Good’ Anthropocenes. As people often tend to be
reserved towards radically different visions it would be interesting to investigate if visions of Spain’s food system can result more desirable and meaningful for the broad society when including reference to traditions and culture. This idea is derived from the notion that TEK can enhance the acceptance of SE innovation.

To conclude, I suggest that TEK existing at different stages of the food system is relevant for sustainable food systems. Such knowledge is interrelated as captured by the knowledge-tower metaphor. Therefore, I argue that the concept of TEK needs to be expanded in order to account for both production and consumption-related TEK.


Díaz Méndez, Cecilia. 2013. “La Alimentación En La Sociedad Española.”


Jackson, Jeremy B C, Michael X Kirby, Wolfgang H Berger, Karen A Bjorndal, Louis W


Ministerio de Agricultura, Alimentación y Medio Ambiente, ed. 2013a. *Las Pérdidas Y El Desperdicio Alimentario Generado Por La Producción Agrícola de Alimentos En España*.


En España.”


### APPENDIX I: INTERVIEW GUIDE

#### TABLE 4: INTERVIEW GUIDE

**Part 1 - BIOPHYSICAL & ORGANIZATIONAL ASPECTS**

<table>
<thead>
<tr>
<th>Spanish</th>
<th>English (Translation)</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>¿Cómo describirías tu iniciativa? ¿Quiénes sos? ¿Quiénes participan?</td>
<td>How would you describe your initiative? Who are the members?</td>
<td>Background</td>
</tr>
<tr>
<td>¿Conoces la extensión aproximada del territorio del que hablamos?</td>
<td>What is the approximate extension of the area the initiative works in?</td>
<td>Background</td>
</tr>
<tr>
<td>¿Qué titularidad tienen las tierras de producción?</td>
<td>Who has the land ownership of the productive land?</td>
<td>Background</td>
</tr>
<tr>
<td>¿Qué tipo de cultivo tenéis?</td>
<td>What type of cultivation do you have?</td>
<td>Background</td>
</tr>
<tr>
<td>¿Cuál es el porcentaje de la producción ecológica?</td>
<td>What is the percentage of organic production?</td>
<td>Background</td>
</tr>
<tr>
<td>¿Dónde os colocáis dentro de las actividades agroalimentarias? ¿Qué actividades tenéis?</td>
<td>What are the agro-food activities the initiative deals with?</td>
<td>Organization of data (attributes)</td>
</tr>
<tr>
<td>¿Cómo estáis organizados?</td>
<td>How is the initiative organized?</td>
<td>Organization of data (attributes)</td>
</tr>
<tr>
<td>¿En qué fase os encontráis en este momento? Piensa en la metáfora de una semilla.</td>
<td>What is the present stage of your initiative? Think of the metaphor of a seed.</td>
<td>Organization of data (attributes)</td>
</tr>
</tbody>
</table>

**Part 2 – PAST**

<table>
<thead>
<tr>
<th>Spanish</th>
<th>English (Translation)</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>¿Cómo se sembró la iniciativa? ¿Me podrías decir cuándo y por qué fundasteis la iniciativa? ¿Qué eventos facilitaron la creación de la iniciativa?</td>
<td>How, when and why was the initiative founded? What favoured its foundation?</td>
<td>RQ 1</td>
</tr>
<tr>
<td>Desde entonces: ¿cómo se ha desarrollado la iniciativa? ¿Habéis detectado cambios? ¿Qué factores fueron facilitadores y os hicieron crecer? ¿Qué barreras encontrasteis en el camino?</td>
<td>Since then: how has the initiative developed? Have you discovered any changes? What has facilitated and made you grow, and what has hindered the development?</td>
<td>RQ 1</td>
</tr>
</tbody>
</table>
**Part 3 – PRESENT**

<table>
<thead>
<tr>
<th>Spanish</th>
<th>English (Translation)</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>¿Hoy en día, que podría facilitar más el crecimiento de la iniciativa y qué son los desafíos principales?</td>
<td>What could further enable the growth of the initiative and what are the main challenges?</td>
<td>RQ 1</td>
</tr>
<tr>
<td><strong>RQ 1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Según tú: ¿cuáles son los aspectos más positivos e innovadores de vuestra iniciativa? ¿Y por qué? ¿Por qué crees que la iniciativa es especialmente interesante?</td>
<td>According to your opinion, what are the most positive and innovative aspects of your initiative? Why?</td>
<td>RQ 2</td>
</tr>
<tr>
<td>De estas actividades ¿puedes pensar o identificar prácticas ligadas al o derivadas del conocimiento tradicional? ¿En qué consisten?</td>
<td>Can you identify any traditional practices within your initiative? Describe them.</td>
<td>RQ 3</td>
</tr>
<tr>
<td>¿Cómo y de quién habéis aprendido la práctica?</td>
<td>How and from whom have you learned this knowledge?</td>
<td>RQ 3</td>
</tr>
<tr>
<td>¿Me podrías explicar por qué usáis esa(s) práctica(s)? ¿Qué ventajas le(s) encuentras y qué desafíos pueden ser resueltos?</td>
<td>Why do you use these practices? What advantages do ascribe to them and what challenges can be addressed?</td>
<td>RQ 3</td>
</tr>
<tr>
<td>¿Habéis tenido que adaptar el conocimiento tradicional a vuestra realidad o contexto? ¿Cómo?</td>
<td>Did you need to adapt the traditional practices and knowledge to your context? How did this occur?</td>
<td>RQ 3</td>
</tr>
<tr>
<td>¿Cuál es el rol de las mujeres respecto al intercambio de conocimientos?</td>
<td>What is the role and importance of women in the exchange of knowledge?</td>
<td>RQ 3</td>
</tr>
<tr>
<td>¿Hay un intercambio de conocimientos intergeneracional?</td>
<td>Is there any type of intergenerational knowledge exchange?</td>
<td>RQ 3</td>
</tr>
<tr>
<td>¿Qué otros tipos de conocimientos empleáis? ¿Hay también una mezcla e hibridación de los conocimientos que has descrito?</td>
<td>What other types of knowledge do you use? Is there any blending and hybridisation of the knowledge that you have described?</td>
<td>RQ 3</td>
</tr>
<tr>
<td>¿Qué relación crees que puede haber entre el conocimiento tradicional y la innovación?</td>
<td>What relationship do you think can exist between the traditional knowledge and practices and innovation?</td>
<td>RQ 3</td>
</tr>
<tr>
<td>¿Cuál es el rol de las mujeres en la iniciativa?</td>
<td>What is the role of women in the initiative?</td>
<td>RQ 2</td>
</tr>
</tbody>
</table>

58
<table>
<thead>
<tr>
<th>Spanish</th>
<th>English (Translation)</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>¿Qué impactos sociales, económicos y ambientales piensas que tiene la iniciativa?</td>
<td>What social, economic and environmental impacts do you attribute to your initiative?</td>
<td>RQ 2</td>
</tr>
<tr>
<td>Part 4 -FUTURE 9</td>
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<td></td>
</tr>
<tr>
<td><strong>Spanish</strong></td>
<td><strong>English (Translation)</strong></td>
<td><strong>Purpose</strong></td>
</tr>
<tr>
<td>Imaginate que estamos en el año 2067 y tu iniciativa sigue existiendo. Se ha expandido, multiplicado y dado lugar a nuevas semillas y se ha convertido en una de las ideas dominantes: ¿Cómo quisieras ver los sistemas agroalimentarios del futuro?</td>
<td>Imagine it’s the year 2067 and your initiative still exists. It has expanded, multiplied and produced new seeds and it has even turned into one of the dominant ideas. What is your ideal of the food systems of the future?</td>
<td>Visioning workshop</td>
</tr>
<tr>
<td>¿Qué importancia tendrán las prácticas culturales X en vuestra iniciativa en el futuro?</td>
<td>What relevance will the cultural practices X have for your initiative in the future?</td>
<td>Visioning workshop</td>
</tr>
<tr>
<td>¿Cómo ves que tu iniciativa contribuye a ese futuro? ¿Cuáles son los elementos clave, los valores a mantener y los cambios a los que ha contribuido tu iniciativa?</td>
<td>How does your initiative contribute to this future? What are the main elements and values that you would like to maintain, and what are the changes that your initiative will have contributed to?</td>
<td>Visioning workshop</td>
</tr>
<tr>
<td>Hablando de comida, ¿cuál es tu ingrediente para el futuro? ¿Por qué?</td>
<td>Talking about food: What is your favourite ingredient for the future? Why?</td>
<td>Visioning workshop</td>
</tr>
</tbody>
</table>

9 This part of the interview was conducted as a preparation of a visioning workshop with the initiatives. However, due to unforeseen developments, it was not possible to carry out the visioning workshop during the Master’s thesis.
## APPENDIX II: OVERVIEW OF INTERVIEWEES

### TABLE 5: DESCRIPTION OF THE INTERVIEWEES AND LENGTH OF THE INTERVIEWS.

<table>
<thead>
<tr>
<th>Initiative</th>
<th>ID</th>
<th>Length of interview</th>
<th>Gender</th>
<th>Key informant description</th>
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<tbody>
<tr>
<td>AgroLab</td>
<td>1</td>
<td>1h52</td>
<td>F</td>
<td>Researcher and co-founder</td>
</tr>
<tr>
<td>La Troje</td>
<td>2</td>
<td>1h10</td>
<td>F</td>
<td>Researcher and co-founder</td>
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<tr>
<td>Club gastronómico KM0</td>
<td>3</td>
<td>1h14</td>
<td>F</td>
<td>Co-founder and project coordinator</td>
</tr>
<tr>
<td>Aponiente</td>
<td>4</td>
<td>1h32</td>
<td>M</td>
<td>Environmental consultant and friend of Aponiente</td>
</tr>
<tr>
<td>Suralgas</td>
<td>5</td>
<td>1h18</td>
<td>F</td>
<td>Founder and manager</td>
</tr>
<tr>
<td>Montaña y Desarrollo</td>
<td>6</td>
<td>2h22</td>
<td>M</td>
<td>Secretary</td>
</tr>
<tr>
<td>Veta La Palma</td>
<td>7</td>
<td>1h25</td>
<td>M</td>
<td>Technician in charge of the Quality and Environment Department</td>
</tr>
<tr>
<td>La cuina a Sils</td>
<td>8</td>
<td>2h18</td>
<td>M + F</td>
<td>Initiator and coordinator</td>
</tr>
<tr>
<td>La Platjeta</td>
<td>9</td>
<td>42min</td>
<td>F</td>
<td>Management, marketing and</td>
</tr>
<tr>
<td>Gallecs</td>
<td>10</td>
<td>1h24</td>
<td>F</td>
<td>Manager</td>
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<td>Espigoladors</td>
<td>11</td>
<td>47min</td>
<td>F</td>
<td>Co-founder and director</td>
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<tr>
<td>Menjadors Ecológics</td>
<td>12</td>
<td>1h21</td>
<td>M</td>
<td>Coordinator</td>
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## APPENDIX III: ATTRIBUTE TABLE & DEFINITIONS

### TABLE 6: OVERVIEW OF THE FOOD SEED INITIATIVES AND THEIR ATTRIBUTES

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<td><strong>III.</strong> Agrofood activity along the food chain</td>
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<td><strong>VI.</strong> Urban to rural</td>
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</table>
DEFINITIONS:

Driver of innovation

- Grassroot: community-led solutions for sustainability. Networks of activists and organizations generating novel bottom-up solutions for sustainable development; solutions that respond to the local situation and the interests and values of the communities involved (Martin and Upham 2016)

- Public-private Partnerships: “relationship in which public and private resources are blended to achieve a goal or set of goals judged to be mutually beneficial both to the private entity and to the public” (Witters, Marom, and Steinert 2012).

- Social entrepreneur: “human-centered concept that highlights the personal qualities of a person who starts a new organization” (Westley and Antadze 2010)

Topics of work

- Gastronomy: The practice or art of choosing, cooking, and eating good food (Oxford dictionary).

- Fisheries: refer to all activities relating to the act or business of fishing, culturing, preserving, processing, marketing, developing, conserving and managing aquatic resources and the fishery areas, including the privilege to fish or take aquatic resource thereof.

- Short value chains: “involve very few intermediaries. In many cases produce only travels a short distance, so producer and consumer can actually talk to each other... Such supply chains typically involve local producers working together to promote local food markets. These partnerships help boost the rural economy, creating new ways of selling local produce and attracting new types of customer. They also foster cooperation between local farms, the tourist industry and the food sector.” [https://ec.europa.eu/agriculture/organic/consumer-trust/certification-and-confidence/short-supply-chain_en](https://ec.europa.eu/agriculture/organic/consumer-trust/certification-and-confidence/short-supply-chain_en)

- Nutrition & health: focus on improving the nutritional value and the health impacts of the food consumed.

- Education: focus on educational aspects of the food system.

- Food waste: reducing food waste along the food chain.

- Biodiversity management: enhance biodiversity through their activity.
Agrofood activities:

Adapted from Ericksen (2008).

Stage of seed

- Prototype: Idea exists in ‘seed’ form
- Implemented: Idea was able to make roots and grow
- Thriving: Successful replication and diffusion of the idea

The stage of the seed was assessed according to the self-definition of the initiatives. The metaphor of a seed was used for the self-assessment.

S-E Type

- Social: the motivations and changes to be achieved are in great measure social
- Ecological: the motivations and changes to be achieved are in great measure ecological
- Social-ecological: the initiative has an integrated social-ecological perspective.

Urban to rural

- Urban: The activities of the initiatives are in an urban setting.
- Peri-urban: The activities of the initiatives are in a peri-urban setting.
- Rural: The activities of the initiatives are in a rural setting.
- Marine & coastal: The activities of the initiatives are in a marine and coastal area.
## APPENDIX IV: QUOTES FOR RQ1

### TABLE 7: OVERVIEW OF QUOTES USED FOR RQ1

<table>
<thead>
<tr>
<th>Keyword</th>
<th>Quote</th>
<th>Interview</th>
</tr>
</thead>
<tbody>
<tr>
<td>time</td>
<td>“work rythms, tendencies and habits have changed, the work rythms are very stressful [...] the everyday life often does not allow us to make/prepare your own food, you go and buy it in the supermarket”</td>
<td>Interview 11, response 1.</td>
</tr>
<tr>
<td>time</td>
<td>“Young people work and don’t have time anymore to cook with the old techniques.”</td>
<td>Interview 8, response 1</td>
</tr>
<tr>
<td>Consumer preferences</td>
<td>“We got used to the convenience of “I go to the supermarket and there I have everything, I take it and I can shop food only in a single spot” [...] Because I was grew up in a moment when the hypermarkets appeared in the everyday life of the Spanish population in the 70. And ever since, the diet has changed [...] products that we didn’t know before started to arrive”</td>
<td>Interview 3, response 1</td>
</tr>
<tr>
<td>Time; consumer preferences</td>
<td>“How many people cook at home? Less and less. The speed of our life, impossible hours, work, activities... Therefore, the people get used to dine microwaved food, quickly cooked, pam pam and ready. I tear open a bag and I can eat”.</td>
<td>Interview 12, response 1</td>
</tr>
<tr>
<td>Prices</td>
<td>&quot;For some people who do not have a job, it's complicated, because in the end they go to supermarkets caught up in prices and buy what they can.&quot;</td>
<td>Interview 12, response 2</td>
</tr>
<tr>
<td>Food culture</td>
<td>“The capacity that lies within sitting together around a table, which is something very linked to food culture in the Mediterranean, eating with family and sharing, because it made people get closer to each other [...] we like to eat, we like to share and starting from that we start to get interested in things.”</td>
<td>Interview 3, response 2</td>
</tr>
<tr>
<td>Food culture, Taste transformation</td>
<td>“Let's see, the problem is that the food culture was lost. And in the end, what is happening in schools is a reflection of what is happening in families, on the street and in houses. How many people cook at home? Every time less. Speed, impossible hours, work, activities ... Then people get used to dinner because things microwave, cooked fast, pam pam and that's it. It's something like that, I open the bag that I just have to open and eat. Well, that's what is also happening in school. And of course when you find this loss of food culture, many people, young people no longer ... unless, in your family, that value or that culture has been transmitted, as there are few people who are, apart from being grilled food, but cooking there are</td>
<td>Interview 12, response 3</td>
</tr>
</tbody>
</table>
few people who do it. Cooking in the oven has been lost. And what’s up? When our children eat at night anything, of course in school, in the dining room, you want to change tastes, people, for example, to the taste of beet the same is not used.”

Left-over recipes; food waste
The traditional cuisine often makes use of left-over recipes. You learn how to make use of left-overs and not to throw them away.”

Interview 8, response 2

Food waste
“Because you throw away food for a couple of reasons; because of aesthetic reasons, due to overproduction, because of falling prices of the products, or because the fruits or vegetables are already ripe.”

Interview 11, response 1

Market power (retail sector)
“the free market dynamics, when neither the producer nor the consumer have power, but only the intermediary

Interview 12, response 4

Procurement standards
Supermarkets only sell “ideal” tomatoes or a peppers. That’s why the consumers are now used to those types and want to buy the perfect tomato. It’s the fault of the big supermarkets that the farmer doesn’t want to have a wrinkled tomato. The consumer got used to a beautiful tomato, that’s why we only want to buy those beautiful tomatoes.

Interview 5, response 1

price
Those big companies, what those big companies are doing is to pressure the producer and lower the prices that they receive for the production

Interview 12, response 5

taste
For a couple of years we have been eating tomatoes that don’t taste like anything.

Interview 3, response 3

Climate impact
...10 tons of vegetables that remain in the Maresme [region] and they remain within 10 km between the farm and the school, that’s an impact, right? Instead of going to other markets and [and buy vegetables that have travelled long-distances]

Interview 12, response 6

Less farms; concentrated primary production
Here in Catalonia every day two farmers are disappearing. Why? Because they retire and there are no young people that want to take over. Why? Because the farmers can’t survive with their farming practices only.

Interview 12, response 7

Market power (seed companies)
Today, all seeds are controlled by 4-5 multinational companies that decide what we grow.

Interview 6, response 1
<table>
<thead>
<tr>
<th>Topic</th>
<th>Quote</th>
<th>Interview</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diet and biodiversity are linked</td>
<td><em>I recover a traditional recipe and that recipe implies that you use products that had been forgotten. If I manage that this recipe is used again, for example in restaurants, as it happened with the course “Taste from the past”, I create a demand for a product that was disappearing. I safeguard the traditional cuisine to promote a diversification and maintenance of local varieties.</em></td>
<td>3, response 4</td>
</tr>
<tr>
<td>Missing appreciation</td>
<td><em>Today, there are a lot of farmers that are not conscient about the role they have for society. They see their future in the city and sacrifice a lot to send their children to the cities to study.</em></td>
<td>6, response 2</td>
</tr>
<tr>
<td>Missing generational replacement</td>
<td><em>It is difficult to find young people that want to work within fisheries, it’s the same that is happening within agriculture.</em></td>
<td>9, response 1</td>
</tr>
<tr>
<td>Diminishing margin</td>
<td><em>The price for fish stagnated during the last 20 years, but the expenses to be able to go out fishing haven risen. The price of the boats, taxes, equipment [...] that makes that the margin from fishing decreases.</em></td>
<td>9, response 2</td>
</tr>
<tr>
<td>Diminishing fish stocks</td>
<td><em>He noticed that both the quantity and quality of fish stocks has decreased. And, as he likes fishing and the ocean, he gets upset when he sees that restaurants only serve 10-15 types of fish. He says: we are stupid. One the one hand we throw away tons of fish before even landing it in the harbor, because no one wants to buy it [...] and at the same time, the restaurants innovate less and less.</em></td>
<td>4, response 1</td>
</tr>
<tr>
<td>Processing skills</td>
<td><em>Because in the past, people knew how to cook, conserve and freeze fish without problems. Now it is more complicated</em></td>
<td>9, response 3</td>
</tr>
<tr>
<td>Processing skills for local varieties needed</td>
<td><em>you need to understand how they [the varieties] were consumed [...] some need to be cooked, otherwise they are not as good, for others you need to wait for a couple of months. You need to understand that and transmit this knowledge to the people. Otherwise, if you give them the fruit they will say &quot;that is not worth anything&quot;</em></td>
<td>2, response 1</td>
</tr>
<tr>
<td>interest in vanguard</td>
<td><em>Young people want to be like Ferran Adrià, they are not interested in the traditional cuisine.</em></td>
<td>8, response 3</td>
</tr>
<tr>
<td>Tiredness of vanguard cuisine</td>
<td>“... a rising interest of the people for gastronomy. In Spain, we lived this effervescence of the vanguard cuisine. But then there came a moment when the people got tired of it and needed to comeback to something more authentic and familiar.”</td>
<td>3, response 5</td>
</tr>
<tr>
<td>“mainstream” eco-production</td>
<td><em>Many organic farms are big farms that export almost the whole harvest.</em></td>
<td>3,</td>
</tr>
<tr>
<td>commercialization of the concept 'organic'</td>
<td>Big companies are entering organic markets, but they don't believe in the transformation of the food system. They have merely realized that there is the possibility for an organic niche in the market.</td>
<td>Interview 12, response 8</td>
</tr>
<tr>
<td>commercialization of the concept 'organic'</td>
<td>When we started in the villages, nobody was interested. We organized samples because we went there, but the municipalities ignored us. But now they call us and want us to do samples of tomatoes, super luxury restaurants call us and want local tomato varieties. [...] Suddenly they value it as something that differentiates, that gives additional value. Suddenly, it makes sense in their discourse. [...] But we sometimes mistrust this, because there could be different trends in the future [...] In other words, we cannot trust this trend. “</td>
<td>Interview 2, response 2</td>
</tr>
</tbody>
</table>
APPENDIX V: ETHICAL REVIEW – FINAL REVIEW

The first part of the field work, the data collection via interviews, went accordingly, as planned in the Ethics review.

- All interviewees received the PLS form and filled in the consent form prior to the interview.
- The interviews were audio-recorded and safely stored.
- The interviewees’ personality (but not the initiatives) were anonymized.
- Some initiatives requested a short written statement about how I experienced the activities they were carrying out. This was done in form of blogposts and Instagram posts latest one month after the fieldwork.
- Quotes were sent out to those initiatives that had marked that they would like to check the included quotes.

Changes in the research design and ethical implications:

However, the second part of the fieldwork, the visioning workshop, was not viable, due to a personal unforeseeable incident. The initial preparations (attending the Mälaren workshop to gain experience with the methodology) were nevertheless taken. The initiatives were informed about the reasons why the workshop could not take place and brief inquiry was conducted about what elements of the workshop are most important to them. Currently, possibilities are assessed to organize the workshop in a later stage, in order to debrief/feedback the results and give the initiatives the possibility to create a network. However, funding and timing are making the organization difficult. An executive summery in Spanish will be send out in order to guarantee the diffusion of the results even if it is not possible to organize a physical workshop in Spain.