

The viability of small farms from a reproductive perspective: the case of extensive olive oil production in the Mediterranean

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Even though I am not a native speaker or writer – as I am sure it will become apparent –, it made sense to write my Ph.D. dissertation in English. After four years of doctoral studies, English has become the language in which I learn and think, the language in which I approach scientific debates and draw my own conclusions and explain results. It is the language of my researcher persona, which has grown immensely in these past years. In this kind of foreword I want to acknowledge and express gratitude towards the things I learned and the people that have helped me along the way, but doing it in English feels a bit odd. Working on my Ph.D. and writing this dissertation has been as much a career milestone, as it has been a very personal, emotional, journey of self-discovery, so in this acknowledgments, I might switch to my native Catalan at some point.

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1 Introduction

1.1 Small family farms as peasant farms and their viability.

Small farms play an important role in food systems worldwide. Despite food systems being apparently dominated by large farm holdings, large farm holdings represent less than 1% of farms worldwide. They, however, operate 40% of farmland while small farms represent about 80% of farm holdings worldwide but only control about 20% of farmland (Lowder et al., 2021). In addition, family farms represent the vast majority of farms worldwide and provide between 50% and 80% of food production (Ricciardi et al., 2018; Samberg et al., 2016). Small and family farms are recognized as fundamental agents in food systems; they are multifunctional, since they develop and provide environmental, social and economic functions and services (Marsden & Sonnino, 2008; Shucksmith & Rønningen, 2011). Small farms are complex systems and embody a way of farming that goes beyond productive economy, intertwining balances between social groups, agricultural activities and ecosystems. However, the sustainability and persistence of small farms has been a source of academic debate for decades (Fuller et al., 2021; Holt-Giménez et al., 2021). Productivity-based definitions of viability are not able to explain their sustainability (Van Der Ploeg, 2013). Indeed, the study of small farms, of their functioning and sustainability, requires a comprehensive approach, one that can broaden conventional notions of viability and resilience and can bring forth the overlooked elements that sustain small farms.

From a socio-economic standpoint, small and family farms are relevant contributors to global food security (Ricciardi et al., 2021) by enabling food provisioning and access to rural households (Galli et al., 2020). They also contribute to rural development by providing rural employment (Fuller et al., 2021), promoting rural sustainability (Marsden & Sonnino, 2008; McDonagh et al., 2017a) and contributing to poverty reduction (Gioia, 2017). Beyond food production, small and family farms contribute to maintaining the rural social fabric (European Commission Agriculture and Rural Development, 2011), through for example, engaging in the re-localization of food chains (Berti & Mulligan, 2016; Galli et al., 2020) and thus, they are an important agent in resisting rural depopulation (Holt-Giménez & Altieri, 2013). Furthermore, small and family farms contribute to preserving rural ecosystems (P. Rosset, 2011), as they provide a high provision of ecosystem services (Ricciardi et al., 2021) and contribute to wildfire and soil erosion prevention (Guth et al., 2022), among others. Because small and family farms are tied to higher crop diversity and higher biodiversity, they promote ecological resilience (Guth et al., 2022; Ricciardi et al., 2021) and are the base of agroecological farming and food systems (van der Ploeg, 2011). Small-scale farming, family farms and agroecology are types of farm management and food systems that, in different ways, offer alternatives to other more globalized (as disembedded from local realities and systems), linear and neoliberal food systems (Shucksmith & Rønningen, 2011). These systems, which are dominated by large-scale corporate farms, have been proven to generate detrimental ecological and social externalities, (IPES-Food, 2018; Lowder et al., 2021).

However, small farming has become a rather loose term, with authors pointing out the need to clarify the concept (Ebel, 2020; Lowder et al., 2021). In many of the cases that take a worldwide perspective, small farms are defined by land size and small farming considers farms that operate less than 5ha (Ebel, 2020; Lowder et al.,

2021; Rapsomanikis, 2016), a size range that emerges from the realities of small farms in Asia and Africa (Guth et al., 2022). However, other authors suggest the need to adapt the definition of small farming to different geographical and socio economic contexts and the re-definition of small farming using criteria beyond land size (Galli et al., 2020; Gioia, 2017; Guiomar et al., 2018). For instance, farms of up to 20ha would be considered large in certain contexts, but in Europe, they may function as, and have, small farming features (Guth et al., 2022; Slavickiene & Savickiene, 2014), such as economic size of the farm, calculated through generated income or the capital needed to operate the farm, or the amount and type of labour used, or the type of crop cultivated. These features are used to define small farming in a way that accounts for the complexity and heterogeneity of small farming (and agriculture in general) in different contexts (Guiomar et al., 2018; Guth et al., 2022).

Small farming usually overlaps with family farming, as family is also used as a feature of small farms, not only in terms of ownership but defining small farming as being based on family labour. While there are several definitions of family farms, most commonly they are defined through ownership and labour provisioning, making family farms those owned by a family whose members provide most of the labour to operate the farm (Lowder et al., 2021). Family farms are a wide and diverse category and are not necessarily tied to sustainable agriculture, but both in practice and in academic debates, small and medium scale farms are overlapped with sustainable farming (FAO, 2014; Galli et al., 2020; Lowder et al., 2021). In this overlap, small farming is defined based on the relative size of farm resources (not just hectares) in relation to the food system they are embedded in (Galli et al., 2020). This wider understanding of small farms account for the particularity of extensive farming, which uses a relatively large amount of farmland, but has lower productivity and generates relatively lower income, such is the case of traditional Mediterranean olive production.

Furthermore, some authors go beyond quantifiable or institutional farm features to define small farming as a specific way of doing agriculture that entails an alternative to large corporate farms. In these definitions, which can reflect the context-based heterogeneity of small farming, small farms are defined based precisely on their contributions to sustainable agriculture, such as preserving biodiversity, reconnecting with consumers or their multifunctionality (Gioia, 2017), and by the use of specific strategies for sustaining the farm's household's livelihood, such as pluriactivity or again, relying on family labour (Galli et al., 2020).

Thus, definitions of small farming limited to size do not seem to fully account for their complexity and heterogeneity, particularly in the European context (Gioia, 2017), or be able to explain their contributions to sustainable agriculture (Ebel, 2020). The specificity of small farms lies in the alternative economies they embody, not on their size (Van Der Ploeg, 2013). While big farm holdings are governed by a capitalist economy and a profit-producing logic, small farms follow the logic of peasant economy (Van Der Ploeg, 2013) and maintaining farm livelihood (others would say as a way of life) as their long-term goal (Darnhofer, 2010). Thus, we go back to the peasantry debate, as an akin and overarching concept. Peasantry is a heterogenous category, which means that peasant farms look different in different geographical and social contexts, but share a common farming style that makes them recognizable (Van Der Ploeg, 2013). While acknowledging that small, family or extensive farms can be distinct categories, they also often overlap, not only in theoretical frameworks, but in

the reality of food systems, and peasantry is an overarching concept that accounts for the potential of all these typologies of farms.

We mainly use peasantry as explained by van der Ploeg (van der Ploeg, 2018; Van Der Ploeg, 2013), which draws heavily from the work by Chayanov (Chayanov, 1966). When it comes to agricultural management, peasant farms tend to use practices based on peasant knowledge, that focus on the recirculation of resources within the farm, a reciprocal relationship with nature and renewal of natural resources and lower dependency on external inputs (Steve Gliessman et al., 2019), i.e. they use agroecological practices. Agroecology acknowledges peasants as holders of fundamental local and traditional knowledge on the building of resilient and sustainable farming systems (Toledo, 2005). In addition, agroecology is furthered and carried out in peasant farms (van der Ploeg, 2011). The transformative capacity of peasantry lies also in its socioeconomic dimensions, as peasant farms are guided by peasant economics, an understanding of economic values and relationships that is alternative to capitalism (Akram-Lodhi, 2021) and is akin again to agroecology. In peasant economics, the goal of the farm and its productive activities is not the accumulation of profit, but the sustaining and reproduction of the farm and its social group or household. As a moral economy, values beyond monetary criteria, such as nature conservation, finding balance between work and production or beauty and identity play a role in peasant economics. In that way, peasantry and small family farms can be drivers of a sustainable transition that it is not limited to technical changes, but also accounts for its social dimensions and the need for fairer food systems.

Small family farms face an adverse socio-economic context (Hazell, 2005), in which they are subordinated and even threatened by capitalist agriculture as an ecological and economical extractive system (Holt-Giménez et al., 2021). As peasant farmers, small farmers face the squeeze of agriculture, in which market prices for farm products are insufficient to cover production costs, which are also increasing in cost (Akram-Lodhi & Kay, 2009). In reality, the difference between peasantry and so called entrepreneurial farming is not black and white (van der Ploeg, 2016), but rather a range, as peasant farms are still influenced by the capitalist system in which they are embedded (Galt, 2013). Both the market squeeze and agricultural policies have pushed farmers to adopt entrepreneurial strategies, such as intensification of land and production to keep their farms viable in strict conventional economics term (Guth et al., 2022; van der Ploeg, 2016), particularly in contexts where small farmers sustain households through income crops (not through self-consumption) and need to make money constantly (Guth et al., 2022). For instance, in Europe small and family farms are still the most common agricultural holdings (EUROSTAT, 2020), but small-holder farming is closely linked to part-time farming or hobby farming (Gioia, 2017).

Despite the recognition of their contributions to sustainable food systems, small farms struggle in a global production system marked by unfavourable policies, since agricultural policies and regulations (as is the case of the Common Agricultural Policy in the European Union) are highly market oriented and integrated in neoliberal perspectives that favour "*productivist industrialized-style farming*" and neglect small farms (Shucksmith & Rønningen, 2011, p. 278). They also face an unfair competition of large industrialized corporate agri-business. Small farmers face the loss of control over food production, as distributors and marketers

monopolize more and more the value in food production systems (Berti & Mulligan, 2016; S. R. Gliessman, 2014), trapping small farmers on a cost–price squeeze that makes it challenging to maintain their projects and land (MacDonald et al., 2000; P. M. Rosset & Altieri, 1997). All these challenges have led to a decline of farmland and number of farms, particularly in Western countries (S. R. Gliessman, 2014; van der Ploeg, 2016).

The historical debate around how small farms sustain themselves and remain when they were projected to disappear decades ago is still very much alive and remains a complex topic. In other words, the agrarian question around the persistence of small farms remains unresolved after decades of being posed. When the industrialization of agriculture and the consolidation of capitalism as the dominant global socio-economic system began to push small farms to the corners, the agrarian question emerged, debating the survival and viability of small farms (Akram-Lodhi, 2021; Bernstein, 2006b; Bernstein et al., 2018; Chayanov, 1966). From a neoliberal perspective, the disappearance of small diversified family farms, in favour of large monoculture farms, was (and still is) viewed not only as inevitable, but as desirable, falling victim of not being able to compete with the technical efficiency of economies of scale and agribusinesses and the commodification of food systems (Shucksmith & Rønningen, 2011). Other perspectives maintain that peasant agriculture is bound to disappear or at least go through a process of differentiation, as capitalist dynamics become internalized in farming households and the process of farming abandonment continues (Bernstein, 2006a). It was the anomaly of small and family farms resisting in a socio-economic context in which they weren't expected to be able to compete that raised the agrarian question (Newby et al., 1981 in Shucksmith & Rønningen, 2011).

Peasantry remains, both in the Global South and Global North, and small farmers still engage in alternative strategies that gives them autonomy from the capitalist market (Holt-Giménez et al., 2021; van der Ploeg, 2011, 2018). With the persistence of small farms in a context of corporate dominance (Akram-Lodhi & Kay, 2009; van der Ploeg, 2018), discussions analysed whether small farms could exist alongside capitalism and even offer an alternative or resistance to it (Darnhofer, 2010; Sevilla Guzmán & Woodgate, 2013). In the European context, where the tendency towards capitalist and entrepreneurial farming is even more extreme than globally, researchers identify re-peasantization along with a process of de-peasantization, with new peasantries emerging, in new waves of young farmers, and the resistance of peasant systems (Góngora et al., 2019; Monllor, 2013; van der Ploeg, 2018). From this approach, peasant and small farms, hand in hand with agroecology, are pointed as a pathway to more sustainable food systems (Akram-Lodhi, 2021; Holt-Giménez & Altieri, 2013; van der Ploeg et al., 2019), since these new and old peasantries, characterized by extensive farming, alternative food networks and agroecological practices, become more relevant in the face of the social and ecological crisis of the current climate emergency and the need for a fair transition in food systems.

While small farms and peasant systems are being studied and looked at as examples of sustainable and resilient agriculture, their future and viability in a challenging context is still being debated (Aubert & Perrier-Cornet, 2009; Bernstein, 2006b; Hazell, 2005). Researchers from different perspectives have been trying to address the question of how do peasants and small farmers “*hung on their farms and their way of life*” (Holt-Giménez et al., 2021, p. 2) under the threat and pressure of industrial agriculture and capitalist economy (Bernstein et al.,

2018; Cabell & Oelofse, 2012) and unfavourable agricultural policies (Shucksmith & Rønningen, 2011). This question has been addressed from different perspectives, in which different understandings of what viability is and how a viable farm looks like are crucial. “*Neo-liberal imperatives*” predominate in the understanding of agriculture as an economic activity and food as a commodity, an approach that leads to food systems in which rural livelihoods are threatened, small farmers are oppressed and natural resources are depleted (McDonagh, 2012, p. 713). Fostering small farms and their potential for global and rural sustainability requires an approach on agriculture and food systems that goes beyond productive and neoliberal economy (McDonagh et al., 2017a; Shucksmith & Rønningen, 2011). From more conventional economic perspectives, viability is narrowed down to economic growth and a viable farm is a system that is able to generate profit (Latruffe et al., 2016; Spicka et al., 2019). Such approaches are not suited for small farms (Shucksmith & Rønningen, 2011), as they are not able to explain how small farm reproduce still, since in these farms oftentimes the income generated by the farm is lower than the expenses of the farm’s household, nor grasp the complexity and balances at play in peasant farms (Van Der Ploeg, 2013).

The debate around the sustainability of food systems, which has moved from being limited to ecological sustainability to become more nuanced and complex and incorporating social sustainability and economic sustainability (Shucksmith & Rønningen, 2011; Therond et al., 2017) expanded the understanding of farm viability. Sustainability approaches expand the scope of viability by incorporating a long-term perspective, including key aspects in the continuity of small farms, such as transferability or durability of the farm (Latruffe et al., 2016; Spicka et al., 2019). However, the social and economic dimensions have proven to be more difficult to integrate in sustainability frameworks (Dumont et al., 2016; Gonzalez de Molina, 2013; Latruffe et al., 2016; Rööös et al., 2019). Also, the use of sustainable agriculture approaches to explore farm viability is affected by the overuse of sustainability, both within and outside academic debates, which has become a potentially confusing term that is used to refer to many different, and often confusing, perspectives and definitions (Therond et al., 2017; Velten et al., 2015).

Akin to the more complex and comprehensive sustainability perspectives, there are other perspectives that can provide relevant conceptualizations of small farm viability, such as the sustainable livelihoods approach and the debate around farm resilience. The sustainable livelihoods framework allows for a more complex perspective, moving the debate from a monetary focus, towards the household, when analysing resources and strategies and thus, it is suited to the idiosyncrasies of small farming. On the other hand, from a resilience perspective, farm viability is a combination of resistance and a farm’s ability to adapt to change and disturbance, therefore as something dynamic (Cabell & Oelofse, 2012; Darnhofer, 2010). A resilient farm “*cannot privilege the social nor the ecological*”, thus this approach to viability frames small farms in its complexity and integrate both social and ecological domains (Darnhofer et al., 2016, p. 113).

In the present thesis we take the sustainable livelihoods approach (Natarajan et al., 2022; Scoones, 1998) and the livelihood resilience framework (Ifejika Speranza et al., 2014) as the theoretical foundation to examine and approach small farm viability. However, as we explore throughout the thesis, these approaches still have some

limitations and blind spots, as they overlook or under-explain crucial aspects of small farming, in which reproduction is even more central than in other economic systems. For that, we incorporate a feminist economics approach, as a critical perspective (Carrasco Bengoa, 2017), to further the understanding of how small farms remain and reproduce, bringing forward issues such as well-being, interdependencies and equality to the debate. Feminist economics aim to problematize the conventional understanding of the real economy (Di Masso Tarditti et al., 2021) by taking into account reproductive work and labour and bring it to light as fundamental for productive work and labour and more broadly, for the socio-economic system and human well-being (Ezquerro, 2011; Federici, 2013). Rather than centring around production and market, feminist economics place life at the centre of the socio-economic system (Carrasco Bengoa, 2017), and through ecofeminist approaches, they are able to integrate non-human life in this centrality (Herrero, 2013). Thus, feminist economics could be well suited to comprehend small farms, in which agricultural activities and household activities share common space and are fully interlinked (Chayanov, 1966; Van Der Ploeg, 2013), and environmental, social as well as economic dimensions are at play (Shucksmith & Rønningen, 2011).

Thus, the object of study of the present research is small extensive family farms defined as peasant farms, a term that refers to a farming style, a way of doing agriculture and even an identity (van der Ploeg, 2016), rather than a strict farm typology. In approaching the complex issue on small farms and particularly, on how they persist and are able to sustain food systems, this thesis hypothesizes that there is a need for a shift in perspective to examine small farm viability, towards comprehensive theoretical perspectives that take into account the circumstances of small farms and peasant economics, including the reproductive aim of peasant farms, and answer to the current need for a sustainable and fair transition in food systems.

1.2 Thesis goals & structure

The present thesis aims to examine the viability of small-scale farms to understand how this type of farms sustain themselves and farmers' livelihood and how they persist in a challenging socio-economic context. In order to fulfil the thesis' general objective we address four specific objectives, each of them building into each other:

- SO1. To identify limitations and gaps in the existing theoretical approaches to small farms' viability;
- SO2. To identify the viability strategies small farms implement;
- SO3. To develop a new theoretical framework to examine the viability of small farms in their complexity;
- SO4. To test the developed theoretical framework in view of two of the major challenges small scale farms currently face: work and labour management, and waste management.

To do so, we focus on a sector largely dominated by small farms, the extensive Mediterranean olive oil production, in the Terres de Ponent in Catalonia (Spain). Most Mediterranean olive oil producers are small farms, not only in terms of land size, but also in terms of income, use of family labour and an extensive and diversified production, thus implementing a peasant way of farming. Furthermore, in Mediterranean olive oil

production, the sector faces important environmental and socioeconomic challenges and the monetary and productive viability of small farms is being questioned, while at the same time small farms remain as the most important agent in the sector.

Firstly, the notion of viability, which we use to explore how small farms sustain themselves and reproduce, can be ambiguous in academic debates, as it is used with differing definitions and scopes. We propose an outlook that goes from narrow to holistic definitions of viability, which integrate its economic, ecological and social dimensions, emphasizing the latter as the one that has been given less attention and its complex in itself. In this shift, sustainability and reproduction, rather than profit, become the main measures of farm viability, which implies, in a wider scope, shifting from a productive or monetary to a reproductive understanding of the economy. A wider approach or outlook on small farm viability also translates to how a farm is understood and examined within a system and as a system in itself. On one hand, shifting from a productivist or industrial approach to agriculture to an agroecological perspective, means that the farm is understood as an agroecosystem, in which social, economic and ecological elements are connected. On the other hand, the farm is not understood as a stand-alone or disconnected project, but rather as a household's livelihood, which implies that a farm, as a productive endeavour and agroecosystem sustains the household and vice versa. This outlook, based on different theoretical shifts, guides the unravelling of the research question throughout the thesis and research process. Thus, firstly, we review different theoretical frameworks approaching small farm viability focusing on the sustainable livelihoods approach and resilience frameworks, as holistic theoretical perspectives. In them, we identify limitations and gaps from an agroecological and feminist as critical points of view. The second sub-objective is the identification of the viability strategies actually implemented by small farmers in the case study of olive oil production in Terres de Ponent, alongside the challenges they face and circumstances that drive these strategies. In turn, this second sub-objective contributes to the first, as it allows us to check whether the frameworks we build upon are theoretically suited to analyse the strategies identified. Together, sub-objectives 1 and 2 lead to the third sub-objective, the development of a framework to analyse the viability of small farms, the *livelihood reproduction* framework. Sub-objectives 1 and 3 are answered in Chapter 3, while sub-objective 2 is also addressed in deeper detail throughout Chapter 4 and 5.

The fourth sub-objective is to test the proposed *livelihood reproduction* framework in the examination of different aspects of small farm viability. To do so, we chose two of the most pressing challenges posed to small olive oil farms. The first challenge is specific of olive oil production as it relates to the increasing environmental and economic issue of the waste and by-products generated by olive oil production. This issue is largely addressed by the circular economy field, within which techno-economical solutions to the issue are proposed. In Chapter 5, we explore the viability strategies related to waste management and by-product valorisation used by olive oil farmers and use the *livelihood reproduction* framework, shifting the analysis' point of view to one that centres small farms and their circumstances. The other challenge refers to the labour scarcity small farming is undergoing. Due to broad socio-economic changes, rural households have become smaller, family labour is less available and labour costs are one of the most important expenses in small farms. This labour challenge is

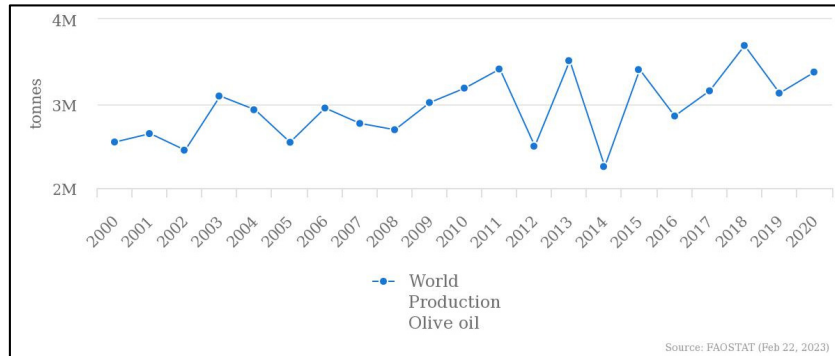
closely linked to the squeeze between increasing costs of production and low prices that small farms in Europe characterized by cash crops, such as olive oil farms, face. Conventional/monetary economy perspectives on farm viability propose intensification strategies, focused on increasing production and reducing the need for labour as solutions to the challenge. However, using *livelihood reproduction* framework, in Chapter 6, we take a wider and more complex approach to this viability challenge and examine in depth labour and work strategies, out and within the household, and other viability strategies implemented by small olive oil farms to acquire labour and organize work.

2 Mediterranean olive oil production, a sector
characterized by an extensive, small and family
production

2.1 Traditional Mediterranean and European olive oil production

The global production of olive and olive oil has been smoothly increasing in the last twenty years (Figure 1). The reasons behind include i) an intensification of the production (Fernandez Escobar et al. 2013), ii) an increase and generalization of olive oil consumption (Donner and Radic 2021); and iii) countries that were not olive producers historically now being relevant olive producing regions, such as the US, Australia or Argentina (Figure 2.1), caused by an increase of olive consumption worldwide.

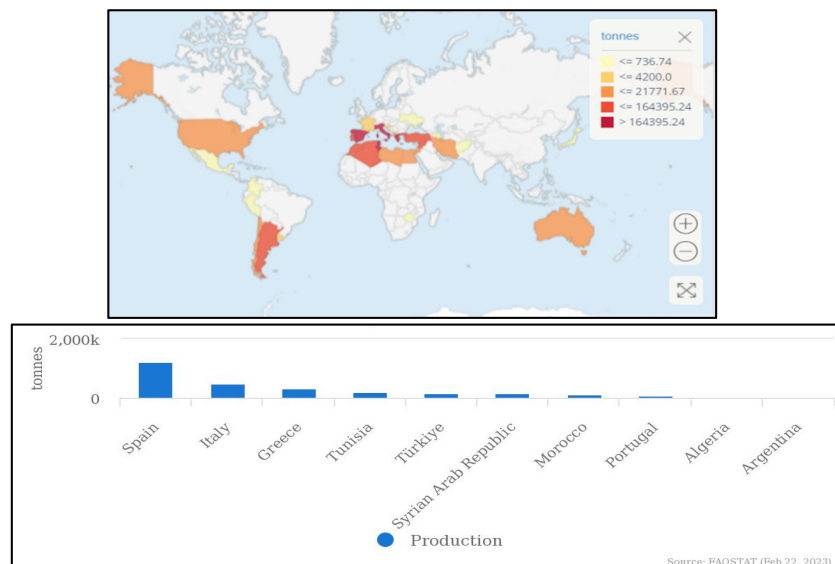
Figure 2.1. Olive oil production worldwide



Source: FAOSTAT (2021) – consulted February 2023

As recent statistical data show (Figure 2), the Mediterranean region remains the global focus of olive and olive oil production (FAOSTAT, 2022). Among the Mediterranean countries that produce olive and olive oil, Spain, and in particular, the Southern Spain region, stands out as the first region globally in terms of volume of production (EUROSTAT, 2021).

Figure 2.2: Olive oil production per countries worldwide



Source: FAOSTAT (2021) – consulted February 2023

Olive and olive oil production are economic and cultural activities with a long history in the Mediterranean (Colombo & Perujo-Villanueva, 2017; Karanikolas et al., 2018). Olive groves shape the Mediterranean

agricultural landscape being the principal use for agriculture land (Lozano-García et al., 2022) and one of the main products of the region's agricultural sectors. Also, olive oil is a fundamental element of the Mediterranean diet (Donner & Radic, 2021). Olives are a permanent crop with a bi-annual production (EUROSTAT, 2021). Traditionally, olive groves have been extensive and rainfed and produced in small and family farms with a diversified production. Olive groves in the Mediterranean are often found in mountainous and sloping areas, where potential for mechanization is limited, and in combination with other crops (Duarte et al., 2008). Traditional olive production is extensive, grown in low-intensity and low-density groves and without irrigation, which makes it a relatively low productivity crop (Fernandez Escobar et al., 2013; Moragues-Faus, 2014; Tous, 2011). With these agronomic characteristics, traditional olive production contributes to diversity and soil conservation, preventing soil erosion and promoting biodiversity (Arriaza Balmón et al., 2008; Colombo & Perujo-Villanueva, 2017). Olive trees are also resilient to both drought and cold and require low inputs to sustain the crop (Colombo & Perujo-Villanueva, 2017). In Europe, olive oil farms are fragmented (Colombo & Perujo-Villanueva, 2017) and mostly done in small and family farms (Moragues-Faus, 2014), not only in terms of hectares, but also as being dependent on a mostly familial labour force and a low economic turnover (Colombo et al., 2020). Traditionally, olive production is done in farms with diversified crops and economic activities, which count on income from other products and activities alongside olives (Duarte et al., 2008). Linked to this, a high number of Mediterranean olive farmers are part-time farmers, and in addition, old or retired (Moragues-Faus, 2014).

In recent years, however, small olive farms are decreasing due to financial difficulties and lack of generational change, while medium and large farms are increasing in a tendency towards land concentration and intensification (Colombo et al., 2020). The intensification of olive production (Fernandez Escobar et al., 2013) is done through new plantations and denser groves (intensive planting frames), sustained through irrigation. Irrigation was introduced in the 60s. The increased global demand for olive oil and the good response of olive trees to irrigation, together with the climate change projections in the Mediterranean region, is making this practice an increasing trend (Fernandez Escobar et al., 2013).

Thus, different forms of olive production currently co-exist with different degrees of intensification: traditional, extensive, semi-intensive, intensive and super intensive, the latter ones being highly mechanized, irrigated and with a high use of inputs (Russo et al., 2016; Tous, 2011). High intensity planting frames, in the form of "*super-high density hedgerow*" increase the production and reduce cost, as they allow for the full mechanization of the cultivation process (Tous, 2011). However, they are a "*short term investment*" in large farms (compared to traditional and extensive olive production) linked to investment from "*other [than agriculture] economic sectors*", that is "*private companies coming from other financial activities (construction industry, service sector, etc.) and large olive oil commercialization groups*" (Tous, 2011, p. 1). Following the same trend of increased productivity, the cultivars that have proven to perform better in terms of yield are spreading and replacing traditional varieties in many areas (Fernandez Escobar et al., 2013).

The environmental impact of intensive olive oil farming is increasing in Southern EU countries (Karanikolas et al., 2018). As the area dedicated to intensive olive production increases and olive irrigation becomes more common and intensifies (Fernandez Escobar et al., 2013), soil suffers from degradation due to heavily mechanized management, tillage and monoculture models (Fernandez Escobar et al., 2013; Lozano-García et al., 2022). In this context, small olive growers seem to face the choice between intensification and abandonment (Karanikolas et al., 2018).

In Mediterranean Europe, olive oil production in general and small olive oil farmers in particular, face two big challenges, the low profitability of traditional olive production, exacerbated by a context of “cost – price squeeze” and a reduction of family labour, and the management of olive oil by-products and waste, associated to the intensification of the production. Traditional olive groves, as part of small family farms, are dependent on family labour and CAP subsidies and both assets are being reduced (Colombo et al., 2020). They also suffer from a global situation in which the price of olive oil has lowered and costs have maintained or increased (Rodríguez Cohard et al., 2017), in a so called *squeeze of agriculture*, deeming the less productive (compared to intensive production) extensive and traditional olive production as not profitable (Colombo et al., 2020; Tous, 2011) Small olive farmers cannot compete, nor in terms of price nor yield, in the globalized olive oil market, which is very competitive and characterized by price fluctuations (Stillitano et al., 2017). Furthermore, as exemplified by the case of Spain, olive oil markets are controlled by large business groups, which set the prices not adapted to the circumstances of small farms or traditional olive production (Colombo & Perujo-Villanueva, 2017; Rodríguez Cohard et al., 2017).

Like other small farms, small olive oil farms would not be able to sustain themselves in monetary terms if it was not for the unpaid labour from family members (Colombo & Perujo-Villanueva, 2017). In a context where the availability of family labour has decreased, labour costs are one of the main challenges faced by small olive oil farms (Colombo & Perujo-Villanueva, 2017; Fernandez Escobar et al., 2013). This leads to lack of profitability and in turn, to farm abandonment and small farms being absorbed by larger, more industrialized farms, with a subsequent negative socio-economic impact on rural areas (Colombo et al., 2020, p. 6).

The other challenge faced by the olive oil sector is also tied to the trend towards intensification. Olive oil production generates large amounts of waste and by-products, which are potentially environmentally harmful and costly to manage, as their disposal or valorisation is complex (Donner & Radic, 2021). Any agricultural production generates by-products, but intensification of production also increases the amount of by-product generated, turning it into more problematic waste (Krzywoszynska, 2012). The olive oil sector generates by-products both in the managing of olive groves, through pruning, and in olive oil mills, with the by-products generated in olive oil production. Berbel and Posadillo (2018), calculated that, only accounting for European countries, olive oil production generates 11.8 million tons a year of pruning biomass and 9.6 million tons a year of by-products in olive oil mills, including olive pomace, leaves and stones. The by-products generated in olive oil production, during the milling process, pose the biggest challenge, as they can be phytotoxic (Souilem et al.,

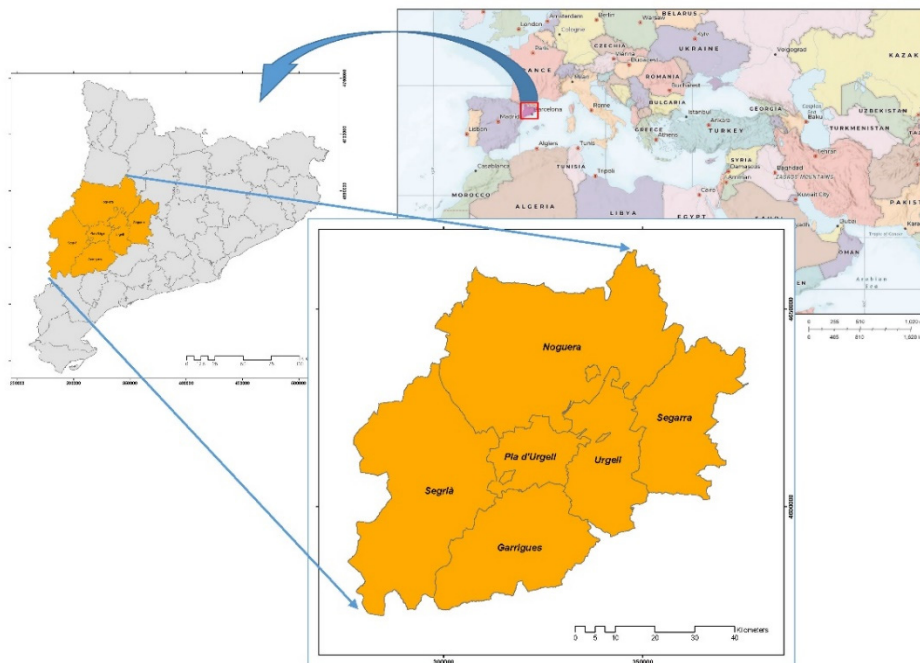
2017). However they offer an opportunity to be valorised in to products of high value and be turned into relevant resources (Donner & Radic, 2021; Roselló-Soto et al., 2015).

To what extent and how these two challenges can be addressed by small farms, and the impacts of different strategies on the reproduction of the livelihoods of farmers, is also an issue addressed in this thesis.

2.2 Characteristics of olive oil production in Terres de Ponent

To examine the viability of small-scale farms and particularly, extensive olive oil farms, we analysed olive oil production in Terres de Ponent as a case study. Terres de Ponent is a typical Mediterranean region where small extensive farms in the olive sector are the most common.

Figure 2.3: Case study of Terres de Ponent region in Catalonia (Spain)



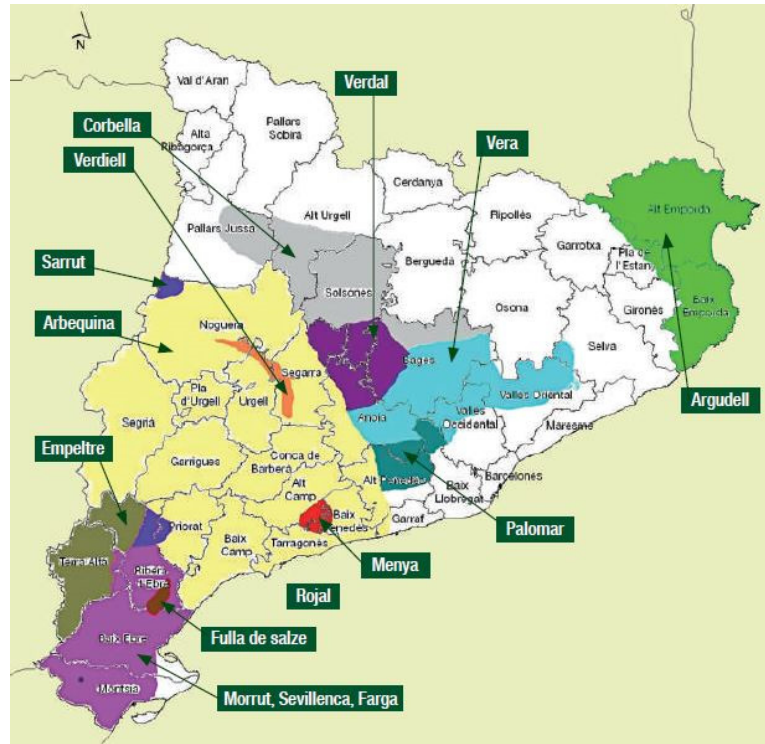
Source: Own elaboration

2.2.1 Catalan olive oil production as a context.

Terres de Ponent is an administrative area, composed of six smaller counties, in Catalonia, Spain. While Andalusia stands out as the main productive olive oil producing region in Spain by far, olive oil production is very relevant in all of Mediterranean Spain, including Catalonia (in the North – East of the country, [Figure 3](#)). Data from the 2021 olive oil campaign shows that Andalusia produces around 86% of Spanish olive oil production and Catalonia roughly 3.4% of the production (Ministerio de Agricultura, 2022), making it the fourth Spanish region in olive oil production. In spite the small percentage it represents in the Spanish context, olive oil is one of the most relevant agricultural products in Catalonia. Olive groves represent 12% of Catalonia's harvested area, with 107,592 hectares dedicated to olive orchards in 2021 (Departament d'Acció Climàtica Alimentació i Agenda Rural, 2022) and 25,988 olive farms (IDESCAT, 2022). While Catalonia is not the most

productive olive oil region, in the Catalan olive sector small producers and traditional production coexist with a few large producers and more intensive production models. As shown in Figure 2.4, olive crops are more important in certain regions, but they are present all over Catalonia with several native cultivars.

Figure 2.4: Distribution of olive varieties (colour coded) in Catalonia (Spain)



Source: (Ninot et al., 2015)

Olive production in Catalonia is mainly oriented to olive oil, with a very small percentage of the production dedicated to table olives. In addition, it is one of the crops with a bigger presence in the organic sector, with 9.665,85 hectares of olive groves certified as organic (Consell Català de la Producció Agrària Ecològica, 2021b), which represent 9% of all olive hectares in Catalonia in the same year. In spite of a tendency towards intensification, most olive groves in Catalonia (>70% of hectares dedicated to olive production) are rainfed, with rainfed groves showing a yield of 1.566kg/ha compared to 3.651kg/ha in irrigated groves (MAPA, 2022).

As is also characteristic of Spanish and Mediterranean olive oil production, Catalan olive oil production is tied to small farms. More than half of olive oil farms in Catalonia have less than 2 hectares and only 9% have more than 10 hectares of olive groves (IDESCAT, 2022). Also, 44,4% of Catalan farms include olive production in their holding (Martín et al., 2014). In terms of income (Table 2.1), in a cost – benefit calculation, olive production brings very few income to Catalan farms, particularly rainfed groves, where costs of production exceed by far the income generated, and the profits generated by olive production represents a very small percentage of the farms gross product (MAPA, 2022). This fact, alongside the small size of hectares dedicated to olive groves within the farms, indicate that olive production in Catalonia is done in diversified (with other crops or economic activities) or part-time farms, as also observed in other Mediterranean and European regions (Moragues-Faus, 2014; Tous, 2011).

Table 2.1: Techno-economical features of olive oil farm holdings in Catalonia and Spain

	Gross product (€/ha)		% of olive on farm's gross product		Cost of production (€/ha)		Salaried labour costs (€/ha)		% salaried labour costs on cost of production	
	SPAIN	CATALONIA	SPAIN	CATALONIA	SPAIN	CATALONIA	SPAIN	CATALONIA	SPAIN	CATALONIA
Rainfed	1230,1	746,2	31%	10%	1303,2	1343,2	225,1	173,9	17,3	12,9
Irrigated	2378,5	1793,8	36%	16%	2148,9	1587,4	477,9	203,5	22,24	12,82
	Family labour (€/ha)		% family labour costs on cost of production		Net margin (€/ha)		Profit of the activity (€/ha)		Profit for the producer (€/ha)	
	SPAIN	CATALONIA	SPAIN	CATALONIA	SPAIN	CATALONIA	SPAIN	CATALONIA	CATALONIA	CATALONIA
Rainfed	303	310,1	23,25	23,09	317,6	-192,5	-73,1	-597	295,8	-284,7
Irrigated	339,7	399,9	15,81	25,19	714,4	735,8	229,6	206,4	793,2	648

Source: Own elaboration using data from MAPA (2022)

2.2.2 Olive oil in Terres de Ponent as a case study as a case study of small farms

Olive oil production is very important in the Terres de Ponent region. Terres de Ponent is the second most producing region in Catalonia, and olive groves have historically shaped the cultural and geographical landscape in the different counties that make up the region (Diputació de Lleida 2015). Olive production in the region is fully oriented to olive oil production¹ and characterized by small olive oil farms, with more than half the olive oil farms in the region having less than 5ha of olive groves (IDESCAT, 2022) and a rainfed production (Table 2.2).

Table 2.2: Surface and olive production in Terres de Ponent (2021)

	Surface (ha)	Yield (kg/ha)	
Rainfed	26.742	875	
Irrigated	9.190	3.231	Production (tones)
Total	35.932		51.752

Source: Own elaboration using data from (IDESCAT, 2022)

According to the 2020 Agricultural Census (IDESCAT, 2022), there were 6.666 olive farms in Terres de Ponent, 427 (6,4%) of them with organic certification. Comparing data between the 2009 Agricultural Census and the 2020 Agricultural Census, we observe an overall stability in olive oil production in Terres de Ponent. Surface of olive groves has slightly decreased in 2020, but the number of olive farms shows a slight increase. Particularly, the number of farms with very little surface of olive production (<2ha) have increased by 37%, medium to large olive farms (20ha to 200ha) have increased by 18%. On the other hand, farms between 2ha and <20ha show a slight decrease in number of 14%. Table 2.3 also shows how surface of rainfed olive groves have slightly decreased, while hectares of irrigated olive groves have almost double.

¹ Through fieldwork we learnt that it is common for olive producers to early harvest a small amount of olives for self-consumption but this practice is not reflected in official data bases.

Table 2.3: Evolution of olive production in Terres de Ponent (2009 – 2020)

	Number of farms	Surface (ha)	Rainfed surface (ha)	Irrigated surface (ha)
2009	6.138	35.485	30.022	5.463
2020	6.666	34.683	27.196	9151

Source: Own elaboration using data from IDESCAT Agricultural Census 2009 – 2020

Compared to Catalan olive oil sector, the yield of olive groves in Terres de Ponent is lower, particularly in the traditional rainfed production. Olive farms in Terres de Ponent are most often diversified, combining olive production with other crops (herbaceous crops, fruit trees, nut trees or vineyards depending on the area) or with other economic activities like husbandry or tourism. The counties of Les Garrigues, Urgell and Segrià have associated one of the five official olive oil Protected Designation of Origin in Catalonia, which certifies virgin olive oil made in certain municipalities in those counties using mostly *arbequina* olives. While the main olive variety cultivated in Terres de Ponent is *arbequina* (named after the town of Arbeca, in Terres de Ponent), which is also the most common in Catalonia (and globally), there are also other native varieties, such as *verdiell* or *sarrut* depending on the counties. Olive producers have recently been experimenting with innovative cultivars and foreign varieties, such as *koroneiki*, tied to a tendency to intensify the production.

The Terres de Ponent region is a relevant olive oil production area to examine the two challenges that small farms face in the Mediterranean context: by-product valorisation and farm viability. The criteria employed to select this region was based on three factors. First, i) olive production is very important in the area, in terms of olive yield, hectares dedicated to olive crops and number of olive farms; ii) Terres de Ponent is a diverse region in terms of diversity of agricultural landscapes and olive varieties; and iii) the presence and relevance of small olive farms is high.

Olive oil production in Terres de Ponent is characterized by small olive holdings in family farms, of less than 5ha, with a diversified, extensive and low yield production, mostly rainfed production. In the construction of our case study (as we describe in the next section) we had two additional criteria. On one hand, in line with the goal and theoretical approach of the thesis to examine farming as a *livelihood*, we looked for olive oil farms in which olive and agriculture were an important part of the household's economy, both in terms of income and work dedicated to it, leaving out hobby farming or projects in which olive production or agriculture was residual. On the other, we looked for diversity in the agricultural and social morphology of the projects within the case study, with some projects in the sample that could be considered mostly intensive and medium farms (by size) on one end, and part-time farms with very few hectares of olive groves on the other.

3 Methodology

3.1 Methodology overview

To accomplish the research objective of examining the viability of small farms and understand how they are sustained and reproduced, we assessed in depth the case of the olive oil production by small farms in the region of Terres de Ponent (see Table 3). To do so a combination of both qualitative and quantitative methods was employed (see Figure 5). In particular, we used literature review to theoretically frame our research and identify gaps in existing livelihoods viability frameworks, semi-structure interviews to gather primary data on the case study and qualitative content analysis, as well as descriptive statistics, creation of characterization indexes and correlation tests to analyse the gathered data according to the thesis' specific objectives.

In this methodology section, we broadly explain literature review methodology, semi-structured interviews conducted in the case study, qualitative content analysis and descriptive statistics as the fundamental methods used in all four specific objectives. In each of the chapters in which each specific thesis' objectives are addressed, a methodology section is included, to explain particular methodologies that were used to attain only that specific objectives, such as the use of correlation tests to examine olive oil by-product valorisation strategies in *Chapter 4: From livelihoods resilience to livelihoods reproduction*.

Table 3.1: Methodologies employed to address thesis' objectives

Thesis sub-objectives	Methodologies	Chapter
Identify limitations and gaps in existing approaches to small farm viability	<ul style="list-style-type: none"> - Critical literature review - Qualitative content analysis 	Chapter 4: From livelihoods resilience to livelihoods reproduction: contributions of a feminist perspective to the analysis of farm viability.
Identify viability strategies of small-scale extensive farms (olive oil production)	<ul style="list-style-type: none"> - Literature review - Semi-structured interviews - Descriptive statistics - Qualitative content analysis 	Chapter 4: From livelihoods resilience to livelihoods reproduction: contributions of a feminist perspective to the analysis of farm viability.
Develop a framework that addresses the limitations of existing frameworks to analyse the viability of small-scale farms	<ul style="list-style-type: none"> - Critical literature review - Qualitative content analysis 	Chapter 4: From livelihoods resilience to livelihoods reproduction: contributions of a feminist perspective to the analysis of farm viability. Chapter 7: Discussion
Implement the developed framework in the analysis of labour and work strategies in small farms	<ul style="list-style-type: none"> - Literature review - Semi-structured interviews - Descriptive statistics - Qualitative content analysis 	Chapter 6: "Who does what?" Unravelling the central role of labour and work in small farm reproduction.
	<ul style="list-style-type: none"> - Literature review - Semi-structured interviews - Descriptive statistics - Content analysis (N-Vivo) - Farm characterization indexes - Correlation tests 	Chapter 5: Shifting the value of by-product valorisation strategies in the livelihood reproduction of small olive oil farms; a dialogue with the circular economy debate.

The literature review is a method that has contributed to all of the thesis' sub-objectives (SOs). Following Grant and Booth (2009) description of typologies of literature review, in this thesis we have used both critical review and literature review. A critical review approach, characterized by not only describing but also analysing and suggesting innovations of existing models, was specifically used to identify gaps and limitations on existing approaches to small farm viability (SO1) and in the development of a framework that addresses such limitations (SO3), in Chapters 4 and 7. The literature review, which has a broader scope, was also used to design the questionnaire for the semi-structured interviews and contributed to the deductive data organization and data interpretation in the qualitative analysis of interviews.

We used semi-structured interviews to gather primary data on the case study of olive oil production in Terres de Ponent and as such, serves as the methodological basis to explore all thesis' sub-objectives. Semi-structured interviews specifically allowed us to gather data on the actual viability strategies used by small farmers (SO2), but also informed the development of a framework that is adequate for the study of small farm viability, highlighting strategies emerging as relevant in the case study but overlooked in existing theoretical frameworks, allowing us to gather specific information on labour and work strategies and waste and by-product valorisation in small farms.

For data analysis we used both quantitative (descriptive statistics), and qualitative methodologies (coding and recoding of interview data) using the qualitative analysis software NVivo 1.5.2-2021. These methodologies set the base for the application of specific methodologies of analysis to address SO4.

3.2 Semi-structured interviews

Fieldwork with olive oil farmers in Terres de Ponent was conducted between July and September 2020. Fieldwork coincided with the affectation of the COVID-19 pandemic and some public measures to contain contagion were in place during the time the interviews were conducted. However, these measures didn't affect fieldwork planning. We built a sample of 59 farm projects across the different municipalities and counties of Terres de Ponent.

As inclusion criteria, we looked for extensive farms observing the following attributes:

- Located at least partially in Terres de Ponent.
- Managed less than 300ha of farmland and less than 100ha of olive orchards, adapted to the characteristics of small and family farms in Europe, leaving out large and industrialized farms.
- Agriculture and olive production were a relevant socioeconomic activity for the farm's household or social group.
- The destination of olives was olive oil production.

The starting point to contact farmers were the Catalan database of farmers that do direct selling (PRODECA, 2019) and the directory of the Catalan Organic Farmers' Association (Consell Català de la Producció Agrària

Ecològica, 2021a). As contact information in these databases is public, they allowed us to distinguish farm projects based on their geographical locations and the criteria we were looking for. From there and after contacting a few farm projects, we used the snowball sampling method (M. Miles & Huberman, 1994). We stopped sampling when the sample was diverse enough to include projects with different socioeconomic morphologies within the inclusion criteria, we had reached a point that additional projects did not provide additional new responses or data or falling in typologies already represented, but the sample was also big enough to conduct quantitative analysis that could provide results with statistical significance.

The interviews lasted between an hour and an hour and a half and were conducted in Catalan, the native language of the interviewees. All the interviews were conducted in person, some of them accompanying the informants in their farms, others at the informants' home and others in public spaces, depending on the availability and schedule of the informants. In some of the interviews, more than one informant per farm was present and responses from each informant were noted on the interviewer notes.

The interview's questionnaire was designed to be as comprehensive as possible in characterizing the farm project and the viability strategies implemented in the different activities of the farm. We aimed to gather information on the farm resources, both material and immaterial, the agricultural management of the farm and how the farmers connected with other agents in the food system and established networks. The full questionnaire can be found, both in the original Catalan and in an English translation, in the thesis Annex 1.

To characterize material resources (land resources, crops, yield and machinery) we used closed questions. We also enquired about immaterial resources, such as the farmers' training background, knowledge sources and skills and of course, labour available and characterization of the labour relationships. Information on farm management was divided first in questions about agricultural management (use of inputs, treatments, techniques and use of by-products generated); second about commercialization, including the outputs of the farm and what channels they used and how they valued them. Finally, on social management, including decision processes and data regarding work calendarization (how work and time is organized within the farms' households or social group (such as cooperatives)), who is part of the farm project and how do they balance the different spheres of their lives. Throughout the questionnaire and in a final section, we included questions aimed at understanding farmers' perceptions on how they perceive the viability of their farm, the goals they set and the challenges faced, and the strength and weaknesses they identify in their own projects.

3.3 Qualitative content analysis: iterative coding of interview data

Through our qualitative analysis we organized, explored, interpreted and reflected on the fieldwork data in an iterative process, also setting the base for further qualitative analysis (Gilbert, Jackson, and Di Gregorio 2014). To support our qualitative analysis we used a qualitative data analysis software (NVivo 1.5.2-2021). To start the qualitative analysis, interviews were transcribed. From interview transcriptions and notes, the information was first deductively coded using the sections of the questionnaire. Later, we explored the data in an inductive coding process, identifying what themes emerged. From the emerging themes we designed a first set of

categories of codes and started the iterative process, refining the set of codes each time the interviews were revisited. This process allowed us to find a set of codes in which we could organize and interpret fieldwork data in terms of:

- Viability strategies, which are the strategies implemented by farmers to manage and sustain their project.
- Factors, external or internal, which are the starting point that viability strategies are aimed to address and condition the strategies available to the farmers.
- Motivations, which we defined as the values and desires that motivate the selection of different viability strategies.
- Consequences, which are the outcomes, both positive and negative, generated after the implementation of Particular viability strategies.
- Struggles farmers face when implementing viability strategies, which we coded as obstacles in cases of perceived obstacles of implementing a strategy by farmers who do not use it.

3.4 Descriptive statistics

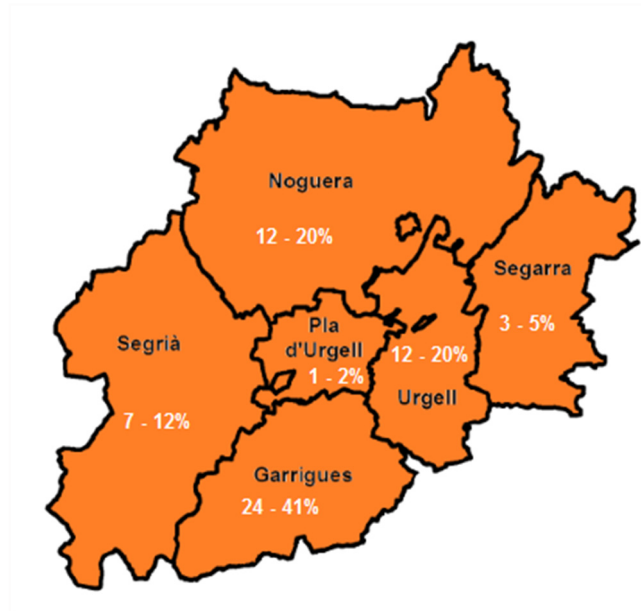
We processed data from the interviews in a spreadsheet database to organize the data in a way that allows us to use quantitative methods to statistically describe the sample and characterize the farms (indexes and correlation tests). These methods were mostly used to analyse the by-products valorisation of farms as described in *Chapter 5: Shifting the value of by-product valorisation strategies in the livelihood reproduction of small olive oil farms*.

Following the questionnaire structure, we organized the 282 variables considered in the database, between measured and observed variables, in five parts. In general information (10 variables) and life story (6 variables) of the farm we included the geographical situation of the farm, time when the project started, background and certifications. In material resources (90 variables), we included variables related to land, crops, yields, infrastructure, use of material resources and livestock. In marketing and income (91 variables) we include variables relating to commercialization channels and farm and household income sources. Finally, in organization and management (85 variables), we include variables relating to the social organization of the farm, the people who are part of it, labour relationships and workers and associative strategies.

3.5 Description of the case study: general features of the sample and characterization of the farms

The sample of our case study is made out of 59 farm projects distributed in the different areas and municipalities of Terres de Ponent, with all six counties represented. In line with being the county with the largest surface of olive groves, farms in Les Garrigues account for 41% of projects in the sample. Farmland in Catalonia is very fragmented, which means that farms often manage, work or own farmland in different counties and municipalities. To define the geographical situation of each farm, we considered the county where most of their olive groves were located, even if the farm's household lived in a different county, still within Terres de Ponent.

Figure 3.1: Geographical distribution of farms in the sample in Terres de Ponent (number of projects and percentage)



Source: Own elaboration using map base from <https://www.catalalatac.cat>

Partly because of the criteria we used when building the sample (see section 3.2 *Semi-structured interviews*), farms in the sample are bigger than the Catalan and Spanish average for olive oil farms, but still have many of the characteristics of Mediterranean and European small-scale and family farms. Farm size in the case study was 65,7ha on average, but the range is very wide, from 3ha to 265ha. Focusing on olive production, the amount of olive orchards in the studied farms ranged from 0,5ha to 80ha, with the average being 20,8 hectares on farm dedicated to olive production. Additionally, 28 of the farms in the sample were certified as organic.

Like in other Mediterranean regions, olive production in the case study, particularly in rainfed and extensive production, is biannual. As explained by the informants, between two years of good yields, olive trees have a year of lower yields, during which the trees focus their energy on growing *brosta*, on growing the tender and new branches from which olives will grow the next year. Years of lower yields are exacerbated during years of drought, more and more common in the region, and we found projects in which olive production is more complementary, that only harvest their olive groves on good years.

The work associated to olive production is seasonal; concentrated in just a few months. The most intense work peak occurs during harvest, which in the case study starts in the beginning of October and lasts to the beginning of January, depending on the area. In addition, harvesting coincides with the olive oil production campaign, as new quality standards require olives to be milled within 24 hours of being harvested. Seasonality of work means that the labour required and work rhythm related to olive production is very different in the work peaks than in the rest of the year. It also means that olives are a crop that are relatively easy to combine with other economic activities and Mediterranean crops. Another work peak in olive production is pruning, which most farmers in the sample do on a yearly basis. While still entailing quite a workload, pruning is not as intense as the harvest

work peak, as the season to do it is longer, from February to April or May depending on the region, and is not as time pressed as harvesting.

In the case study, the tendency in the last few years has been to begin harvesting season earlier and to be shorter. Informants explained that a couple of generations ago olive harvest started in mid-November or even early December, depending on the region. Nowadays, only some farms follow this calendar, and more and more farms start harvest in early October. Several factors contribute to this tendency, but the one most commonly explained by the informants is olive oil quality. With the exception of olive oil sold in bulk (in which case the farmers do not control the final destination), olive oil production in the sample is mostly destined to the production of virgin or extra virgin olive oil. This olive oil has high quality standards when it comes to extraction (only mechanical), and organoleptic properties (low levels of acidity), according to the CEE directive 2568/91 approved by the European Commission. Early harvest olives are used to make *green* olive oil (referring to the degree of ripening of the olives), which is generally valued by the informants as a product with added value, because of its taste and healthy qualities, which also favours product differentiation.

This trend contrasts with how olive harvest used to be in the case study just a few generations ago. In informants' stories, olive harvest used to last well into February and farmers used to pick up very ripe olives from the ground. It was common to store the harvest in silos and milled little by little, a practice that made olives ferment in storage and lead to an olive oil with very different qualities than the ones valued nowadays. While storing olives is now a practice frowned upon among the farmers in the sample, some of them still prefer to harvest at a later date because riper olives yield a higher amount of oil. The focus on quality and the need to mill olives on the same day they are harvested also leads to a shortening of the harvest season, promoted as well with the use of harvest machinery.

Olive groves in the farms from the sample are highly fragmented. One farm often has different olive groves, rather small and distributed in different places. This fragmentation contributes to how farmers in the sample combine different management styles within the same farm project, as oftentimes cultivation framework and irrigation are adapted to the specific morphology of each olive grove. Similarly, one olive grove can be suitable for mechanization, while another, with different orography might make it impossible.

Table 3.2: Characterization of the olive oil farm projects in the sample

Type of olive production (number of cases)			Olive oil manufacturing (number of cases)		
Organic	Conventional		Incorporated	Not incorporated	
29	30		49	10	
Land dedicated to olive production (ha)			Yearly olive production (k)		
Average	Max.	Min.	Average	Max.	Min.
20.8	80	0,5	45.094	480.000	500

Extensive olive cultivation frameworks are the most common among the farmers in the case study. Taking into account that 35% (n=21) of farmers in the sample combine different cultivation frameworks in their olive

groves, 20 farmers use traditional cultivation frameworks (>8m between olive trees) and 39 farmers use extensive cultivation frameworks (4 – 7m between olive trees). However, intensive cultivation frameworks (<3m between trees) are also relevant in the sample, as 25 farms have at least a few hectares of olive groves in an intensive framework and in 13 of them, intensive cultivation frameworks make up more than 50% of the farm's olive groves. 33 farms in the sample have fully extensive olive groves (either traditional or extensive) and 5 of them fully intensive groves in terms of cultivation framework. The picture is very similar when looking at irrigated or rainfed olive groves, as the use of irrigation and more intensive cultivation frameworks often overlap. While 35 (60%) farms in the sample have rainfed olive groves, 18 of them in all their olive farmland, 17 farms combine rainfed and irrigated olive groves and 24 farms in the sample have fully irrigated olive groves, although the type of irrigation system, water access and amount of water use can be different in each farm and even, in different olive groves within the same farm.

Arbequina is the most common olive variety among the olive farms in the sample. Generally, olive production in the sample is monovarietal. However, it is common in farms with old groves, in which they have centuries old trees, to find a few trees from other autochthonous cultivars (*grossal*, *verdiell*, *verdal*, *negral*). Informants state that these few trees of different varieties, which often yield bigger olives than arbequina, were probably planted for self-consumption to make table olives.

In the northern areas of Terres de Ponent, *arbequina* is cultivated alongside the *verdiella* cultivar, a variety described by the informants as autochthonous from the Segarra and Noguera counties and which is older than arbequina. This variety is not always valued and most commonly, is mixed with *arbequina* to make olive oil. *Verdiella* trees are described as more resistant to the cold than arbequina, but less productive and it is most commonly found in rainfed old groves. Only two farmers in the sample focus on traditional varieties; these two projects also produce arbequina, but work to recuperate and valorise traditional varieties of olives with the goal of making differentiated olive oil. Other producers have introduced foreign varieties, known for the higher yields, but also as a way to obtain a more differentiated product.

In the case study, traditional olive groves had such wide cultivation framework because herbaceous crops were planted between the rows of olive trees. This can explain why such wide cultivation frameworks remain and why olive trees in field margins are still common. This practice has almost disappeared now and none of the farmers in the sample use it, as they tend to make groves and land plots uniform to make management easier. However, olive production is still a complementary crop, as crop diversification is one of the most prominent features of olive farms in the sample. 85% (=50) of the farms in the sample combine olive production with at least another crop. In this case, again related to farmland fragmentation that is characteristic of the case study, crop diversification mostly occurs with a farm producing different crops in different groves or plots of land, rather than different crops being grown in the same plot. This crop diversification at farm level, contributes to the characteristic agricultural mosaic landscape in Mediterranean regions.

In the sample, 22 farms combine two different types of crops, 13 farms grow three different types of crops and 15 farms grow more than three types of crops. Olive farmers combine olive production with almond groves (n=38), herbaceous crops (grains, fodder and legumes – n=28), vineyards (n=13), fruit trees (n=6), horticulture (n=5), saffron (n=3) and hazelnut groves (n=1). The complementarity and importance of the different crops, including olive production, varies from farm to farm. In some cases, the farm has a one or two main crops and the other(s) are complementary and in other farms, the different crops are of similar importance in terms of land and farm's economy. Broadly, in Segarra and Urgell olive groves are combined with herbaceous crops and vineyards, in Les Garrigues is mostly combined with almond trees and in Segrià and Noguera, is common to find it as a complement to fruit production. On average, olive orchards represent 52% of land cultivated by a farm project, but again there are cases in which olive production is very complementary and others in which it is the economic base of the project.

The combination of animal husbandry with crops is not very common. Only one farm combines extensive animal husbandry, sheep, with other crops, producing their own forage and using olive and almond groves for grazing. There is another farm which at the time of the interview they had projected a similar project, with cattle. 5 of the farms have some livestock, donkeys, chicken, pigs or horses, either for self-consumption or use in the farm. Additionally, 3 of the farms complement agricultural production with intensive pig farming with a fattening farm. In this case, the intensive farm operates as a separate business from the rest of the farm activities and crops. As explained before, in all farms olive production is aimed at olive oil production and 81% (n=48) of them incorporate the production of olive oil to some extent, either through their own mill, an olive oil cooperative or outsourcing the milling service.

Diversification is also socio-economic, not only agricultural. Only in 9 of the farms the farm's incomes is the sole income of the household. In the rest of the cases, either the farmer or another household member have a job outside the farm, do agricultural jobs for other producers or have complementary economic activities.

The majority of olive farmers we interviewed were male. When interpreting this data, it is important to note, even if we collected data from a total of 59 farms, in a few cases more than one member was present during the same interview. In terms of age, informants ranged from 30 to 66 years old, with most of them being between 40 to 64 years old. A big majority, 45 farmers, took over the farm project from their parents, while new farmers with no direct generational ties to farming were rare, only 3. The rest (n=11) took over farming after their grandparents, that is, as a second generation.

Table 3.3: Age distribution by gender of the informants in the sample

Gender of the informant(s)	Age range of the informant(s)					Total
	<30	30-39	40-49	50-59	60-69	
Female	1	3	3	5	4	16
Male	5	8	12	15	9	49
Total	6	11	15	20	13	

All the studied projects were formally family farms, with a couple of exceptions, a cooperative and an association. Out of the family farms and in terms of people actively involved in the management of the farm, 24 of the farms were described as individual farms (although as we explore in Chapter 6 this criteria is not clear cut and often times household members are informally involved), 9 of the farms were the project of a married couple, 24 of the farms had the active involvement of several family members, such as projects being siblings or parents and children. Additionally, 6 of the family farms are involved in some sort of collective projects with other producers, such as partnering in an olive oil mill. While most of the farms rely mostly on family labour for the everyday farm management, 44 of them hire salaried farm workers for some of the tasks; 24 of them only hire temporary farm workers and 17 of them hire at least one salaried farm worker.

4 From livelihoods resilience to livelihoods reproduction: contributions of a feminist perspective to the analysis of farm viability²

² This chapter is a modified version of the article Judit Manuel, Marta G. Rivera-Ferre & Feliu López-i-Gelats (2023): *Contributions of a feminist perspective to the analysis of farm viability: the livelihoods reproduction framework*, The Journal of Peasant Studies, DOI: 10.1080/03066150.2023.2210500

4.1 Introduction

The current globalized economic system is an increasing challenge for small and peasant farms (Hazell, 2005). The production model of big producers and retailers is forced upon them (Aubert & Perrier-Cornet, 2009; Sevilla Guzmán & Woodgate, 2013) and they are vulnerable to land encroachment and loss of resources due to extractive industries (Holt-Giménez et al., 2021). With the seepage of the principles of the Green Revolution into the agricultural domain, small farms have been subsumed and subordinated to capitalist agriculture, predominantly adopting the role of suppliers of cheap labour (Holt-Giménez & Altieri, 2013), while their local knowledge, practice and institutions have been negated (Sevilla Guzmán & Woodgate, 2013). Small farms also feel the squeeze of agriculture caused by the decrease of off-farm prices and increase in farm costs (Akram-Lodhi, 2021; van der Ploeg et al., 2019) and nowadays, we need to add the social and ecological emergency generated by climate change, a global challenge that also (if not more acutely) affects small farms (Azadi et al., 2021; Holt-Giménez et al., 2021; Morton, 2007).

Peasant agriculture is defined as a distinct mode of farming carried out by small farms, based on family labour and guided by moral economy (Chayanov, 1966). In peasant farms, the owners are the ones managing and working the farm, which cannot be separated from the farm's family unit (or akin social group) (Bernstein et al., 2018; Van Der Ploeg, 2013). These farms are characterized by some autonomy from market and a reliance on internal resources, which are fundamentally self-reproduced and self-controlled (Bernstein et al., 2018; van der Ploeg, 2011) and the goal of their economic activity is not only generating profit but the reproduction of the farm itself (Padró et al., 2019; Van Der Ploeg, 2013) and maintaining farming as their livelihood or way of life (Darnhofer, 2010).

Behind the different views on the persistence of peasantry in adverse contexts lies different conceptualizations of viability. The use of different conceptions of viability entails reaching contradictory resolutions to this agrarian question. If a narrow approach to viability is taken, reducing it to the monetary dimension, peasant farms show worse performance than industrial farm enterprises. Viability in this case refers to continued economic growth. Thus, viable farms are those that manage to increase in farm size, either by land or labour (Aubert & Perrier-Cornet, 2009). In this approach, farm viability is equated to profitability (Latruffe et al., 2016; Spicka et al., 2019) This approach to viability is incapable to explain the endurance of peasant farming as it is seen as largely unviable (Van Der Ploeg, 2013). This is due to the fact that this view of viability largely simplifies the complexity of peasant farming. While big industrial farm holdings are governed by a capitalist economy and a profit-producing logic, small farms follow the logic of peasant economy (Van Der Ploeg, 2013) and maintaining farm livelihood as their long-term goal (Darnhofer, 2010).

The livelihoods framework, developed by Ian Scoones to understand the assets and strategies that lead to sustainable livelihood in impoverished areas (Scoones, 1998), draw a more complex picture moving the debate from a monetary focus, towards the household. Yet, this framework was rather a description of the complexity of livelihoods, it lacks the temporal dimension and fails to explain why peasant farms endure despite the

existence of adverse conditions, that is, why and how they are resilient. Peasant farms' viability has also been approached from resilience approaches that analyse viability as something dynamic (Cabell & Oelofse, 2012; Darnhofer, 2010; Holt-Giménez et al., 2021). However, when resilience approaches examine the social dimensions of farm systems, they fail to incorporate the analysis of relationships and issues that take place within the household and farm, leading to definitions of viability sometimes at the expense of women and other actors in the farm.

In understanding farm viability, beyond monetary and production terms and including reproductive strategies that allow the project to sustain itself (Padró et al., 2019; Van Der Ploeg, 2013) a feminist approach can be of use. Feminist approaches bring in reproduction as the domain of the essential elements for social continuity and wellbeing, and place nature and care at the base of the sustainability of life (Carrasco Bengoa, 2017; Carrasco & Tello, 2013). The focus on reproduction of feminist approaches also link to a peasant economics focus. Feminist approaches have seldom been applied to food systems, but their contributions are essential in a context of a global sustainable transition. Taking a feminist perspective brings in issues of equality and justice, not only in the relationship between farms and other agents in the broader system, but also within the farm and the household. Thus, feminist approaches stress traditionally overlooked dimensions of farm viability, such as relationships within the household, gender equality or well-being (Carrasco Bengoa, 2017; Siliprandi, 2018), and put reproduction as the goal of small farm viability at the centre of the debate.

In view of all this, and considering the need to implement a holistic approach capable to capture the complexity behind the viability of peasant farming and the strategies that small farmers use to reproduce their livelihoods, we propose to critically revise the livelihood resilience framework (Ifejika Speranza et al., 2014) from a feminist perspective to better capture the different dimensions of farm viability. We identify the viability strategies used by peasant farmers in the particular case study of small olive farms in Terres de Ponent (Spain). We understand viability strategies as the practices through which farmers access and implement resources and manage the farm in order to reproduce and sustain both the farm and household or social group. The identification of strategies has run in parallel with a feminist analysis of the sustainable livelihoods and livelihoods resilience frameworks. These two processes were conducted in an iterative way, combining both deductive and inductive analyses, resulting in the development of the livelihood reproduction framework to examine peasant and small farms viability.

4.2 The sustainable livelihoods and livelihoods resilience frameworks: main characteristics and limitations.

Sustainable livelihoods framework and resilience theory are not approaches limited to peasant farms or even food systems, but they have frequently been applied to these fields with success (Scoones, 2015; Tendall et al., 2015). Both approaches offer holistic frameworks to farm viability, inasmuch they take into account ecological, social and economic dimensions of farms and viability, and they integrate the notion of reproduction of a system in the definitions of resilience and sustainable livelihoods. They understand viability as the capacity of a farm

system to generate resilient generating the conditions and resources needed for reproduction and a dignified life to all.

The sustainable livelihoods framework (SLF) aims to understand how sustainable livelihoods are achieved (Scoones, 1998). In SLF, livelihood strategies lead to sustainable livelihood outcomes and are explained as dependent on access to capital assets, that is “*the basic material and social, tangible and intangible assets that people have in their possession*” (Scoones, 1998, p. 7), where access is conditioned by institutional processes and organizational structures (Scoones, 1998). The definition of livelihoods and the focus on means of living in SLF (Chambers & Conway, 1992) is appropriate for the examination of peasant farms, in which the economic goal is sustaining farming as a means for living and way of life. Much like peasant economics, sustainable livelihoods approach showed that rural and farming livelihoods can't be reduced to income (Natarajan et al., 2022; Van Der Ploeg, 2013).

Peasant farms' viability has also been approached from the resilience theory, in which viability is a combination of resistance and adapting to change and disturbance, therefore as something dynamic (Darnhofer, 2010; Holt-Giménez et al., 2021). These approaches introduce *self-organization* and *capacity for learning* as elements of resilience (Cabell & Oelofse, 2012; Ifejika Speranza et al., 2014) and a resilient farm “*cannot privilege the social nor the ecological*” (Darnhofer et al., 2016: 113). Resilience approaches can then be used to understand socio-ecological systems as “*the dynamic relationship between humans and the environment*” (Cabell & Oelofse, 2012: 1), a definition that resonates with peasant economics' understanding of farming as a co-production between society and nature, in a relationship of reciprocity (Van Der Ploeg, 2013). When applied to an agroecosystem, resilience emerges from the interaction between farm, farmer and context, which means that, similarly to sustainable livelihoods, is locally specific (Cabell & Oelofse, 2012).

The livelihood resilience framework is particularly interesting to analyse how peasant farmers sustain themselves, as it merges SLF with resilience approaches. First introduced by Ifejika Speranza et al. (2014), this framework is based on a comprehensive definition of resilience as the “*capacity of individuals, social groups or socio-ecological systems to accommodate stresses and disturbances, to self-organize, and to learn in order to maintain or improve essential basic structures and ways of functioning*” (Ifejika Speranza et al., 2014, p. 110). The framework operationalizes the livelihoods approach through the lens of resilience, thus taking into account the components of livelihood and their interactions (Ifejika Speranza et al., 2014). Livelihood resilience places livelihood and not just the farm system as the object of resilience, connecting the indivisibility between household and farm characteristic of small and peasant farms.

The livelihoods resilience of a farm system is based on four comprehensive dimensions; buffer capacity, self-organization, capacity for learning and diversity (Ifejika Speranza et al., 2014). Each of these dimensions has several defining attributes. Buffer capacity determines the farm's ability to endure in case of disturbances and to absorb change and opportunities while sustaining itself. It is mainly related to resource availability and accessibility and such resources are categorized as human, social, natural, physical and financial, based on the

SLF. Following the original definition of the framework (Ifejika Speranza et al., 2014), self-organization refers to a socio-ecological system's ability to manage and regulate themselves and establish networks with other agents in the broader food system, allowing them to control system processes and giving them agency in controlling the outcome of such processes and emerging social structures. Attributes of self-organization are institutions, the societal norms and rules, local or enforced by government agents, cooperation and networks, reliance on own resources and network structure, which is context specific. Capacity for learning covers the system's actor's ability to access and transfer knowledge, as well as their ability to apply knowledge and information towards the improvement of their livelihood. Capacity for learning is indicated by the actors' knowledge of threats and opportunities, a shared vision, commitment to learning, functioning feedback mechanisms and actors capability for knowledge identification, sharing and transferring. Lastly, diversity is a slightly different dimension of livelihood resilience cross cutting that can be assessed in the other three dimensions. In spite its comprehensive approach, the livelihood resilience framework shows some shortcomings, inherited from SLF and resilience approaches. One of the main criticism of SLFs is how they tend to overlook or under explain power relationships and institutions, which are relegated to context (Natarajan et al., 2022; Scoones, 2015). Like seminal SLFs, livelihoods resilience (Ifejika Speranza et al., 2014; Jacobi et al., 2018), includes attributes such as institutions, network structure and decentralization and independence that should bring power relationships and social inequalities to the analysis, but the political, including gender inequalities, ends up being treated as "*background noise*" (Natarajan et al., 2022, p. 5). Furthermore, livelihood resilience, like most approaches to farm viability, leaves out important aspects of livelihoods, such as domestic and care work, job distribution and work conditions, division of labour or time organization. This blind spot is partly due to the fact that the household or family, in which the farm system is based on, is taken as a monolithic agent, rather than a social group made out of different individuals, where inequalities occur (Ferreira et al., 2020; Natarajan et al., 2022). This leads to overlooking gender inequalities and the prominence of women in the assumption of care and non-productive tasks, which sustain the reproduction of the farm and household (Álvarez Vispo & Begiristain, 2019; Siliprandi, 2018). The household, as a community, needs to be theoretically opened up in the examination of peasant farming livelihoods, gender analysis needs to be incorporated to resilience thinking, as gender roles have an impact in farm resilience as they might limit access to land and resources, knowledge diversity and undermine social institutions (Aregu et al., 2016) and power institutions have to be emphasized in the study of sustainable livelihoods (Natarajan et al., 2022).

4.3 The livelihoods reproduction framework

To address the shortcomings of the livelihoods resilience framework, we propose adding a feminist economics and ecofeminist perspectives into the analysis. The relevance of gender inequalities in the management and viability of peasant farms is acknowledged but not fully considered in peasant economics (Van Der Ploeg, 2013). Feminist economics expands the notion of reproduction already present in peasant economics. Much like peasant studies, feminist economics arises from the critique towards modernization and capitalist system, exposing its failure to provide a dignified life for all human communities (Álvarez Vispo & Calle Collado, 2019;

Carrasco Bengoa, 2017; Herrero, 2015). Feminist economics highlights the reproductive sphere of labour and economy (Carrasco Bengoa, 2017), which includes domestic labour and care work (of both humans and nature), essential to fulfil basic human needs, and enabling the so-called productive sphere (Álvarez Vispo & Begiristain, 2019; Carrasco Bengoa, 2017). Reproductive labour is often assumed by women in the patriarchal division of labour (Herrero, 2015): women are appointed as care takers while care labour is devalued (Rivera-Ferre & Álvarez Vispo, 2017). Reproductive tasks, which care for life and sustain a social organization, are made visible and put at the centre of the economy (Herrero, 2015; Rivera-Ferre, 2018).

In addition, ecofeminism, as a social movement and theory that integrates feminist economics and political ecology, brings out human and social life as interdependent, as human beings dependent on each other for care at different points in our life cycle; and ecodependent, as dependent on nature and ecosystems (Herrero, 2015). The introduction of a feminist approach to the examination of the viability and resilience of small farm livelihood, offers a broader horizon and answers the question, often raised in resilience frameworks of resilience for what (Darnhofer et al., 2010; Jacobi et al., 2018), by placing life in good conditions at the centre.

The livelihoods reproduction framework (LRF, Table 4.1) is built on the livelihoods resilience framework (Ifejika Speranza et al., 2014), also using insight from previous and subsequent frameworks, both from SLF and resilience, and adding new dimensions and attributes. Understanding dimensions as the areas of a socio-ecological system which are relevant in the capability of a farm to be reproduced and attributes indicating how each dimension can be characterized. The LRF uses the three dimensions defined in the livelihood resilience framework (Ifejika Speranza et al., 2014), buffer capacity, capacity for learning and self-organization, with diversity as a cross-cutting dimension (Ifejika Speranza et al., 2014). It splits self-organization into internal and external self-organization and interdependence and adds power relations & institutions as a sixth dimension, also cross cutting, that needs to be emphasized in the analysis of livelihoods (Natarajan et al., 2022).

Diversity is a cross cutting dimension (Ifejika Speranza et al., 2014), since diversity of system elements generally contribute to autonomy, flexibility and differentiation, taking shape in different viability strategies which strengthen and contribute to different attributes across dimensions of livelihood reproduction (Darnhofer, 2010). This may include biodiversity and crop diversity, diversity of income or diversity of knowledge. Power relations & institutions, which include political processes and formal institutions (e.g. policies, political agents, regulations and administrations, etc.) and informal social structures and institutions (e.g. family, class or gender), affect livelihood reproduction. They seep into all other dimensions of LRF (Natarajan et al., 2022) and as a dimension, it includes the intersecting systems of oppression affecting agroecosystems and particularly small farms (Holt-Giménez et al., 2021; Trevilla Espinal et al., 2021).

We follow livelihood resilience (Ifejika Speranza et al., 2014) to define buffer capacity as based on the livelihoods assets (Scoones, 1998) a socio-ecological system counts on (either by having them or having access) to endure in case of disturbances and to absorb change and opportunities while sustaining itself. We expand capacity for learning (Ifejika Speranza et al., 2014) as the system's actors ability to access and transfer

knowledge outwards and within the farm, as well as their ability to apply knowledge and information towards the improvement and reproduction of their livelihood (Cabell & Oelofse, 2012; Darnhofer, 2010), in a way that allows farmers and their community to adapt to their specific circumstances and generate situated knowledge (Darnhofer, 2021).

Table 4.1: Dimensions & attributes of the livelihood reproduction framework

Buffer capacity	
Natural capital	Natural resources (soil, water, land, etc.) and ecosystem services (Jacobi et al., 2018; Scoones, 1998).
Human capital	Labour availability, skills and education, state of health of the members of the household and people involved in the farm (Jacobi et al., 2018; Scoones, 1998).
Social capital	Associations, social networks and affiliations to groups, also reciprocity relations and autonomy in decision making (Jacobi et al., 2018; Scoones, 1998).
Physical capital	Infrastructure, machinery and tools (Jacobi et al., 2018).
Financial capital	Financial resources in the form of income, savings or subsidies (Jacobi et al., 2018; Scoones, 1998).
Capacity for learning	
Different types of knowledge and learning	Farmers need to stay informed and be able to identify both threats and opportunities to or for their livelihoods (Ifejika Speranza et al., 2014; Jacobi et al., 2018). They do so by combining different sources of knowledge and learning spaces, which means engaging in more technical or scientific sources, but also using local and traditional knowledge (Altieri & Nicholls, 2012; Darnhofer, 2010).
Shared vision	How the vision for the farm of each of its members is adapted to a relation of reciprocity with living nature (ecodependence), is shared with other members of the farm (as fostered by a collective household (or social group) and fair labour relationships) and with other local agents and social networks (Miguel Angel Altieri & Nicholls, 2012; Ifejika Speranza et al., 2014; Jacobi et al., 2018).
Reflected and shared learning	Reflected as it is based on past experience and not a mere response to present conditions and shared as it is created and spread based on the relationships with other local agents (Cabell & Oelofse, 2012; Darnhofer, 2010; Jacobi et al., 2018). Also, exchange of knowledge between farm and household members (across genders and generations) and ability to learn from other members within the farm, which fosters a collective household or social group.
External self-organization & interdependence	
Decentralization and independence	Refers to the autonomy of the farm and household “from controls that are outside the agroecosystem’s sphere of influence”, when it comes to designing the agroecosystem, managing and generating resources and making decisions (Cabell & Oelofse, 2012). It is achieved for example, through trade relations that don’t rely on middlemen and through local economy cycles, rather than fully depending on globalized markets (Ifejika Speranza et al., 2014; van der Ploeg et al., 2019).
Reliance on own & local resources	Low dependence on external inputs for farm management and prioritizing self-provisioning (Darnhofer et al., 2010). This translates to an agroecosystem that is adapted and fosters local natural resources and ecosystem services and manages waste and by-products locally (Cabell & Oelofse, 2012; Ifejika Speranza et al., 2014).
Cooperation and networks	The farm & household are part of local social networks and establish relationships of cooperation and trust with different agents and groups in the local food system (Cabell & Oelofse, 2012; Ifejika Speranza et al., 2014; Jacobi et al., 2018). The agroecosystem benefits from such connectedness, which generates social resources, promotes flexibility and adaptiveness and foster a shared vision at a local level (Lucas et al., 2019).
Internal self-organization & interdependence	
Work satisfaction	Work pace & workload are satisfactory when farmers are satisfied with them and are healthy (mentally and physically) (Dumont & Baret, 2017; Dupré et al., 2017). Satisfaction includes issues such as enjoying tasks and taking pride or identification with the work

	In all its complexity, work satisfaction impacts directly the reproduction of the farm as a livelihood for future generations, as it influences the desirability of farming as a livelihood.
Collective and flexible household (or social group)	Collective refers to the amount of people able (and healthy) to actively participate in the farm, but also to a flexible task distribution between members of the household or social group. In this way, it allows for farm to have more labour available, fosters equal relationships between household members and allows household members to share their workload and have a more flexible schedule, contributing to work satisfaction.
Fair labour relationships	Fairness is reflected on a fair task distribution, not based on restrictive gender roles. Also including salaried workers and labour outside the household, would include a fair salary or compensation and safe and healthy working conditions (Dumont et al., 2016; Dumont & Baret, 2017; Shortall et al., 2020; Trevilla Espinal et al., 2021).
Ecologically self-regulated	While in an agroecosystem human intervention is needed to ensure that the system provides for human needs, as agroecology shows, " <i>it is possible for farms and food systems that are organized by humans to have the capacity to regulate energy and nutrient flows, control pests, and regenerate with much less need for human intervention than the conventional model of agriculture</i> " (Cabell & Oelofse, 2012, p. 3; Jacobi et al., 2018). This means that the agroecosystem relies on the regulation of ecosystem services terrestrial communities (including humans) depend.
Diversity (cross-cutting)	
Power relations & institutions (cross-cutting)	

Self-organization, as a quality of a resilient socio-ecological system, refers to how system managers are able to organize the system in a particular manner, in a way that is adapted to their needs and desires (Cabell & Oelofse, 2012). In our attempt to theoretically open up the household and taking a feminist approach in the examination of livelihood reproduction, we consider two self-organization dimensions, one external, the other internal, and highlight the interdependence aspect also present in this dimension of autonomy (Cabell & Oelofse, 2012; Jansen et al., 2022). Thus, external self-organization considers system organization in relation to external agents (Ifejika Speranza et al., 2014). This translates to an agroecosystem that is globally autonomous (system organization and resource management is not determined by external power institutions or relations) (Cabell & Oelofse, 2012; van der Ploeg et al., 2019) and locally interdependent, as it fosters networks and connections at a local scale (Cabell & Oelofse, 2012; Ifejika Speranza et al., 2014). In a way that it can be relatively autonomous from global controls (Cabell & Oelofse, 2012; Jacobi et al., 2018; van der Ploeg et al., 2019), reliant on use of internal or local resources (Cabell & Oelofse, 2012; Darnhofer et al., 2010) and foster local interdependence through cooperation and trust (Cabell & Oelofse, 2012; Jacobi et al., 2018; Lucas et al., 2019).

Self-organization and interdependence also take place in how the system is managed internally, as the household or the social group managing a farm is not an indivisible agent but a community (Ferreira et al., 2020). This dimension highlights the need to look into the household when analysing livelihoods (Aregu et al., 2016; Natarajan et al., 2022) and food systems (Trevilla Espinal et al., 2021) and be able to delve further into social dimensions, as they have tended to be less explained when assessing agroecosystems (Dumont et al., 2016). This dimension refers to how system managers organize their own work and the work of other members of the

farm in a way that fosters well-being (of human and non-human life), equity and promotes a self-regulated ecosystem. Both the cited literature and the strategies identified in the case study guided the definition of the attributes within this dimension. Firstly, work satisfaction directly conditions how an agroecosystem is managed and affects its viability (Dumont & Baret, 2017; Dupré et al., 2017); it is constructed through tangible aspects such as workload but also through enjoyment or pride. A collective and flexible farm household (or other type of social unit) can make the agroecosystem more resilient by bringing in more resources. However, this attribute is not only a matter of how many people are in a farm household, but also how work is distributed and knowledge exchanged within the household, as flexibility and horizontality further contribute to labour availability and satisfaction. Fair labour relationships refer to social equity in the working conditions and relationships established in an agroecosystem, within the household and also including farm workers. Working conditions, financial situation, salaries condition the fairness of labour relationships (Dumont & Baret, 2017), but also gender equality in work distribution (Shortall et al., 2020; Trevilla Espinal et al., 2021). Finally, we include ecologically self-regulated, as defined by Cabell & Oelofse (2012) and integrated in livelihood resilience by Jacobi et al. (2018), within this dimension to highlight how internal self-organization is also related to ecodependence.

4.4 Methodology

In previous sections, we explained the theoretical development of LRF, building on previous frameworks and addressing their limitations. The construction of the framework was done in parallel with fieldwork and the analysis of the cases study, which served both to inform the design of the framework and to test its suitability. A total of 59 semi-structured interviews were conducted among olive peasant farmers in Terres de Ponent during the summer of 2020, from July to September. It is relevant here to mention that the objective of this work is to identify the diversity of viability strategies being implemented by small olive oil farms, not to identify the number of farms that ascribe to each of them, what might be approached in future work. Data was analysed using a qualitative data analysis software (NVivo 1.5.2-2021) to identify the main viability strategies being employed. This examination was done in two steps. First, we coded the interviews to identify the viability strategies implemented by the farmers in their farms and household. Then, we synthesized the viability strategies previously identified into thirty-four parent strategies. Later, we examined how the identified strategies strengthen the different dimensions and attributes of the livelihood reproduction framework. A comprehensive description of the methodology for both data gathering and analysis can be found in Chapter 3 of this thesis.

4.5 Results & discussion

4.5.1 Viability strategies implemented and their impact on peasant farm reproduction.

A total of 34 viability strategies were identified in the case study (see Table 4.2). We clustered them into five groups: associativity, diversification of income and crops; manufacturing and control over commercialization; traditional farming; intensification; labour and work management. As follows, we examine how the strategies impact the different dimensions and attributes of the livelihood reproduction framework and thus, farm viability.

4.5.1.1 *Associativity*

We have identified 5 strategies focused on associativity, which can be grouped into informal association, i.e., farmers collaborating and exchanging with local producers, neighbours or friends; and formal association, through membership and participation to different types of organizations. Associativity strategies build social relationships and thus, contribute to a farm's *social capital* and to building *cooperation and networks*. In turn, this social capital can turn into other types of assets, more prominently as a source of knowledge, contributing to a farm's *capacity for learning* and *human capital*. Different associativity strategies act as sources for different types of knowledge and information: informal collaboration with other producers can be a source of *traditional knowledge*, learning locally specific information and from a previous generation of farmers; olive oil cooperatives, farmers' unions or plant protection associations are a way to access technicians or updated information on regulations or subsidies, for example.

Collaboration with other producers is a central strategy in the case study, as this type of cooperation provides knowledge, labour and physical resources to a farm (Lucas et al., 2019). These exchanges, which make very explicit the interdependence of farming, are based on reciprocity and trust rather than monetary compensation, leading to more *decentralization and independence* from external factors. One of the farmers expressed that he and the neighbouring farmers "*help each other a lot*", as he explained how he has had friends taking over harvest or sowing when he had to be away taking care of his sick father. By easing a farmer's workload and allowing him flexibility to be off the farm, informal exchange and networks contribute to *work satisfaction*.

Membership to olive oil cooperatives allows farmers to access milling and commercialization infrastructures (Moragues-Faus & Sonnino, 2012), incorporating these strategies without increasing the workload of farm members, contributing to *work satisfaction*. Olive oil cooperatives can be spaces for consensus contributing to a *shared vision* between the members. However, some farmers viewed cooperatives as spaces of struggle and divided opinions, as organizations with outdated views that can make difficult innovations. This shows how, in spite their potential as a space for farmers to engage in alternative food networks, cooperatives don't always function smoothly (Moragues-Faus & Sonnino, 2012).

Similarly, farmers unions can contribute to both *decentralization & independence*, as they can amplify farmers' voices and lobby in front of policies or threats, and generate a shared vision between the members. However, some farmers in the case study express disenchantment over the impact of unions, feeling "*costs keep rising and nobody does anything*". Finally, while generally associativity strategies have a positive impact on work satisfaction, we have also found some farmers that experience participation in associations as overwork, when they feel like they have to put a lot of time and effort in participating or managing an association, but they get few benefits from it; "*I'm there for the sake of it*".

4.5.1.2 *Diversification of income and crops*

We have identified 4 strategies of income diversification, the strategies through which farmers and household members engage in alternative sources of income, other than the farm. They are characteristic of small farming

(Chaparro Africano & Calle Collado, 2017) and in the case study they aim to address the economic inability of the farm project to sustain the household, in a context where farmers feel the squeeze of agriculture. We distinguish three main types of diversification strategies: i) external agriculture jobs, when farmers perform agricultural tasks for other farmers, ii) non-farming jobs, when farm and household members have off-farm jobs, which range from jobs completely unrelated to farming and agriculture (e.g., nurses, teachers or office workers), to jobs that are related to food or even within the agriculture sector (e.g., managing restaurants, agriculture technicians or industrial engineers specializing on farm machinery); and iii) crop diversification, where olive oil is often combined with other crops and economic activities. One last strategy includes balance between schedules of on farm and off farm job, which is linked to the existence of external agricultural and non-farming jobs.

Generally, income diversification strategies contribute to stabilizing and ensuring *financial capital*, financially sustaining small farms and their households (Moragues-Faus, 2014), and to build global *autonomy*, as extra income can be invested in the farm (van der Ploeg, 2011). External agriculture jobs are also tied to *physical capital*, as they are based on jobs that require specific machinery. They are also a potential space for *shared learning* and *social capital*, since in the case study, farmers that do external agriculture jobs do so within their local social network. Non-farming jobs can be a source for farmers to learn new skills and opportunities for the farm. One of the farmers combined olive production, using biodynamic agriculture, with an industrial engineer job designing farming machinery, allowing her to design and use machinery better adapted to biodynamic production. Finally, we have found that income diversification strategies through other jobs put pressure on internal self-organization. While strategies like balancing the schedules of farming and non-farming jobs can make it easier, in general when farmers and household members engage in other jobs, it limits their availability to work on farm and increases their *workload*, leading to farmers feeling overworked or having to give up farming tasks or strategies.

Crop diversification strengthens *natural capital*, as it contributes to the heterogeneity of the local landscape. With crop diversification, farmers aim to stabilize and compensate yields and prices; one year a crop can have a lower yield or be sold at a lower price, but having other crops compensates the loss, contributing to *financial capital*. Having different crops opens opportunities to diversify the selling channels and be less dependent on a single buyer or channel, finding *autonomy* from market fluctuations while securing access to buffer resources (van der Ploeg et al., 2019). Farmers in the case study combine seasonally diverse crops, which means that work peaks don't overlap. In this way, in spite the increased workload of different crops, it doesn't increase the work pace and it even makes work more enjoyable for farmers, leading to *work satisfaction*.

4.5.1.3 *Manufacturing and control over commercialization*

Here we include those strategies that allow small farmers to decide the sale price of their products, to control the conditions of the selling channel, to maintain the added value and to have a closer relationship with consumers. We found 3 strategies: direct selling, short circuit commercialization and selling through small distributors. The alternative strategy is to use wholesale commercialization channels, where farmers sell their

product unbranded to big distributors and middlemen, who are the ones setting the price and commercialization terms. Farmers in the case study combine both strategies for their products and also diversify their commercialization channels.

Control over commercialization in olive oil production is tied to the incorporation of manufacturing, which allows to transform olives into an edible product and facilitates direct commercialization. Incorporation of olive oil manufacturing is done in different ways: through membership to an olive oil cooperative, having an olive oil mill (either individually or in partnership with other producers) or hiring the milling service. Different strategies of incorporating manufacturing have different impacts on *human* and *financial resources* (buffer capacity) and *self-organization*, but as a general strategy it makes the farm more self-reliant in using and transforming products within the farm. However, in the case study, its impact as a strategy that contributes to livelihood reproduction is related to the extent it allows farmers control over commercialization.

Farmers choose direct and controlled commercialization channels to address the insufficient prices they get through wholesale channels, contributing to their *financial capital*; “*I do direct selling and now, I set the price, is the only way*”. In addition, control over commercialization makes it less dependent on global markets and big distributors (*autonomy*). Because it allows a more direct relation with consumers and small retailers, farmers can build *cooperation and networks* (Bezner Kerr et al., 2022) and in that way, it can contribute to both *social capital* and a *shared vision*. On the other hand, wholesale channels make farmers more dependent on the prices set by fluctuating global markets and to conditions set by big retailers and middlemen. However, it is perceived as an easy strategy that doesn’t require more human capital; on the contrary, using more direct selling channels means learning new skills and introducing additional work to their farming job. Control over commercialization strategies can be detrimental to *work satisfaction*, as they increase the *workload* (Dupré et al., 2017). In fact, some farmers in the case study consider control over commercialization strategies appealing, but don’t implement them due to the expected workload increase. They would only consider them if they could do it in cooperation with other producers, that is, sharing commercialization workload, highlighting again the importance of cooperation and interdependence and pointing at the relevance of workload in livelihood reproduction.

4.5.1.4 *Traditional extensive farming*

We have identified 6 strategies in this group. Either as an alternative or in combination with intensification strategies, farmers in the case study opt to maintain traditional extensive olive production, using strategies such as rainfed production and wide planting frames. The desire to maintain the local traditional agricultural landscape or the internal characteristics of the farm, such as orography of the olive groves and lack of access to irrigation channels are among the reasons to use extensive strategies. We found traditional extensive farming to be tied to organic agriculture. Olive trees are perceived by farmers as a type of crop that doesn’t require much in terms of treatments and input application to have a minimum yield. Because of that, organic olive oil production is generally perceived as an easy transition, even if they acknowledge that it might mean lower yields (compared to intensification strategies). Organic olive production appears tied to extensive strategies, which are

connected to lower use of external inputs and to farmers trusting natural rhythms (rather than forcing them) to manage the agroecosystem.

These strategies have a similar impact on livelihood reproduction: they contribute to the reproduction of natural resources and foster biodiversity, contributing to *self-regulation* of the ecosystem. Also, they encourage the use of by-products and recirculation of resources (e.g. use of biomass as green cover), further strengthening a farm's *reliance on its own resources*. If focused on quality, extensive farming strategies can also lead to *financial capital*, allowing for higher selling prices, and be connected to the desire to *regain control* over how farm products are distributed and sold.

4.5.1.5 Intensification

Olive trees are naturally alternate bearing trees, which means that one year olive yield is higher and the year after, the production is lower. This characteristic conditions farm management, with some farmers in the case study intensifying their olive production to compensate for it. With intensification, farmers increase and ensure olive production every year, aiming to increase and ensure *financial capital*, trying to compensate for insufficient sale prices. We found 3 strategies here. Irrigation and intensification of planting frames can increase the *physical capital* of a farm. Intensification strategies also lead to a high use of external inputs (phytosanitary products, fertilizers and herbicides), as irrigation and denser groves make olive trees more prone to diseases and can put pressure on the agroecosystem natural resources. The high use of phytosanitary products also arise from the perception that weeds and biodiversity compete with agricultural production. Thus, in spite the higher olive yield, intensification strategies increase dependence to external inputs and can be detrimental for natural resources and the agroecosystem in the long term.

Despite the fact that intensification and extensive farming strategies are opposite to each other and have different impacts on livelihood reproduction, farmers in the case study often implement them together. They might do so due to the physical and geographic characteristics of the farm; different fields and groves might require different strategies. Diverse and differing strategies give small farmers flexibility in the management of the farm and household, allowing them adjust to their circumstances as efficiently as possible and to better absorb disturbances or cease opportunities (Darnhofer, 2010) and in that way, ensure their reproduction. Farmers who generally manage a farm following either an intensification or extensive strategy, might incorporate particular strategies from the alternative. One farmer in the case study, who manages his farm following an extensive and quality focused strategy, asserting the added value of traditional, organic and rainfed production in the selling of his olive oil, opted to incorporate irrigation to deal with situations of drought, which have become more common in the area with climate change.

Experimentation and desire to try out new strategies is also a reason for farmers to combine alternative strategies. Some farmers had recently planted new olive groves in an intensive planting frame, aiming to try it out as a relatively recent innovation in the region, which could increase their production and make harvest easier. But at the same time, they maintain the other olive groves using a more extensive strategy, avoiding the risk of a big

investment into a new strategy that requires a lot of physical, financial and natural capital, an example of how small farmers carry out viability strategies favouring reliability over productivity (Roe et al., 1998; Spiegel et al., 2021).

4.5.1.6 *Labour and work management*

We found 7 strategies in this group. Labour and work management strategies play a central role in the livelihood reproduction, and can affect other groups of strategies, or being affected by them. Farms in the case study rely on family labour as the main workforce and household members take on most of the workload related to agriculture production tasks, commercialization and manufacturing, domestic and care jobs, income diversification jobs and administrative tasks. In work organization between household members, we have identified two opposite strategies: a flexible work distribution and a clear or strict work distribution. With a flexible work distribution, all members of the household can handle most tasks, even if each member has their expertise and they only do other exceptionally, in case for example of a member being sick or having to leave the farm. Similar to associativity practices, flexible work distribution contributes to *human capital*, *work satisfaction* and a *collective & flexible household*. In one of the farms that also do extensive sheep farming, the two adult sons in the household are the ones taking care of the flock. Their mother usually takes care of other tasks, but if neither of her sons are available, she is the one taking the flock out to pasture. In this way, the farm increases the labour availability of household members and allows them to have a more flexible work schedule. Flexible work distribution also strengthens *fair labour relationships* between household members, as work is more evenly shared, and because it is related to an exchange of knowledge, it contributes to *shared vision* and *reflective and shared learning*.

Among the farms in the case study, the most common way of task distribution is through sexual division of labour, which traditionally determines who is responsible for what tasks within the farm and household and appoints women as care takers (Álvarez Vispo & Begiristain, 2019; Rivera-Ferre & Álvarez Vispo, 2017). Women are responsible for domestic labour and men farmers sometimes express that, even though agricultural work can be flexible, they feel too “tied to the farm/land” and struggle to dedicate time to family and care work. However, women are usually the ones that take on jobs outside the farm, jobs with more rigid schedules. They also assume commercialization and manufacturing tasks, especially when the farm project incorporates direct sales or manufacturing strategies for some of the farm products. It is also common for the women in the household to handle all or part of the administrative work tied to the farm project, such as keeping the books or handling contracts; a type of work that men farmers express as burdensome, “*there’s more and more paperwork*” and women farmers don’t particularly enjoy it either, one of them expressing “*I don’t enjoy it [administrative tasks], it never ends, farm work is more relaxing*”. Women also participate on agricultural tasks, for example during work peak seasons or tasks that don’t require heavy machinery, jobs that are usually taken on by men; even in these cases, women’s agricultural work is described as support to the main farm job carried out by the men, as described in other farming contexts in Europe (Shortall et al., 2017).

This sexual division of labour highly conditions the strategy of having a clear or even strict work distribution between household members, which unlike flexibility, it might lead to *unfair labour relationships* and can *hinder work satisfaction*. With few exceptions found in the case study, women farmers are mainly responsible for the so-called non-productive economic tasks of the farm and household. Following the terminology found in the case study, women have a supportive role around the main productive farm work, in a double sense. In the sense of taking over side or auxiliary tasks, which are devalued and their role on sustaining and reproducing the farm and household is often overlooked (Ferreira et al., 2020). But also in the sense of being primary responsible for work and tasks that are essential to sustain the farm and household, make farm or productive work bearable and make possible tasks that bring monetary and symbolic value to the farm (Álvarez Vispo & Begiristain, 2019; Rivera-Ferre & Álvarez Vispo, 2017), such as direct sales, manufacturing or income diversification (van der Ploeg et al., 2019). Thus, a feminist economics approach shows how relevant the unpaid work of women or extended family members is, essential in ensuring the viability of the farm, and thus, its reproduction.

When family labour is not enough, small farmers use different labour acquisition strategies. In addition to associativity strategies, farmers hire workers, either long term or seasonal, and count on the support of relatives outside the household. These strategies contribute to *human capital* and ease the *workload* of family members. However, hiring employees has a financial cost that the farmers perceive as very high. Also, particularly in the case of seasonal workers employed during olive harvest, farmers offer precarious working conditions, sometimes not offering legal contracts or work insurance. Some farmers struggle with having to offer low salaries, as they would like to offer better working conditions but they feel too financially squeezed to do so. Tied to the struggles of hiring, some farmers opt to adapt farm management to avoid needing employees, focusing on strategies such as crop diversification, harvest mechanization, prioritizing more control over commercialization, rather than intensifying or increasing agriculture production, or outsourcing some of the jobs. This latter strategy has a financial cost and can make farmers reliant on external agents, but it eases the *workload* of household members and allows them to take on strategies that otherwise couldn't be assumed due to lack of human resources.

4.5.1.7 *Other strategies:*

Counting on farming subsidies, from the Europe's CAP or from regional governments or certification bodies, is similar to income diversification. Subsidies can strengthen *financial* and *physical capital*, as they can be used to acquire machinery and farm infrastructure. However, while subsidies can be seen by farmers in the case study as indispensable to cover the costs of production, they can generate dependence on external agents and are often disliked by the farmers because of that.

The main work peak in olive production happens during harvest (from late October to early January). We have identified two main harvest methods; mechanized and hand harvesting. Planting frames, tree morphology and age, orography of groves and destination of the olives affect the suitability of the different harvest methods, hence they are conditional on other viability strategies. However, we have found that the impact of harvest

methods on livelihood reproduction is highly connected to the work management and labour acquisition strategies. For instance, if harvesting by hand is done by hiring temporary employees in precarious conditions, it might lead to unfair labour relationships, something that might not happen if harvest by hand is done with support from extended family. Similarly, mechanization might contribute to reliance on own resources if the farm has the necessary machinery, but it might have the opposite effect if harvest is mechanized through outsourcing the service.

4.5.2 Suitability of the livelihood reproduction framework

Our work has shown that peasants use a diversity of viability strategies to survive and guarantee their reproduction. These strategies not only depend on external elements and trends, but are also conditioned by the inherent and inherited factors of the farm and agroecosystem. Ecological, structural and socio-economic circumstances internal to the farm influence the viability strategies available to the farmers and shape how farming adapts or absorbs external factors (Padró et al., 2019). These internal conditions can result in farmers adopting strategies that could be categorized as contradictory (e.g., intensification and extensification) but this shows that in fact, peasant farmers evaluate the different possibilities and organize the diversity of strategies available in novel ways, to ensure their reproduction (Darnhofer, 2021).

Table 4.2: Viability strategies identified and the dimensions and attributes of the livelihood reproduction framework they impact.

Viability strategies		Buffer Capacity					External self-organization & Interdependence			Internal self-organization & Interdependence				Capacity for learning		
		Human cap.	Natural cap.	Social cap.	Physical cap.	Financial cap.	Reliance on own resources	Cooperation & networks	Decentralization & independence	Fair labour relationships	Work satisfaction	Collective & flexible household (social groups)	Self-regulated ecosystem	Different types of knowledge & learning	Shared vision	Reflective & shared learning
Associativity	Collaboration & exchange with other producers	+		+	+			+	+		+			+	+	+
	Membership: olive oil cooperative	+		+	+			+	+		+			+	+/-	+
	Membership: farmers' union			+				+	+					+	+	+
	Membership: ADV			+				+						+		+
	Participation in associations			+	+			+								+
Income	Crop diversification		+			+		+	+		+			+		
	External agri-jobs	-		+	+	+		+	+		-					+
	Non-farming jobs	-				+		+	+		-			+		
Commercialization & manufacturing	Direct selling	-		+		+		+	+		-/+				+	
	Short circuit commercializat.			+		+		+	+		-				+	
	Small distributors			+		+		+	+						+	
	Diversification of selling channels					+			+							
	Wholesale channels								-							
	Incorporate manufacturing	-						-/+	+							
Intensification of	Higher use of phytosanitary products					+			-							-

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		Buffer Capacity					External self-organization & Interdependence			Internal self-organization & Interdependence				Capacity for learning		
Viability strategies		Human cap.	Natural cap.	Social cap.	Physical cap.	Financial cap.	Reliance on own resources	Cooperation & networks	Decentralization & independence	Fair labour relationships	Work satisfaction	Collective & flexible household (social groups)	Self-regulated ecosystem	Different types of knowledge & learning	Shared vision	Reflective & shared learning
	Intensive planting frame					+							-			
	Irrigation				+	+			-				-			-
Traditional and extensive olive production	Integration livestock & crops	-	+				+						+	+		
	Lower use of herbicide, fertilizer & phytosanitary		+				+									
	Organic agriculture	-	+				+				-/+		+	+		
	Rainfed production		+				+						+	+		
	Extensive planting frame		+				+							+		
	Use by-products as resources		+			+	+									
Labour and work management	Flexibility in task distribution	+					+			+	+	+		+	+	+
	Clear task distribution									-	-/+	-				
	Exchange of knowledge within the farm	+														+
	Hiring employees	+				-				-						
	Job outsourcing (harvest/sowing/pruning)								-/+		+					
	Support from extended family	+		+												
Other	Subsidies				+	+			-							
	Harvest by hand						-/+			-/+	-/+					

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		Buffer Capacity					External self-organization & Interdependence			Internal self-organization & Interdependence				Capacity for learning		
Viability strategies		Human cap.	Natural cap.	Social cap.	Physical cap.	Financial cap.	Reliance on own resources	Cooperation & networks	Decentralization & independence	Fair labour relationships	Work satisfaction	Collective & flexible household (social groups)	Self-regulated ecosystem	Different types of knowledge & learning	Shared vision	Reflective & shared learning
	Harvest mechanization				+	+	-/+			-/+	-/+					
	Disposing of olive by-products						-				-/+					

We organized viability strategies into 5 different groups, which strengthen several attributes within the LRF. LRF shows how associativity strategies not only contribute to building cooperation and networks, allowing the farm to self-organize within their local system, but also, by bringing in social and human assets in the form of labour, knowledge and shared infrastructure, associativity impacts internal self-organization, contributing to flexibility and work satisfaction. By introducing well-being and satisfaction aspects in the analysis of farm viability, LRF allows to identify trends that would otherwise be neglected. For instance income diversification strategies which are often seen as a positive strategy for resilience and is central to sustain financial assets and their struggle for autonomy, might conversely strain human assets and constrain household's self-organization. While the shared aspect of capacity for learning as a dimension of resilience is tied to associativity strategies, in which farmers can also self-organize externally, the LRF also shows how shared and reflective learning is built within the household as well, through strategies such as exchange of knowledge within the farm, which in turn contribute to labour availability and flexibility. The LRF also allows us to understand how some strategies that might increase autonomy, such as control over commercialization, might not be adopted because the increase in workload cannot be assumed by the farmer, suggesting how strategies towards associativity can overcome such barrier.

The LRF introduces a feminist perspective that allows for the analysis of strategies that take place within the household and thus, accounts for the impact of work and labour management strategies on farm viability, strategies that are often overlooked by other frameworks but are fundamental for the reproduction of the household. The application of the LRF in the case study highlights the importance of flexible task distribution in the reproduction of the farm by contributing to equal relations and well-being, but also by strengthening buffer capacity and as a strategy that enables diversification of viability strategies. One problem we have encountered in our work is that the nature of the fieldwork didn't allow for the proper examination of one key dimension in the LRF: power relations and institutions. To address this dimension the fieldwork would have required a different methodology than the one we used to identify the strategies, yet, the feminist literature shows this dimension can definitely hamper the reproduction of farms.

4.6 Conclusions

Peasant farms endure in a context of agricultural industrialization and mercantilization that threatens their reproduction and way of life, fuelling the ongoing debate around agrarian questions. LRF is an approach to peasant's viability that goes well beyond a monetary notion of viability and accounts for the complexity and centrality of reproduction of farms, by introducing a feminist perspective. It builds on SLF and resilience approaches while also addressing their shortcoming in delving into the social aspects of small farm viability and to incorporate a feminist perspective within the farm's household into the analysis.

The analysis of the viability strategies identified in small olive oil using the LRF sheds some light onto how small farms endure. Farmers use different strategies within associativity, income diversification, control over commercialization, intensification, extensive farming and work management to reproduce and sustain their

farm. These strategies strengthen different dimensions of LRF and in fact, viability strategies that could be considered opposite, are implemented simultaneously. The use of the different strategies identified is conditioned by both external factors and internal resources and circumstances of the farm.

Finally, our analysis highlights the importance of interdependence in peasant's viability and the need to examine relationships and strategies that take place within the household. Our work hints the relevance of power relations and institutions in the study of viability and sustainability and points at the need for future research in this direction.

5 Shifting the value of by-product valorisation strategies in small olive oil farms: a dialogue with the circular economy debate.

5.1 Introduction

Olive oil production is one of the most important agri-food sectors in Europe and the Mediterranean and is a sector in which waste management has become a pressing environmental and economic issue (Galanakis, 2017). The management of olive and olive oil by-products is part of any olive oil farm and an aspect that small farmers have always integrated in the production process. However, local and global changes have turned olive oil by-products into more of a challenge for both olive oil as a production sector and for Mediterranean small olive oil farmers particularly (Galanakis, 2017). Olive oil production in the Mediterranean has increased in the last decades, with Spain, Italy, Greece and Tunisia leading a production that is increasingly oriented towards export markets (FAOSTAT, 2022), increasing as well the by-products generated. Furthermore, the by-products generated by olive oil mills entail a disposal challenge when produced in large quantities, due to their phytotoxicity (Pantziaros et al., 2021; Souilem et al., 2017). Current research highlights the importance of by-product valorisation strategies in the olive oil sector, given that a significant amount of by-product biomass is being wasted by the industry, while their valorisation could bring promising strategies for small olive oil farms, in a context where they struggle to sustain their production (Karanikolas et al., 2021; Rocamora-Montiel et al., 2014; Rodríguez Cohard et al., 2017). There are several residues and by-products left from olives and olive oil production. One is olive tree pruning biomass (OTPB), made out of olive leaves, branches and wood. The other is olive pomace (OP), the resulting paste of separating the oil from the crushed olives. The most common type of olive pomace in the Mediterranean sector is *alperujo*, which is the result of two-phase olive oil mills, and also the most difficult to manage (Souilem et al., 2017). Other by-products suitable of being valorised are olive stones and the water used in the milling process. Most of the by-products, up to 9.6 million tonnes, comes from olive mills, while the rest is OTPB (Berbel & Posadillo, 2018).

While the management of waste has become a challenge, in the last few years the olive oil industry has focused on the potential for valorisation of the by-products generated by olive oil production. Regional examinations in different Mediterranean regions point at circular economy as a strategic opportunity for the olive oil sector (Donner & Radic, 2021; Labrador et al., 2011; Pardos i Jordana & Alamon i Beas, 2018). Despite the olive oil sector becoming more and more industrialized, with just a few big manufacturers controlling the global olive oil market (Rodríguez-Cohard & Parras, 2011), in Mediterranean Europe, small olive oil farms remain relevant (Karanikolas et al., 2021). Circular economy has also been proposed to make olive oil production more sustainable by generating new opportunities for manufacturing valuable products for the olive oil and other sectors (Berbel & Posadillo, 2018; Roselló-Soto et al., 2015). Circular economy, based on closed-loop production processes designed to not generate waste and valorise by-products, emerged as an alternative intended to minimize harmful environmental impact through an efficient use of resources and contribute to human well-being (Ellen Macarthur Foundation, 2013; Ghisellini et al., 2016; Murray et al., 2017).

Recent studies on circular economy and bioeconomy in the agri-food sector, highlight the potential of biomass use following the principle of cascading uses, i.e. exploiting biomass first for higher added-value products and

applications before using it for lower added-value energy (Asveld et al., 2011; Berbel & Posadillo, 2018; Donner et al., 2020). Energy generation uses the largest amount of biomass, but has the lowest added value. Medium value applications include the transformation of by-products into fertilizers (composting) or animal feed (Berbel & Posadillo, 2018). Biotechnology is one of the main sources of innovation when it comes to treating and upcycling olive oil waste (Pantziaros et al., 2021; Souilem et al., 2017). The application of biotechnology to olive oil by-products offers a new range of possibilities, from the extraction of chemical compounds, to manufacturing new products for human consumption, such as functional ingredients and component for pharmaceutical and cosmetic purposes (Donner & Radic, 2021). These strategies can include, amongst others, health and lifestyle applications with a higher bioeconomy value. However, this cascading prioritization of by-products uses does not take into account which agents benefit from the added value of higher value uses or the scale and location in which these uses are implemented. The prioritization of technological uses that require highly specialized infrastructure and big monetary investments, might lead to the delocalization of circular economy strategies and by-product valorisation from a farm and mill perspective.

Mediterranean small olive farmers have been recycling some of the waste from olive and olive oil production as part of the historical management of olive groves, but these traditional uses had a limited scope and represented just a little amount of the by-products generated (Berbel & Posadillo, 2018). This changed in recent decades with the growth and industrialization of the production, which generates bigger challenges in waste management (Krzywoszynska, 2012), creating an issue as well for small olive oil farmers who are involved in the process of making olive oil. In addition, the Mediterranean region is deeply feeling the effects of climate change in the form of drought and elevated temperatures, affecting as well olive oil production (Fraga et al., 2021). In this context, local and European policies have tended towards wildfire prevention and reducing carbon emissions in their regulation of agricultural management, limiting practices common among small olive oil farmers such as the in-field burning of pruning waste (Aliaño et al., 2022; Krzywoszynska, 2012).

Applying the value criteria of the bioeconomy debate to olive oil by-products, the only actual use for OTPB is energy generation, although other applications could be implemented in the future (García Martín et al., 2020). For olive pomace, the options identified in scientific literature are more diverse. The use of olive pomace as a biofuel is well established in the sector (Donner & Radic, 2021), but research forwards fertilizer as another low value use (Labrador et al., 2011; Muscolo et al., 2019). Such practice can be particularly beneficial in Mediterranean countries, affected by desertification, since it helps with soil fertility and erosion prevention (Souilem et al., 2017). A practice regarded as a medium value use is using olive pomace as animal feed, but it is seldom applied (Berbel & Posadillo, 2018; Pantziaros et al., 2021). More and more research in the olive oil industry is being dedicated to develop and apply technologies to valorise the valuable properties of olive by-products by extracting polyphenols as high value uses (Difonzo et al., 2021; Otero et al., 2021).

Small farms, in which farm and household cannot be disconnected, are not fully guided by the logic of capitalist entrepreneurship, but rather they are influenced by the principles of peasant economy (Van Der Ploeg, 2013) and develop and implement an agroecological approach to farm management (Sevilla Guzmán & Woodgate,

2013). The goal of small farmers is the sustainability of the farm and its reproduction, in the long term and through generations (Padró et al., 2019). They focus on adding value beyond monetary criteria; rather than increasing gross production, by reducing the need for external inputs, diversifying economic activities and sources of income and by both using efficiently and enhancing the available resources (van der Ploeg et al., 2019). Thus, the resilience of small farms encompasses not only an economic dimension, but social and ecological as well (Czekaj et al., 2020), and requires an economic approach that goes beyond the monetary aspects (Álvarez Vispo & Calle Collado, 2019).

While there is a number of studies pointing at relevance of a circular economy to develop more sustainable agri-food systems (Duque-Acevedo et al., 2020), there is less evidence concerning the specific role small farmers could play or how circular economy strategies affect the viability of small farms. Circularity is a core feature in both peasant economics and agroecology, since circular strategies are tied to farm autonomy, an efficient use of resources and to the understanding of the farm as an agro-ecosystem (Padró et al., 2019). The circular economy debate highlights some potential benefits for small farms are considered. Marketing and valorising olive by-products can bring additional income to olive oil farms and mills (Donner & Radic, 2021; Torrisi et al., 2018). Presenting their production as circular and waste free could help small olive producers attract consumers (D'Adamo et al., 2019), as part of a broader strategy in which small olive oil farmers focus on product differentiation and quality construction (Moragues-Faus & Sonnino, 2012). By-product valorisation practices can also bring value and contribute to small farm's viability beyond monetary worth. Reusing by-products on farm, both through innovative and local practices, are mentioned as agroecological practices that can benefit small farms by enhancing soil fertility (Ameur et al., 2020) and in turn, a more efficient use of farmland (Padró et al., 2019). Closed loop practices and the re-cycling of waste are potentially agroecological practices, which support farm's self-sufficiency and autonomy (Krzywoszynska, 2012).

However, in the debate on the valorisation of olive and olive oil by products small olive oil farmers and their perspectives seem to be left out of the conversation. The way in which by-product uses are prioritized in the circular economy debate (Berbel & Posadillo, 2018; Donner et al., 2020) does not account for the scale in which the different uses take place and regulations focus on methods for agri-waste valorisation that occur at a step of the production chain that farmers do not control (Krzywoszynska, 2012), delocalizing the circularity and indicating how small farmers and their contributions are overlooked in the circular economy debate. Also, in circular economy, as an academic and techno-economic field, small farms and their specificity, characterized by peasant economics and being focused on reproduction rather than being profit-oriented, are rarely taken into account. Understanding the viability and functioning of small olive oil farms requires a shift in perspective also when analysing circular and by-product valorising strategies, both the ones arising from traditional practices and specific circumstances and the ones proposed from the circular economy and bioeconomy field.

In this chapter, we dialogue with the circular economy debate and examine how waste management and by-product valorisation strategies affect the viability of small farms from a reproductive perspective adapted to the complexity and specificity of small olive oil farms. To do so, we first identify and examine the waste

management and by-product valorisation strategies used by small olive oil farmers in the case study of Terres de Ponent. Then, we analyse how these strategies relate with other viability strategies and farm features of small olive oil farms and examine the obstacles and benefits small olive oil farmers express from implementing these strategies. Finally, we examine how the waste management and by-product valorisation strategies used by small olive oil farmers in the case study impact farm viability using the livelihood reproduction framework.

5.2 Methodology

The results and discussion of this chapter are based on the data collected through semi-structured interviews in the case study of olive oil production in Terres de Ponent. Fieldwork methodology is explained in more detail in the methodology chapter of this thesis. We conducted 59 semi-structured interviews to small olive oil farmers in the Mediterranean region of Terres de Ponent. The interview was designed to collect information about the resources available to the farm, as well as on farmer's perceptions on the farm's viability. In particular, data was collected on the material and social configuration of the farm, on farming and viability practices and on olive and olive oil by-product management. On farmer's perceptions, we collected information about the main challenges and strengths of both their farm and agriculture sector.

The data analysis conducted is a combination of qualitative and quantitative methodologies. To identify the by-product valorisation and waste management strategies used by small olive oil farmers, we used the qualitative codification of the semi-structured interviews, described in the methodology (chapter 3). This same qualitative analysis was also used to identify both the struggles and benefits expressed by small olive oil farmers in relation to the implementation of by-product valorisation and waste management strategies.

To examine how by-product valorisation strategies relate to other viability strategies and features of the farms, a Pearson's correlation test was run. Based on the database generated translating interview data into quantitative and categorical variables, we considered a total of 39 variables in the correlation test, representing the most defining farm features, and the wide diversity of viability strategies and by-product management strategies identified in the case study (see Table 5.1).

Table 5.0: Variables considered in the Pearson's correlation tests

Variable	Ranges	Definition
Region	Garrigues Noguera Segarra Segrià Pla d'Urgell	Region within Terres de Ponent the farm project is based in.
Age range	<40 years old 40 - 64 years old >64 years old	Age of the informants.

Organic certification	<p>The project has an organic certification for olive production.</p> <p>The project doesn't have an organic certification for olive production.</p>	Whether the farm has an organic agriculture certification.
Gender of the informants	<p>Female</p> <p>Male</p>	Gender of the informants
Size of the farm	<p><20 hectares</p> <p>20 - <50</p> <p>50 - >50</p>	Number of hectares of farmland the project works.
Olive hectares in the farm	<p><15 hectares</p> <p>= or >15 hectares</p>	Number of hectares in the project dedicated to olive farming (ha)
Percentage of olive hectares	<p><25% hectares</p> <p>25% - <75%</p> <p>75% - 100%</p>	Percentage of hectares olive orchards represent within the farm project.
Cultivation framework	<p>Traditional (are 8 or more meters between trees)</p> <p>Extensive (7 to 4 meters between trees)</p> <p>Intensive (3 or less meters between trees)</p>	Cultivation frameworks used in olive orchards. Different cultivation frameworks can be used within the same farm or project.
Olive production (k/y)	<p><10.000kg</p> <p>10.000kg – 49.999kg</p> <p>50.000kg – 90.000kg</p> <p>>90.000kg</p>	Amount of olives the farm produces each year.
Mill access	<p>No olive oil production</p> <p>Outsourced milling</p> <p>Cooperative</p> <p>Complementary olive oil mill</p> <p>Olive oil mill as the main business</p>	Strategy used to incorporate olive oil production to the project. In the correlation test, only the strategies in which the farmers are responsible for handling the resulting by-products of olive oil production.
Annual Working Unit	<p>< 2 AWU</p> <p>>2 AWU</p>	An Annual Working Unit corresponds to the amount of work done by one person working full time for a year. This variable is based on the AWU dedicated to farm work available to the farm or project.
Agriculture background training	<p>Knowledge passed down from a family member</p> <p>Formal training</p> <p>Learning by doing</p>	How did the informants acquire their knowledge on agriculture and farm management. These learning strategies are not exclusive.
Deciding treatments and agricultural practices	<p>Based on their own experience.</p> <p>Technical advisor</p>	How do the informants decide what treatments and agricultural practices to use and where do they seek advice. These strategies are not exclusive.
Index of productive intensification (IPI)	<p>Low level of IPI</p> <p>High level of IPI</p>	IPI measures the trend of intensive farming practice being used in olive farming.
Traditional application (TPA) practice	<p>Low level of TPA</p> <p>High level of TPA</p>	TPA measures traditional practices used in olive farming.

Index of autonomy (IAUT)	Low level of IAUT High level of IAUT	IAUT measure the level of autonomy of the farm from other agents in olive oil production chain and other external elements.
Index of diversification (IDI)	Low level of IDI High level of IDI	IDI measures the level of diversification of the project in its different dimensions.
Index of feminist perspective (IFP)	Low level of IFP High level of IFP	IFP measures the level of feminist practices and perspective present in the project.
Index of agricultural continuity (IAC)	Low level of IAC High level of IAC	IAC measures the level of implication of the members of the project and the projects potential for continuity.
Index of mutual support	Low level of mutual support index High level of mutual support index	IMS measures the degree to which the project is a collective endeavour and its connection to support networks.
By-products valorised by the farmers	Valorisation of olive tree pruning biomass. Valorisation of olive pomace. Valorisation of olive stones.	Which by-products of olive and olive oil production are managed by the farmers as resources.
Management strategies for olive tree pruning biomass	Burning of olive tree pruning biomass. Shredding of olive tree pruning biomass.	Strategies implemented by the farmers in the sample to manage olive tree pruning biomass.
Management strategies for olive pomace	Olive pomace sold to a refinery. Olive pomace used as fertilizer.	Strategies implemented by the farmers in the sample to manage olive pomace.
Management strategies for olive stones	Olive stones used for heating.	Strategies implemented by the farmers in the sample to manage olive stones.

To both enrich and facilitate the quantitative examination of how by-product valorisation and waste management strategies relate to other viability strategies in relation to farm features, we created seven indexes (see Table 5.2). Each of these indexes integrate several of the 39 variables considered in the databases in seven overarching pathways linked to small farm reproduction. In designing these indexes, we took into account relevant trends and strategies affecting the viability of small olive oil farms in Terres de Ponent, such as a tendency towards intensification, the conservation of traditional olive oil production and the challenge of generational change. At the same time, they were designed to consider the wider approach to farm viability we take in this thesis, an approach that centres around farm reproduction and peasant economics, as best suited to understand small farms. Thus, autonomy, feminist perspective, diversification, and mutual support are incorporated as viability pathways in the form of indexes. To run the correlation test we discarded variables that applied to less than 5% of the sample, having a final list of 24 variables, including the indexes. A Pearson's correlation coefficient table was finally developed, using XLSTAT 2021.3.1 software, to identify those variables participating in significant correlations.

Table 5.2: Description of the indexes created to analyse the contribution of olive oil by-product valorisation practices to the viability of olive oil small farmers in the Terres de Ponent region in Catalonia (Spain)

Indexes	Definition
Index of productive intensification (IPI)	IPI measures the trend of intensive farming practice being used in olive farming. It measures: ownership of more than one tractor, the use of heavy machinery, using intensive cultivation frameworks, the use of irrigation, a productivity higher than 2.500kg of olives per hectare, the use of chemical treatments and the informants' perception that technification is one the project's strengths.
Traditional practice application (TPA)	TPA measures traditional practices used in olive farming. It measures: olive harvest done by hand, not using external advising, a traditional cultivation framework, no irrigation (rain-fed), the integration of agriculture and livestock, diversity of olive varieties, the recirculation of products within the farm, informal training based on family relationships or experience, tradition or identity as a motivation for farming, the project going back more than one generation, and the informants' perception that the strengths of the project are emotional factors (tradition, locality, values, family project) and the informants explicitly state a motivation related to benefiting nature and society through their project.
Index of autonomy (IAUT)	IAUT measure the level of autonomy of the farm from other agents in olive oil production chain and other external elements. It measures: owning >20% of the land worked, outsourcing harvest machinery, the farm is the main source of income (>50%), subsidies represent <20% of the farm's income, hiring long term workers, direct selling and short marketing channels are the main source of income, >50% of farm products sold through direct selling and short marketing channels, water access using wells, owning an olive oil mill, incorporation of olive oil production, the farmers' perceptions considers autonomy as one of the strengths of the project.
Index of diversification (IDI)	IDI measures the level of diversification of the project in its different dimensions. It measures; diversity of olive oil varieties, crop diversity, the farm project is a supplementary source of income for the family unit, olive oil project as a supplementary source of income for the family unit, selling more than 2 different products, diversity of cultivation frameworks, diversity of irrigation in olive orchards (no irrigation, support irrigation, irrigation), diversity of water sources, diversity of olive harvesting methods, diversity of marketing and distribution channels, farmers' perception that crop diversification is a strength and farmers' perception that income diversification is a strength.
Index of feminist perspective (IFP)	IFP measures the level of feminist practices and perspective present in the project. It measures: presence of women in the project, decision making power held by women, struggle with balancing working and family life, participation of men in manufacturing tasks, hiring women workers.
Index of agricultural continuity (IAC)	IAC measures the level of implication of the members of the project and the projects potential for continuity. It measures: land ownership, farmers' perception of their desire for continuity, the implication of sons and daughters in the project, family project, a minimum of a AWU from the family unit, the farm project is not residual (farming income is >10% of the family's income) and the motivation for farming is lifestyle, vocation or autonomy.
Index of mutual support	IMS measures the degree to which the project is a collective endeavour and its connection to support networks. It measures: collective project, sharing small machinery with other producers, sharing heavy machinery with other producers, access to olive oil mill through membership to an agrarian cooperative, handling work peaks with informal labour or volunteers and the farmers' perception that being a collective project is a strength.

Finally, we analyse the specific impact of waste management and by-product valorisation strategies on the viability and reproduction of small farms using the *livelihood reproduction framework* as defined in the Chapter 4. Through a qualitative examination we evaluate the positive or negative impact of the several waste management and by-product valorisation strategies on the different attributes of the *livelihood reproduction framework*.

5.3 Results

5.3.1 Identification of by-product valorisation strategies implemented by small olive oil farms

Olive farming and olive oil making comprise different practices that produce different waste and by-products and thus, require different waste management strategies and offer different opportunities in terms of by-product valorisation. In our sample, all farmers produce olives to be used in olive oil production, but not all of them

incorporate olive oil manufacturing to their projects or control the milling process to the same extent. There are different strategies in which olive oil making is combined with olive production and different ways to access olive-oil milling infrastructure. How olive farmers access olive oil mill affects the type of by-products olive farmers need to manage. The main olive oil by-product management strategies identified are burning OTPB, shredding OTPB, using OP as fertilizer, selling OP and using olive stones as heating biomass.

In our case study in Terres de Ponent, we identified four categories of incorporating olive oil production (see Table 5.3), which lead to a higher or lower degree of controlling of the by-products of making olive oil. As an exception to these categories, there are two cases that are members of the same olive oil cooperative, which outsources the milling process to a local mill. Therefore, while 83% of the olive farmers in the sample are olive oil producers, only 51% have to deal with managing the by-products of olive oil or get to benefit from the valorisation of such by-products.

Table 5.3: Categories of olive oil mill access and degree of control of the by-products generated in olive oil mill in the Terres de Ponent region in Catalonia (Spain)

Category of mill access	Representation in the sample	Definition	Control of olive mill by-products
<i>No olive oil manufacturing</i>	17%	Olive farmers who are not involved with olive oil production and sell their olives to private olive oil mills.	NO
<i>Outsourcing the manufacturing process</i>	32%	Olive farmers who outsource the milling process. They take their olive production or part of it to an external mill and can later commercialize their own olive oil production.	
<i>Membership to olive-oil cooperative</i>	22%	Olive oil farmers who are members of olive oil cooperatives. The cooperative as a collective owns and manages the olive oil milling infrastructure and manages the commercialization of the olive oil they produce. The olive farmers are paid for the olive oil produced out of the olive production they bring to the cooperative after the oil is sold.	YES
<i>Olive oil mill as the main economic activity</i>	19%	Olive farmers whose main economic activity is the olive oil mill and whose production of olive oil is based on olive supply from local producers, rather than their own olive production, which is more complementary.	
<i>Olive oil mill complement to olive production</i>	10%	Olive farmers that own a mill to manufacture olive oil only or mainly from their own olive production.	

A total of 15% of the farmers in the case study do not valorise any of the olive and olive oil by-products they manage. As shown in Table 5, there is a positive correlation between no by-product valorisation and farms where farmers are older than 64 years, low level of agricultural continuity, less than 15 ha, less than 2 annual working units (AWU), low level of intensification and high level of traditional practices application.

When it comes to waste generated on farm, the main by-product of olive production is olive tree pruning biomass (OTPB), the resulting biomass of the yearly pruning of the olive trees. The traditional strategy to deal with OTPB is to burn it, but nowadays most farmers choose to valorise it by recycling it into the farm; 71% of the farmers we interviewed shred OTPB with the pertinent machinery and either use it as soil coverage or incorporate it in the soil as organic matter. We also found an exceptional case in which the farmers combined

olive production with extensive livestock farming. In this case, OTPB, particularly smaller branches and leaves, are also used as feed for the sheep, who also eat the offshoots in olive trees.

We found that management of OTPB is generally connected to the number of AWU available in the farm, the level of intensification of the project, which includes the cultivation framework, and the degree of traditional practice application (see Table 6.4). Burning OTPB is associated with extensive planting frames, while it is negatively correlated with intensive planting frames, and it is also connected to projects that have less than 2 AWU available to do farm work. On the other hand, shredding and recirculating OTPB is a valorisation strategy that is more labour intensive and requires machinery. Consequently, it shows a correlation with having more than 2 AWU available for farm work and it is connected to medium to high levels of intensification (IPI) as well as with those applying traditional practices.

Table 5.4: Significant correlations between by-product valorisation strategies implemented by small olive oil farmers and their farm features in the Terres de Ponent region in Catalonia (Spain)

Variables	By-products valorised				By-product management strategies				
	OTPB	Olive pomace	Olive stones	No by-product	Burning OTPB	Shredding & recirculation OTPB	Olive pomace fertilizer	Olive pomace to refinery	Olive stones biomass
<i>Age range of the informants</i>									
>64	-0,136	-0,112	-0,107	0,259*	0,109	-0,148	0,131	-0,213	-0,107
<i>Type of olive production</i>									
Organic	0,154	-0,155	-0,290*	-0,048	-0,215	0,189	0,340**	-0,284*	-0,290*
Conventional	-0,154	0,155	0,290*	0,048	0,215	-0,189	-0,340**	0,284*	0,290*
<i>Olive orchards (ha)</i>									
<15	-0,131	-0,345**	-0,126	0,334*	-0,020	-0,158	-0,170	-0,368**	-0,126
>15	0,131	0,345**	0,126	-0,334*	0,020	0,158	0,170	0,368**	0,126
<i>Cultivation framework</i>									
Extensive	-0,266*	0,196	0,061	0,096	0,400**	-0,254	0,228	0,064	0,061
Intensive	0,210	-0,124	0,020	-0,223	-0,267*	0,248	0,023	-0,160	0,020
<i>Olive production (k/year)</i>									
<10.000	-0,051	-0,284*	-0,252	0,162	-0,004	-0,070	-0,094	-0,347**	-0,252
<i>Type of mil access</i>									
Cooperative	-0,223	0,415**	0,148	0,112	0,260	-0,245	-0,183	0,517***	0,148
Complementary mill	0,083	0,366**	0,031	-0,146	-0,077	0,185	0,628***	0,084	0,031
Mill as the main business	0,102	0,434**	0,319*	-0,207	-0,045	0,090	0,145	0,396**	0,319*
<i>Farming AWU</i>									
<2	-0,287*	-0,149	-0,020	0,414**	0,267*	-0,328*	-0,125	-0,027	-0,020
>2	0,287*	0,149	0,020	-0,414**	-0,267*	0,328*	0,125	0,027	0,020
<i>Deciding treatments and farming practices</i>									
Technical advisor	0,034	0,121	0,194	0,092	0,058	0,034	-0,290*	0,196	0,194
<i>Index of productive intensification</i>									
IPI low	-0,338*	-0,145	-0,203	0,272*	0,342**	-0,369**	-0,032	-0,172	-0,203
IPI medium – high	0,338*	0,145	0,203	-0,272*	-0,342**	0,369**	0,032	0,172	0,203

Variables	By-products valorised				By-product management strategies				
	OTPB	Olive pomace	Olive stones	No by-product	Burning OTPB	Shredding & recirculation OTPB	Olive pomace fertilizer	Olive pomace to refinery	Olive stones biomass
<i>Traditional practice application</i>									
TPA low	-0,340**	-0,146	-0,004	0,291*	0,194	-0,367**	-0,201	-0,056	-0,004
TPA medium – high	0,340**	0,146	0,004	-0,291*	-0,194	0,367**	0,201	0,056	0,004
<i>Index of autonomy</i>									
IAUT low	-0,164	-0,306*	-0,239	0,108	0,084	-0,194	-0,296*	-0,178	-0,239
IAUT medium – high	0,164	0,306*	0,239	-0,108	-0,084	0,194	0,296*	0,178	0,239
<i>Index of diversification</i>									
IDi low	-0,086	0,204	0,275*	0,021	0,026	-0,108	-0,228	0,244	0,275*
IDi medium – high	0,086	-0,204	-0,275*	-0,021	-0,026	0,108	0,228	-0,244	-0,275*
<i>Index of feminist perspective</i>									
IFP low – medium	-0,023	-0,431**	-0,132	0,171	-0,051	-0,012	-0,357**	-0,409**	-0,132
IFP high	0,023	0,431**	0,132	-0,171	0,051	0,012	0,357**	0,409**	0,132
<i>Index of agricultural continuity</i>									
IAC low – medium	-0,228	-0,056	-0,060	0,276*	0,113	-0,215	0,094	-0,199	-0,060
IAC high	0,228	0,056	0,060	-0,276*	-0,113	0,215	-0,094	0,199	0,060
<i>Index of mutual support</i>									
IMS low – medium	-0,003	-0,346**	-0,065	0,086	0,045	0,011	-0,124	-0,438**	-0,065
IMS high	0,003	0,346**	0,065	-0,086	-0,045	-0,011	0,124	0,438**	0,065

Note: * p < 0.05; ** p < 0.01; *** p < 0.001.

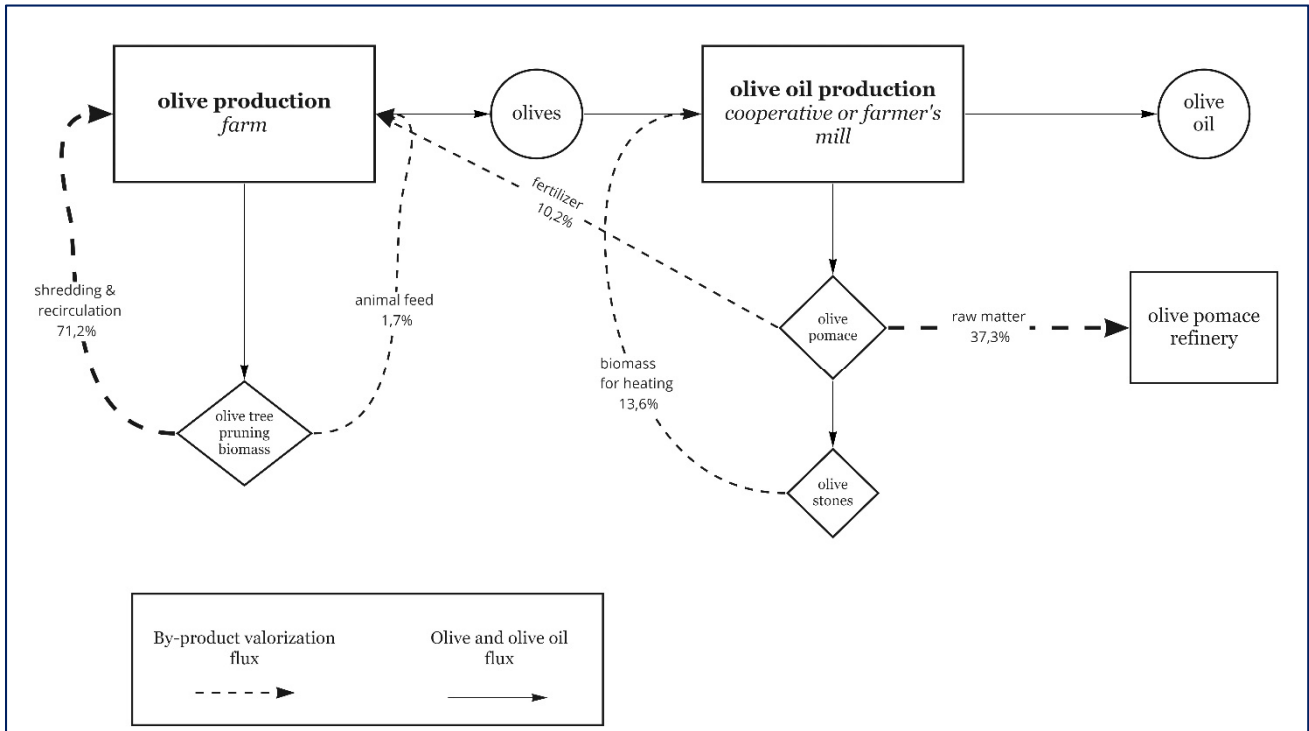
Farms producing olive oil have more available options to valorise by-products. All of them use only mechanized methods to extract the olive oil and thus, the main by-product of olive oil making is olive pomace. The majority of the mills in the sample are two phase mills and the olive pomace they generate is *alperujo*. In some cases, olive oil producers choose to extract olives stones from the pomace as an additional by-product.

In the case of olive pomace, all farmers valorise it, as its disposal is highly regulated. Out of the 27 olive farmers that control the milling process, 22 sell the olive pomace as raw matter to a refinery, in which olive kernel oil is produced through chemical extraction. Another use is to compost it and use it as fertilizer, implemented by 6 of the farmers. Among those, in two cases, the farmers use both strategies, part of the olive pomace as fertilizer and the rest, sold to a refinery.

The recirculation of olive pomace as fertilizer is positively correlated with organic agriculture, a high level of autonomy, high level of feminist perspective, and farms that include a complementary oil mill; while it is negatively correlated with conventional agriculture, low-medium level of autonomy and low level of feminist perspective. On the other hand, selling olive pomace to a refinery has a positive correlation with conventional olive production, farms with more than 15ha of olive trees, a high index of feminist perspective and a high level of mutual support. Selling olive pomace to a refinery is also connected to projects that either are members of a cooperative or have an olive oil mill as a main business.

The valorisation of olive stones is less common than the valorisation of olive pomace. Among the 59 farms in the sample, only 8 olive farms valorise olive stones, corresponding to two different cooperatives and five different private olive oil mills. Dried olive stones are used, usually within the mill facilities, as biomass to fuel the heater system. This strategy is more common when olive oil production is the main economic activity category. Also, the valorisation of olives stones is tied to conventional olive production and low diversification level.

Figure 5.1: Olive and olive oil by-products valorisation strategies implemented by the olive farmers of the sample in the Terres de Ponent region in Catalonia (Spain)



5.3.2 Motivations and struggles of olive and olive oil by-products valorisation strategies

For each of the olive oil by-product strategies found in the case study, we have examined both the motivations and the struggles expressed by small olive oil farmers in their implementation. Olive oil by-product valorisation strategies are driven by environmental concerns and the possibility to turn by-products into agricultural resources, but there is an underlying motivation in the necessity small farmers face to manage olive oil by-products, particularly olive pomace, which cannot be simply disposed of. On the other hand, in the implementation of these strategies, small farmers deal with certain struggles and obstacles, generally related to the investment in machinery, infrastructure and labour requirements and the fact these strategies might not be adapted to how they manage their farm.

The shredding of olive tree pruning biomass (OTPB) is described by olive farmers as a relatively recent innovation that is becoming more frequent, as it is often recommended to farmers by agrarian technicians. We have identified two motivations behind the practice of shredding, (i) the addition of organic matter to the soil

and (ii) preventing the harmful environmental impact that burning OTPB has. For one of the farmers, who went for burning to shredding OTPB, *“we used to burn it [OTPB] now we shred it, for the same reasons, because of climate change, also it gets very hot and the neighbour doesn’t work the fields and there is a lot of dried matter in the surrounding fields”*. On the other hand, we also identified some hesitation towards the practice of shredding OTPB, in terms of (i) using it because it’s the new trend, but they don’t think it is necessarily the best option; and (ii) uncertainty over the usefulness of shredded OTPB as organic matter for the soil.

In spite shredding OTPB being the preferred strategy in the sample, in 14 of the cases olive farmers choose to burn it and we found 4 cases in which the farmers alternate between shredding and burning OTPB. We identified six different reasons for olive farmers to choose burning OTPB: (i) lack of the necessary machinery to shred OTPB; (ii) burning perceived as a better strategy to prevent xylophagous plagues; (iii) burning takes less work than shredding OTPB; (iv) the orography of the olive orchards prevents the use of the machinery needed for shredding OTPB; (v) shredding with machinery would endanger the protected wild fauna in the orchards and; (vi) shredding OTPB is associated to tilling and perceived as a strategy that hinders water conservation.

The selling of olive pomace to an olive pomace refinery is mainly motivated by the need to *get rid of or dispose of* olive pomace as a waste by-product. We have identified two important struggles faced by the olive farmers who sell olive pomace to a refinery: (i) low price of olive pomace that is close to just covering the transportation costs; and (ii) lack of options in terms of possible olive pomace buyers. For instance, a farmer member of a cooperative replies that olive pomace *“we give it away. Do you know how much we got from all the 200.000kg of olive pomace we produced last year? 3.000€! We don’t turn into energy, we sell it to a company close by, between Juneda and Borges, it’s the only one, these companies are very rare, and so everyone goes there”*. Another one defines the situation as a “drama” and explains, *“We have a by-product and we need to get rid of it, like in any other industry, and there is someone who comes and takes it [olive pomace] to someone else, who manages it [olive pomace]. We’ll reach a point where the milling cost is going to cost 15.000€ and on top of that, 3.000€ to get rid of the olive pomace and take it there [to the refinery], because it won’t be worth enough so they come and take it for free”*. These struggles have to be understood in the context of olive pomace being logistically difficult to manage and dispose of and olive oil pomace being a sector that has been struggling with very low prices

For the alternative of using olive pomace as fertilizer, we identified several motivations: (i) recommendation by organic technician; (ii) perceived as better than selling it to a refinery (due to the low price they were getting for the OP); (iii) its high nitrate content when composted and added to the soil; and (iv) to achieve a circular or zero waste production model. One farmer defines their approach for valorising olive pomace in that way as *“producing zero residues, we don’t litter the world”*.

The valorisation of olive stones is less present in the sample. We have found a few cases in which the informants are aware of the possibility of valorising olives stones for energy generation and express they thought about it, but don’t implement it. One of them doesn’t want to invest in the necessary machinery *“yet”* and the other feels

like their production volume is not enough to make it worth it currently, but they might consider buying the machinery once they have covered the investment they made to build the mill. A third farmer, member of a cooperative, express they “*would love to*” valorise olive stones, but cannot afford the investment it requires.

5.3.3 Assessing the impact of by-product valorisation strategies on farm viability through the *livelihood reproduction framework*

Olive oil by-product valorisation strategies contribute to the viability of small farms in several ways. The olive oil by-product and waste management strategies identified can be categorized in three types. First, strategies aimed at disposing of the by-product as waste, which includes burning OTPB. Then strategies in which olive oil by-products are valorised by recirculating them as resources on the farm or project, which includes shredding OTPB, using OTPB in synergy with livestock grazing, using OP as fertilizer and using OS as biomass for heating. Finally, strategies in which by-products are valorised but off farm, which includes the selling of OP to a refinery. These different ways of managing by-products have different impacts on the several dimensions and attributes of a farm’s livelihood reproduction (the definition of the livelihood reproduction framework we apply in this chapter can be found in Chapter 4 of this thesis), as summarized in Table 4.

Disposing of OTPB, which in the case study is done through in-field burning, can have a negative impact on both the natural capital of the farm and the ecosystem’s ability to self-regulate, as it can pose a higher risk of wildfires. It can also be detrimental for the farm’s reliance on own resources since OTPB could potentially become a natural resource. On the other hand, the practice of burning OTPB stems from traditional local knowledge and in this way, it can strengthen the farm’s capacity to access different types of knowledge and learning. The alternative strategy to shred OTPB has opposite effects on livelihood reproduction; it can bring in natural capital in the form of organic matter and strengthen the self-regulation of the ecosystem and as a source of internal resources, it strengthens the farm’s ability to rely on its own resources. This is in line with the positive significant correlation of shredding OTPB with the autonomy index. On the other hand, shredding OTPB is more work than burning it, demanding more human capital and physical capital, as machinery is required. Because of that, it could be detrimental for work satisfaction, but this impact could be offset or is combined by a contribution to work satisfaction as a practice tied to organic farming and a better alignment with farmers’ values. While not very common in the case study, we consider the using OTPB within the integration of olive orchards and extensive livestock as strategy with an overall positive impact on livelihood reproduction. It is a source of natural capital, strengthening a farm’s ability to rely on its own resources and as generating synergies between livestock and crops, it strengthens the self-regulation of the ecosystem. In addition, it is a traditional and local practice, albeit it becoming uncommon in recent years, and as such it strengthens a farm’s capacity to access different types of learning and knowledge.

The effects of using OP as fertilizer on livelihood reproduction are very similar to those of shredding OTPB. It brings in natural capital as fertilizer, contributing to both the reliance on the farm’s own resources and ecosystem self-regulation. However, it is a strategy that has a higher workload, thus potentially being detrimental for work satisfaction. In addition, because it offers an alternative to selling OP to a refinery, it can contribute to farm

decentralization and independence, as it allows for less dependency on external markets or agents in the need to manage OP (positive correlation with autonomy index). In turn, selling OP to a refinery has a detrimental effect on a farm's ability to self-organize in a decentralized and independent way, as in this strategy farmers are dependent on the terms set by refineries and global prices and in the case study, the refinery is centralized. While selling OP to a refinery shows a positive correlation with a high index of mutual support, we argue that this correlation is due to selling OP to a refinery being common practice in olive oil cooperative, rather than to a feature of the valorisation strategy in itself. In addition, selling OP to a refinery is detrimental for the farm's ability to rely on its own resources, since in this strategy, a potential farm resource is given up. While selling OP could be a source of financial capital, the low prices they get from selling OP and the lack of control over its valorisation are sources of dissatisfaction and unfair labour relationships, since farmers don't set the terms of the marketing relationship with the refinery. Finally, using OS as heating biomass is a complex strategy which can increase natural capital, but that requires human and physical capital and a big financial investment. Unlike selling OP, this strategy could strengthen a farm's reliance on its own resources and since by-product is most often used locally and in a decentralized manner, it could strengthen a farm's decentralization and independence.

Table 5.5: Impact of waste management and by-product valorisation strategies on dimensions and attributes of the livelihood resilience framework³

Viability strategy implemented		Buffer capacity					Outwards self-organization & interdependence			Internal self-organization & interdependence				Capacity for learning		
		Human cap.	Natural cap.	Social cap.	Physical cap.	Financial cap.	Reliance on own resources	Cooperation & networks	Decentralization & interdependence	Fair labour relationships	Work satisfaction	Collective and flexible household (social groups)	Self-regulated ecosystem	Different types of knowledge and learning	Shared vision	Reflective and shared learning
Disposing strategy	Burning OTPB		--				--				- +		--	++		
On farm recirculation	Shredding OTPB	--	++		--	--	++				-- +		++			
	Using OTPB within the integration of olive orchards and extensive livestock		++				++						++	++		
	Use of olive pomace as fertilizer	--	++				++		++		-- +		++			
	Use as biomass (heating)	--	++		--	---	++		++							
Off farm valorisation	Selling olive pomace to a refinery					+	--		--	--	--					

³ The definition of the livelihood reproduction framework we apply in this chapter can be found in Chapter 4 of this thesis
The viability of small farms from a reproductive perspective: the case of extensive olive oil production in the Mediterranean

5.4 Discussion

By-product valorisation strategies are widely implemented in small olive farms as shown the examination of the case in Terres de Ponent, in Mediterranean Spain. As illustrated in Figure 6.1, we identified five olive oil by-product valorisation strategies implemented by small olive oil farmers in Terres de Ponent, with the shredding and incorporation of OTPB and selling olive pomace to a refinery being the most common. This goes in line with Darnhofer (2010). They pointed that in building farm resilience, multiple strategies tend to be implemented to different extents and farmers use alternatives strategies at the same time, looking to increase the farm's adaptability and flexibility.

Our results indicate that circular economy and small farmers can benefit each other; in one direction, circular economy strategies can contribute to the viability and reproduction of small farms, on the other by-product valorisation strategies used by small farmers can further the design of circular economy production systems. In a context where one of the main challenges of the olive oil sector is the waste generated by its production, both in economic and environmental terms, circular economy practices benefit small olive farmers by turning olive by-products into resources. These resources can be economic, in the form of income, material, as agricultural resources such as fertilizer, but also immaterial resources, as these strategies can contribute to the quality definition and added value of the farm. Particularly, valorisation strategies that recirculate by-products on-farm strengthen the natural capital of a farm, make it more capable of relying on internal resources and favour the self-regulation of the ecosystems, contributing predominantly to the ecological reproduction of the farm. Of the circular economy strategies identified, selling olive pomace to a refinery is the only one in which by-product valorisation takes place off-farm, while with the rest, by-products are valorised on the farm or olive oil mill.

On the other hand, the impact by-product valorisation strategies have in small farms and how they are considered by small farmers, can contribute to reframing the assessment of the different by-product valorisation practices in the circular economy and bioeconomy debates. By shifting from the techno-economic perspective that is common in the circular economy field to a focus on livelihood reproduction in the analysis of by-product valorisation and circular strategies in small olive oil farms, the value and role these strategies play in small farm viability also changes. Thus, small farmers' perspective and how they implement by-product valorisation strategies can contribute to inform the circular economy and bioeconomy debates and their assessment and design of uses for olive oil by-products.

Classifying the by-product valorisation strategies implemented by small farmers in the case study according to the cascading prioritization that organizes by-product biomass uses (Berbel & Posadillo, 2018; Donner et al., 2020), the use of olive stones, and exceptionally of olive pomace, for energy generation would be at the bottom of the pyramid as a use of agro-waste for bioenergy. Recirculating OTPB and OP would be a low-to-medium use, as a type of biofertilizer. Finally, the selling of OP would be the strategy with the highest bio-economy value, since OP is sold to be refined and used for human consumption. High value pharmaceutical and health uses based on the extraction of fine chemicals from olive by-products was not present in the case study.

However, having analysed the impact of these different strategies on the farm's livelihood reproduction by seeing with what other viability strategies and farm features they relate with and farmers' perspective on them, the value they play in small farms is different. We argue that by-product valorisation strategies considered of low and medium value in the circular economy and bioeconomy debate could bring a higher contribution to small olive oil farms than strategies defined as having a higher value from a bioeconomy perspective. Even though the prioritization of by-product uses in the circular economy debate is designed in a cascading way, the priority of using olive oil by-products for high value uses, based for example on the extraction of fine chemicals, would likely mean the delocalization of by-products and their value from the olive oil farms, as they are tied to techno-scientific practices that require highly specialized infrastructure and knowledge.

This is particularly illustrated with the case of OP in our case study. From a bioeconomy perspective, selling olive pomace to a refinery could be defined as a medium or high value valorisation strategy, since the by-product is used to manufacture a food product for human consumption (even if of less quality than the extra virgin olive oil whose production generates the by-product). However, this type of strategy removes biomass from the farm, it is not adapted to the circumstances of small farmers and places potential high value uses out of control of farmers (Krzywoszynska, 2012), making it detrimental for small farms' external self-organization and reducing their autonomy and work satisfaction with negative effects on livelihoods reproduction.

Conversely, strategies that valorise olive oil by-products on the farm or mill allow for circularity to be localized and their value controlled by the farmers and farms whose production generates the by-product. These strategies lead to fertilizer or energy uses, considered of medium or low priority in the circular economy debate, but they contribute natural resources, can make a farm less dependent and even have a positive impact on work satisfaction, thus, have high value to small farmers. By implementing on farm by-product valorisation strategies, small farmers turn waste biomass into farm resources and can make olive production more self-sufficient, while being fully in control of the valorisation process. These strategies offer an alternative to both disposing of by-products and to valorisation strategies of farm, but lack of both human and physical capital are obstacles for their implementation in the small olive oil farms within the case study.

5.4.1 Disposing of OTPB; a traditional practice that hinders self-organization and natural capital.

When burning OTPB, small farmers dispose of pruning biomass as a waste, rather than a by-product or a potential resource. In the case study, this strategy is rooted in traditional practices and as stemming from traditional knowledge, a traditional strategy to prevent against the threat of plagues, it can contribute to the farm's capacity to count on different types of knowledge. As a strategy well rooted in local tradition, it could potentially bring intangible capital as a way the farm embeds itself in the local production. However, inasmuch OTPB is managed as waste instead of using it as a resource, this strategy doesn't build the buffer capacity of a farm and could be considered detrimental for a farm's ability to rely on its own resources. As we have analysed, this strategy is chosen among other reasons, because it does not require as much capital, neither in terms of machinery nor in terms of labour and human capital, as suggested by the positive correlation of the strategy with a low intensification index and less labour available.

On the other hand, in the context of Terres de Ponent, a Mediterranean region where the climate crisis translates to longer and more common periods of drought, arid landscapes and higher risks of wildfire for longer periods of time, burning on fields and agriculture areas is becoming more restricted, driving the replacing of burning OTPB for shredding it, as found in other Mediterranean olive oil producing regions (Benyei et al., 2018). As a potential fire risk in an adverse climatic context, this strategy could threaten the natural capital of a farm, as part of a larger ecosystem and landscape and as such, it could also be detrimental for the farm's ecosystem's ability to self-regulate.

5.4.2 Recirculating by-products on-farm; strengthening small farm self-organization but with high resources requirements.

Strategies that valorise olive oil by-products on farm through their recirculation can be considered agroecological strategies (Ameur et al., 2020; Stephen Gliessman et al., 2013) that bring ecological value and contribute to farm autonomy. Shredding and recirculating OTPB, using it in synergy with livestock grazing, fertilizing with OP or separating OS bring in natural capital to the farm in different ways. The recirculation of OTPB and fertilizing with OP provide soil nutrients and improve land resources (Padró et al., 2019), thus improving soil fertility (Diacono et al., 2019; Labrador et al., 2011). In synergy with extensive livestock, small branches, and leaves in OTPB become part of the livestock's fodder and once separated from OP and dried, OS becomes a source of energy for the farm's mill heating systems.

As shown by the motivations identified, small farmers value valorisation strategies that recirculate resources as a way to achieve a closed loop in the farm production system, connecting to their striving for autonomy (Dumont et al., 2016; van der Ploeg, 2011). These strategies allow the farm to better rely on their own resources, an impact further supported by the correlation found between using olive pomace as fertilizer and a higher level of autonomy in the farm. Furthermore, as it offers an alternative to selling OP to a refinery, it could be considered that using OP as fertilizer contributes to a farm's decentralization and independence, since in using this strategy small farmers don't have to be solely dependent on refineries and the commodity markets that set the price of the by-products to manage OP.

In line with what Benyei et al. (2018) found in Andalusia, the shift from burning to shredding OTPB is related to fire prevention and limitations in acquiring burning permits, which also play a role in the context of our case study and are part of farmers' motivations for shredding OTPB. The correlation we found between shredding OPTB and a medium to high index of productive intensification could also be explained through the higher risk of fire when burning OTPB in denser groves, so the tendency towards intensification of olive production would lead to an increase in shredding OTPB (Benyei et al., 2018) and of course, due to the machinery (physical capital) that is needed to implement the strategy. However, farmers' motivations in our case study also show an environmental motivation behind the preference for shredding OTPB, which we argue show how the on-farm recirculation of OTPB and OP could also be aimed at the self-regulated of the ecosystem contributing to natural capital too.

On the other hand, shredding OTPB, using OP as fertilizer and separating OS require the farm to have certain resources available. All these strategies require more human capital than their alternatives, as they are more complex in terms of tasks and workload involved. Recirculation of OTPB in synergy with extensive livestock is slightly different, as the impacts of this strategy mostly stem from the tasks of extensive livestock, rather than the use of olive oil by-products. Additionally, shredding OTPB and separating OS for their use as biomass, require the farm to have physical capital in the form of necessary machinery and very specific infrastructure. In turn, to obtain or access the machinery and infrastructure, the farms needs to invest financial capital, an investment particularly high in the case of the infrastructure necessary for separating and then using OS. In fact, the financial investment required and the lack of physical capital are important obstacles for the implementation of these strategies, otherwise interesting for small olive farmers.

The impact of the on-farm recirculation of by-products on a farm's internal self-organization and interdependence is more complex. On one hand, the higher requirement of human capital of these strategies, particularly in terms of labour, a requirement that can be an obstacle for their implementation, would indicate a detrimental impact on work satisfaction, as these strategies increase the workload. On the other hand, analysing farmers' discourses, these strategies are valued as they align with farmers' values and because they can address the struggles caused by other strategies of by-product valorisation. Shredding and recirculating OTPB and using OP as fertilizer correlate to strategies such as organic agriculture, the incorporation of manufacturing or the investment in a complementary oil mill. This leads us to suggest that these by-product valorisation strategies are part of a broader strategy towards product differentiation and added value in small farms (Benyei et al., 2018), since both organic farming and incorporating a complementary mill to the farm project are both quality-driven differentiation strategies. Olive oil farmers define the quality of their products through different attributes (Moragues-Faus & Sonnino, 2012) and the shift to a differentiated and quality-focused olive oil production is a strategy that allows them to face some of the challenges of the sector (Rodríguez Cohard et al., 2017), and framing their production as low or zero waste can contribute to further defining and differentiating their olive oil. In this way, in spite of their higher workload, these by-product valorisation strategies can contribute to work satisfaction and autonomy.

5.4.3 Valorisation of by-products off-farm: a need-driven strategy that hinders small farm self-organization.

Diversification is a fundamental strategy for the resilience and reproduction of small farms (Cabell & Oelofse, 2012; Darnhofer, 2010) and the marketing of olive oil by-products could be part of an income diversification strategy, as it can bring additional income to olive oil farms and mills (Donner & Radic, 2021; Torrisi et al., 2018). However, the contribution of this strategy to diversification, as a dimension of livelihood reproduction is not clear. Selling OP to a refinery, a strategy with which a by-product is valorised off-farm through marketing relations, is not a highly valued source of income and is a very complementary element in the broader income diversification strategies of small farms. Olive oil farmers do get paid for selling OP to a refinery, but the low and fluctuating prices make it an unreliable source of income.

The strategy is rather motivated by the need to manage OP as a waste product, as the link between selling OP to a refinery and olive oil mill as the main business and cooperatives suggests. This link could explain the correlation between this strategy and a high level of mutual support, as a strategy commonly used by olive oil cooperatives and types of mills and bigger farms, which generate a larger amount of OP by-product and need to manage more of it. Unlike in the case of using OP as fertilizer, selling it to a refinery is correlated to conventional production and a low index of autonomy, indicating how the strategy could be detrimental for a farm's self-organization, both external, hindering its decentralization and independence, and internal, leading to unfair labour relationships and thus, work dissatisfaction.

Thus, while selling OP to a refinery is a potential source of income and can strengthen a farm's financial capital, small farmers express logistical difficulties and low prices caused by unequal marketing relationships, as a result, this strategy can actually be detrimental for a farm's decentralization and independence. Despite in this strategy by-product valorisation is still local from a regional perspective (the refinery they sell to is located within the same region), farmers are dependent on the terms set by the refineries and prices set within a global olive oil market and once OP is sold, small farmers lose all control about further uses or value of the by-product. Due to the dependency generated by the terms in which the selling of OP is carried out, this strategy leads to unfair labour relationships and is detrimental for work satisfaction, as the farmers often feel stuck in this strategy and the low monetary value it brings.

5.5 Conclusions

The examination of small olive oil farms in Mediterranean Spain shows that small olive farmers actively implement several circular economy strategies, which contribute to the reproduction and sustainability of their farms. Even though the current circular economy debate focuses on techno-scientific solutions, small olive oil farmers regularly incorporate valorisation practices, through which they turn by-products into farm resources, in a way that contribute to the reproduction of their livelihood. The use of the livelihood reproduction framework to examine waste management and by-product valorisation strategies used by small olive oil farmers highlights small farmers contribution to circular economy models, which tend to be under-explained in the debate.

At the same time, the livelihood reproduction framework re-centres the value and impact of by-product valorisation strategies in the realities of small farms. Small olive oil farmers greatly appreciate olive oil by-product valorisation strategies, particularly those that valorise by-products on farm, for their contribution to farm autonomy, product quality and differentiation and as agroecological resources. Which olive oil by-product valorisation strategies are available to small farmers are conditioned by farm features, mainly whether they control the olive milling process, but also the orography of the orchards or annual working units available in the farm. Small olive oil farmers struggle with the need to invest on infrastructure and machinery and the extra work (in terms of time and labour) that some of these olive oil by-product valorisation strategies require.

Our results also indicate that the circular economy debate can benefit from further incorporating small farmers views on by-product valorisation practices, as the role by-product valorisation practices play in small farms and

how small farmers evaluate them offers an alternative to technology-oriented scientific approach that currently centres the debate. The approach from the livelihood reproduction framework in explaining the relevance of by-product valorisation strategies in small olive oil farms, shifts the priority given to by-product biomass uses in the bioeconomy industry and debate, because it allows for the consideration of power relations, in this case, who keeps the value of by-product valorisation strategies and where do they unfold. By-product valorisation practices based on the on-farm recirculation of by-products lead to uses considered of lower or medium priority in the current circular economy and bioeconomy debate, which prioritizes pharmaceutical uses or the extraction of fine chemicals, based in highly specialized technological practices. However, with on-farm by-product valorisation strategies small olive oil farmers are able to fully localize circularity, on a farm scale, and control the value added by the by-product valorisation process, which, if other by-product uses were prioritized, would fall out of their control and not respond to their needs. This requires to redefine what scale is coherent within the circular economy debate. Recirculating resources to be used thousands kilometres from where they are produced based on their economic value can be detrimental for the reproduction and sustainability of small farms and requires of more research.

6 “*Who does what?*” Unravelling the central role of labour and work in small farm reproduction

6.1 Introduction

In the previous chapters, both the identification of farm viability strategies implemented by small farmers and the application of the *livelihoods reproduction framework* pointed at work and labour management as fundamental factors in the viability of small farms. On one hand, attributes directly linked to work management and labour relationships emerged as necessary to explain the reproduction of small farms within the livelihood reproduction framework. On the other, the identification and analysis of viability strategies showed that work organization and labour acquisition condition the livelihood reproduction of small farms and also, these strategies highly affect how other viability strategies within the farm are carried out and how they impact other livelihood reproduction dimensions. Thus, in this chapter we delve further into work organization and labour in small farms and how they affect their viability and ultimately, their reproduction.

The consensus among the experts in pointing the relevance of work in making sense the viability of small farms (e.g., Navarrete et al., 2014) and sustainable agriculture (e.g., Dedieu, 2019) is large. However, as social aspects of agriculture, they tend to be overlooked or underexplained (Röös et al., 2019). The labour (*who works*) of a farm and the characteristics of its work (*how are tasks performed*) are used to categorize different modes of farming (Dedieu, 2019; Dumont & Baret, 2017). In fact, relying on family and non-wage labour and the importance of manual work are defining features of small farms within the peasantry debate (Van Der Ploeg, 2013) and often also linked to sustainable forms of agriculture, such as agroecology (Dedieu, 2019; van der Ploeg, 2011). However, lately more and more evidences emerged pointing to the multifaceted nature of the work and labour in small farms, as well as to the multiple interlinkages existing with every dimensions of a farm, from financial resources and circumstances and agricultural practices, including social relationships and configuration of the farm, to social institutions and power relationships (Duval et al., 2021). Thus, increasingly elements such as working conditions, work satisfaction, labourer' health (mental and physical), labour skills, knowledge, fulfilment, work distribution or type of employment, are being examined in agriculture (Dedieu, 2019; Dumont & Baret, 2017).

The balance between work and benefits (monetary or of other kind) has always been at the heart of peasant economics and central to explain how small farms are sustained and reproduced (Chayanov, 1966; Van Der Ploeg, 2013). Stemming from this debate, self-exploitation remains a key issue when examining the viability of small farms and adjacent modes of farming, such as agroecology or alternative food networks (Galt, 2013). In recent years, research has focused on the importance of working conditions and work satisfaction on farm viability, trying to address the lack of scientific attention on the social aspects of sustainable agriculture (Arancibia et al., 2016; Dumont & Baret, 2017; Dupré et al., 2017; Duval et al., 2021). Small farmers suffer from overwork and burnout situations and lack of work satisfaction, which threaten farmers' well-being (Louazel, 2018), and can limit implementation of other viability strategies (Fanchone et al., 2022; MacDonald et al., 2000) and even lead to farm abandonment (Dedieu, 2019; Galt, 2013). From a broader perspective, overwork and lack of return creates a “*perceived lack of attractiveness*” of agricultural jobs, which hinders

generational change (Duval et al., 2021, p. 2; Hostiou et al., 2020). Since it is linked to well-being and personal perceptions and expectations, work satisfaction is affected by several aspects, from financial pressure to social relationships, but working conditions, in their complexity, are fundamental to build farmers’ satisfaction with work (Dedieu, 2019) and thus, explain the viability of small farms.

Recent research also focuses on how labour availability and type of labour used affects farm viability, including working conditions and organization. Small farms are defined by their reliability on family labour, which takes on most of the work required in the farm and household (Hazell, 2005). However, in industrialized countries and particularly in Europe, demographic and socio-economic changes have led to a situation where small farms have seen their workforce decrease, while having to increase farm land and production (Aubron et al., 2016; Cournut et al., 2018) to be able to sustain monetary viability. This changed the shape of rural and farm households, also affecting the labour available to small farms, how work is organized and the strategies they can implement. In the context of a decrease of labour in agriculture in Western countries, research points at the relevance of salaried workers and their working conditions and strategies such as outsourcing or mechanization (Dedieu, 2019), also used by small farms to increase their labour productivity. These strategies in turn, have an impact on the viability of small farms impacting different dimensions of the LRF.

Given the increasing evidence of the multifaceted nature of the work and labour in small farms, and particularly the lack of attention traditionally paid to social aspects in agriculture, we propose the implementation of a feminist perspective for a deeper understanding of the role of labour and work management in small farms. To do so, we use the livelihood reproduction framework for our analysis. Firstly, a feminist point of view, using both ecofeminism and feminist economics, allow us to place well-being at the centre of the debate (Carrasco Bengoa, 2017; Carrasco & Tello, 2013; Herrero, 2015), an emphasis that emerges as fundamental given the importance of work satisfaction and wellness aspects of work, not only efficiency or labour productivity, in farm viability (Dumont & Baret, 2017). Also, using a feminist definition of labour means that reproductive tasks are taken into account, which is particularly important in the study of small farms, characterized by family labour and the indivisibility of farm and household (Rissing et al., 2021); for instance, childcare directly affects the productive dimension of the farm and vice versa (Rissing et al., 2021). Similarly, this perspective introduces an examination of who does what in the analysis of work organization and labour in the farm, a focus that has been neglected, especially in regard to gender roles (Duval et al., 2021; Ferreira et al., 2020). On one hand, this allows for the analysis to visualize the role of women farmers and its importance in farm management and viability (Shortall, 2014) and on the other, brings forth equity issues, fundamental in social sustainability, when assessing work and labour in small farms (Gustafson et al., 2016).

Labour and work features of farm viability strategies are partly inherent to them, entailing specific knowledge and tasks, and partly, they are conditioned by the specific circumstances and worldviews of the farms and farmers that implement them (Cournut et al., 2018), as “*driver of the system and work organizer*” (Fanchone et al., 2022, p. 4). Part of the complexity lies on how labour availability and work management could facilitate or hinder the implementation of certain viability strategies in small farms and, at the same time, certain viability

strategies could put a strain on the farm’s labour, creating, for instance, an unbearable workload or on the contrary contributing to work satisfaction. Thus, in this chapter after identifying the diverse viability strategies being implemented by small farms, we focus on those having an impact on the farm and household’s workload, work quality and labour requirements. We do so by examining in-depth five representative farms within the case study of this thesis in Terres de Ponent in Catalonia (Spain). In particular, the three specific objectives addressed in this chapter are: (1) to examine how common tasks and viability strategies used by small olive oil farmers affect working conditions and labour requirements of the farm; (2) to identify the work management and labour strategies used by small olive oil farmers to implement these viability strategies; and, finally, (3) to assess how these viability strategies, carried out using different labour and work management strategies, impact farm viability using the livelihood reproduction framework.

6.2 Methodology

The methodological base of this chapter are 59 semi-structured interviews to small olive oil farms in Terres de Ponent conducted during the summer of 2020 and the subsequent qualitative content analysis. A detailed explanation of the methodology can be found in of based on the coding of interview data using a QSA, as explained in *Chapter 3: Methodology*. The viability strategies used by small olive oil farmers and the internal and external factors they address, which we identified and examined in *Chapter 4*, serve as the starting point of the present chapter. Here, we deepen the analysis by identifying and examining in depth five specific cases that represent different farm typologies within the sample, since classification of farm systems can contribute to an analysis that account for more specificity (Madry et al., 2013). We examine in detail five representative farm projects within the case study, rather than using the case study as an average image of small olive oil production in Terres de Ponent, to account for the necessary complexity of work organization and labour in the singularity of a farm and how they condition farm reproduction. In doing so, the first methodological step was to identify the farm projects within our sample in which to analyse in depth how small farmers carry out viability strategies, organize work and access labour within the specific circumstances of their farms. Our goal was not to develop farm typologies within the case study, but rather to identify farm projects that were representative of the diversity of farm systems found in the case study. Thus, instead of using methodologies that would lead to a clustering of the individual farms in the sample, we used what could be described as an *expert-based method* to characterized farm systems, using the terminology proposed in Nyambo et al. (2019), and established a set of criteria to select representative farms within the sample.

Diversity of farm systems can be found even in very specific geographical areas or specific categories (Madry et al., 2013), as would be the case of small olive oil farms in Terres de Ponent. This diversity can be defined in terms of economic activities, land use, farm and household structure or the natural, social and economic resources of a farm (Madry et al., 2013). To choose the representative farms, we look for diversity in three particular arenas: type of agricultural production, commercialization, and social structure. Also building on the

viability strategies identified in *Chapter 4*, we establish a selection criteria, looking for diversity within four farms features specific to our case study, which is well characterized in 5 representative farm projects.

Firstly, different types of agricultural production condition work organization and at the same time, their adoption is conditioned by labour availability, as studied largely in the literature focusing on agroecological and organic farming (Aubron et al., 2016; Navarrete et al., 2014). In the case of olive production in Terres de Ponent, where olive production is traditionally extensive and rainfed but has seen a tendency towards intensification in recent years, we look at (i) intensification of olive oil production (including indicators such as use of irrigation and the density of olive groves plantation) ranging from traditional to intensive. In addition, ii) control over commercialization, through direct sales or short marketing circuits is a common viability strategy among small farmers (Guarín et al., 2020) and one that has a direct impact on farmers' workload and work organization (Navarrete et al., 2014), ranging from having full control over price setting and using direct and short marketing channels, to lack of control over commercialization terms and using wholesale marketing channels. In the specific case of Terres de Ponent, where olive production is oriented to olive oil making, commercialization strategies are tied to manufacturing practices. Thus, we also look at (iii) incorporation of manufacturing olive oil, ranging from farms who do not manufacture olive oil or any farm product to farms in which olive oil production is an inherited practice and the base of its management/economy. In between we find farms that outsource the production of olive oil, farms members to olive oil cooperatives and farms that have an olive oil mill to complement their olive production. Finally, small farms are highly reliable on family labour therefore, considering the social structure of the farm household is fundamental. Thus, we look at the (iv) collectivity of the project, where we consider the number of people in the household who actively participate in the farm, based on family labour.

With these criteria in mind, we identified five farms (Table 7.1) in the case study that show diversity in the four defined farm features and thus, would allow for an in depth analysis of the reciprocal relationships between work and labour and the viability strategies used by small olive oil farmers while taking into consideration the distinct circumstances of every farm system (Madry et al., 2013):

Table 6.1: Characterization of the representative farms identified in in Terres de Ponent in Catalonia (Spain)

<i>Farm in the case study</i>	<i>Farm features</i>			
	<i>Intensification of olive production</i>	<i>Control over commercialization</i>	<i>Incorporation of olive oil manufacturing</i>	<i>Collectivity/Household</i>
<i>Agroecological farm by an intergenerational household</i>	Traditional	Control for some products	Outsourced	Extended family
<i>Traditional olive oil farm by a spouses' household</i>	Extensive	Control for some products	Olive oil cooperative	Spouses'
<i>Family olive oil mill with olive production</i>	Semi-intensive	Control for some products	Inherited olive oil mill	Father and son
<i>Entrepreneurial farm with complementary partnership mill.</i>	Semi-intensive	Control for most of the products	Complementary olive oil mill	Extended family
<i>Diversified farm with no manufacturing.</i>	Semi-intensive	No control	No manufacturing	Mother and son

Having selected five representative farms, we did an in-depth qualitative content analysis of each of them based on the previous codification of interview data. In each farm, we identified the implemented viability strategies, the internal and external factors they addressed and we went a step further in setting apart the strategies and factors directly related to work and labour in the farm, as shown in Figure 7.1, - Figure 7.5. To examine how common tasks and viability strategies used by small olive oil farmers affect working conditions and labour requirements of the farm, we again characterize work and labour associated to the strategies and tasks used in each farm. While viability strategies vary from farm to farm, our analysis shows that there are three type of general tasks that all farms have to perform: agricultural or productive tasks, domestic tasks and administrative tasks.

In our analysis, we use work and labour distinctively: by *work* we understand the jobs and tasks themselves, while we use *labour* to refer to the workforce, the people performing the tasks, and we consider the farmers as the person organizing the work and driving the system (Fanchone et al., 2022). Work and labour in agriculture have been characterized using different categories (Dedieu 2019). We have identified five sets of features to characterize work in small farms and three sets of features to characterize labour and labour relationships, as defined in Table 6.2.

Labour and labour relationships in agriculture and small farms are generally characterized in terms of remuneration (Malanski, Ingrand, et al., 2019), the distance or belonging to the household (Cournut et al., 2018; Dupré et al., 2017) and the temporality of the labour relationship (Dupré et al., 2017). The characterization of paid labour and external labour has been analysed in detail by distinguishing between workers with different contracts or volunteers with different degrees of formality (Mangan & Laurent 2018, in Dedieu, 2019). Less attention has been paid to the distribution of labour within the household (Dedieu, 2019; Duval et al., 2021), in spite the importance of gender roles in task distribution (Arce et al., 2022; Shortall, 2014). To fill this void, we include genderization and associativity as relevant labour categories to make sense the role of work and labour in small farms' viability strategies. In addition, and following Fanchone et al. (2022) and Navarrete et al. (2014),

who highlight the skill and knowledge required to perform specific practices, specialization is also included as a qualitative feature of labour (see Table 6.2).

To characterize farm work, the specialized literature underlines the role of both the temporality and the intensity (Fanchone et al., 2022). To characterize temporality of work, we lean on the differentiation proposed by the *Work Assessment Method* (Cournut et al., 2018; Dedieu & Servièrè, 1999) which proposes to distinguish between routine and seasonal work. Following Dupré et al. (2017), Navarrete et al. (2014) and Fanchone et al. (2022) intensity is seen as characterized by the complexity of the activity, the workload it entails and also, the physical arduousness of the work. In addition, we consider workforce requirements to be able to characterize viability strategies in relation to the human resources it entails.

Table 6.2: Categories used to characterize farm labour and work entailed by the viability strategies

Features of labour and labour relationships		
Category	Definition	Features
<i>Remuneration</i>	Existence of a monetary exchange in the labour relationships associated to a viability strategy.	Paid
		Unpaid
<i>Belonging to farm's social group (household)</i>	Labour for a viability strategy is provided by members from the household or external workers.	From household
		Outside the household
<i>Temporality of labour relationship</i>	Duration of a labour relationship tied to a viability strategy.	Permanent
		Seasonal
<i>Genderization</i>	Task distribution of a viability strategy is associated to traditional gender roles.	Masculinized
		Feminized
<i>Associative labour relationship</i>	Labour used to carry out a viability strategy is based on associativity and whether the relationship is formal or informal.	Formal organization
		Informal cooperation
<i>Specialization of labour</i>	Viability strategy is associated to a specific skill set or knowledge.	Unspecialized
		Specialized
Features of work		
Category	Definition	Features
<i>Temporality</i>	Frequency and postponability of the work associated to a viability strategy or task, distinguishing between routine work, which are tasks that have to be done every day or routinely and cannot be postponed, and seasonal work, which are tasks that are less frequent and can be more easily postponed.	Routine
		Seasonal
<i>Intensity</i>	Work associated to a viability strategy, considering workload, duration or arduousness.	Intense
		Mild
<i>Workforce requirements</i>	Amount of labourers working simultaneously needed to carry out a viability strategy. Rather than calculating a specific amount of people, it's assessed by comparison to an alternative strategy, which is commonly the context in which farmers on the case study assess this type of scope.	More labourers
		Less labourers

Source: own elaboration based on categories used by Dedieu & Servièrè (1999), Navarrete et al. (2014), Dupré et al. (2017), Cournut et al., (2018), Malanski et al., (2019), Dedieu, (2019) and Fanchone et al (2022)

While work satisfaction or an equivalent dimension is often included when assessing work and labour in agriculture (Dumont et al., 2016; Duval et al., 2021), we choose not to analyse it as a specific feature of the work and labour associated to the implementation of viability strategies. Work satisfaction as a key element in farm viability is conditioned by elements beyond work, labour or viability strategies, including pressures from within the farm as well as external factors (Dedieu, 2019; Dumont & Baret, 2017). As such, we include it in the analysis through the livelihood reproduction framework, as an attribute of internal organization and interdependence, which allows for a nuance examination of such a complex element and how it connects to other elements within farm reproduction, such as autonomy, leeway, social relationships or motivations (Dumont & Baret, 2017; Duval et al., 2021).

Finally, as we summarize in Table 6.4, Table 6.6, Table 6.8, Table 6.10 and Table 6.12, we examine qualitatively how the viability strategies implemented impact the different attributes of livelihood reproduction, both positively and negatively, as mediated by work and labour strategies specifically.

6.3 Results

As follow, for each of the representative farms identified, we first give a brief description of the main characteristics of the farm, the external factors perceived by the farmers interviewed and the viability strategies they implement to address them. Then, we look into how they assume and manage the labour and work associated to the different viability strategies they implement and how, in turn, the implementation of these strategies affects work organization, work rhythm and labour requirements in the farm.

○ *Agroecological farm by an intergenerational household*

This farm is a collective family project, with three members in the household actively involved in the management of the farm, a mother and two of her sons. The farm is organized around three main economic products: olive oil, olives and lamb. All 150ha worked by the farm are rainfed, with no option to add an irrigation system. In number of hectares, the most important crop are olive trees then fodder crops and finally, almond trees as a complementary crop, all of them in scattered orchards and fields, a diversity of crops they inherited and maintained from their family's land. The olive orchards are in traditional groves, which means they are rainfed, old trees in traditional planting frameworks and ranging distances between 6 per 6 meters to 10 per 10 meters between trees. This type of orchard is less productive than more intensive managements, but also means olive orchards are more resilient to plagues, which in their case, facilitated an organic management. They have an organic certification for olive production, motivated by their aspiration towards self-sufficiency and a trust on natural rhythms over the use of external inputs. The same motivations drive the management of their flock of around 500 sheep, which are fed fully by pasturing in their own and neighbouring olive and cereal fields and their own production of rotating fodder crops.

On top of the internal factors that shape the farm project and its management, they are also affected by external factors. The project has to deal with the increasing cost of farming supplies, a challenge tied to and exacerbated

by the low sale price of farm products, which through conventional selling channels, it is insufficient to support the farm’s household. They also have to deal with the ignorance of consumers, who don’t value farm products. To address these factors, the farmers incorporated the manufacturing of olive oil through outsourcing the milling service and control the commercialization of some of their products (olive oil and lamb) by selling them to direct marketing channels.

Table 6.3: Diverse nature of work and labour of the viability strategies and common tasks in an *Agroecological farm by an intergenerational household*

Viability strategy implemented	Features of labour and labour relationships													Features of work organization					
	Belonging to farm's social group		Remuneration		Associative labour		Temporality of labour relationship		Specialization of labour		Genderization		Intensity		Workforce requirements		Temporality		
	Household	Outside household	Paid	Unpaid	Formal organization	Informal cooperation	Seasonal	Permanent	Unspecialized	Specialized	Masculinized	Feminized	Intense	Mild	More labourers	Less labourers	Seasonal	Routine	
Farming strategies	Disposing of OTPB																		
	Harvest by hand (olives)																		
	Harvest mechanization (olives)	Task distribution by expertise								Machinery	Household members (mechanized tasks)			Faster & less arduous (than harvest by hand)		Less labourers (than harvest by hand)	Shortens harvest work peak		
	Harvest or sowing of cereal crops		Outsourced service	Outsourced service				Often hire the same person		Machinery				Lowers workload			Softens intensity of work peak		
	Integration of extensive livestock (shepherding)	Task distribution by expertise Flexibility	Support from off-household relatives (mother's partner)		Support from off-household relatives (mother's partner)			Support from off-household relatives (mother's partner)		Knowledge	Commonly, household members			More attentive tasks and work (than intensive farming)		More labourers to maintain flexible schedule		Most tasks are routine work	
	Organic agriculture	Task distribution by expertise Flexibility								Specialized & new knowledge	Commonly, household members			More attentive tasks and manual work (than conventional farming)					
	Shredding OTPB	Task distribution by expertise									Household members (mechanized tasks)			More work (than disposing of OTPB)		More labourers (than disposing of OTPB)		Seasonal task	
	Incorporate manufacturing (olive oil)		Outsource olive oil milling to a local mill	Outsource olive oil milling to a local mill				Same local mill every year		Knowledge				Lowers workload		It takes place off farm	Exacerbates work peaks (coincides with olive harvest)		
Incorporate manufacturing (lamb)	Task distribution by expertise								Knowledge		Household members		Increases the workload		Requires more labourers		Mostly routine tasks (not daily)		

“Who does what?” Unravelling the central role of labour and work in small farm reproduction

Comm.	Control over commercialization	Task distribution by expertise Flexibility	Support from off-household relatives (son's partner)				Support from off-household relatives (son's partner)		Specialized & new knowledge		Commonly household members	More work (than wholesale)		Requires more labourers (than wholesale)			Increases routine workload
	Wholesale commercialization	Task distribution by expertise Flexibility						Unspecialized knowledge					Less work (than control)		Less labourers (than control)	Done after harvest	
Income diversification	Crop diversification	Task distribution by expertise Flexibility							Knowledge on more crops	Commonly, household members		More time consuming			Can be assumed by the same labourers		Steadier work throughout the year
	External agri-jobs	Done by members of the household							Knowledge on agricultural tasks	Household members (mechanized tasks)		More time consuming, increases workload				Exacerbates work peaks as it coincides with farm's agricultural tasks	
	Non-agricultural jobs																
	Domestic tasks	Done by members of the household									Household members & relatives						
	Administrative (book-keeping tasks)	Done by members of the household							Knowledge on administrative tasks		Household members						
	Agricultural tasks	Task distribution by expertise Flexibility	Support from off-household relatives (mother's partner)		Support from off-household relatives (mother's partner)		Support from off-household relatives (mother's partner)				Household members (mechanized tasks)						

In this farm, agricultural management is organized around three strategies, which can be labelled as agroecological approaches: organic farming for olives and almond groves, crop diversification and extensive livestock integrated with the crops and groves. Compared to conventional agricultural practices, these require more labour availability as they are time consuming and can increase the farm’s workload. Organic farming, as explained by the informant, requires that they are more attentive of early signs of pests or disease, as they want to limit preventive treatments and only use the minimum necessary, and favour manual approaches over the use of synthetic products. In this farm, opting for shredding olive tree pruning biomass, which is more labour intensive than the alternative of burning it, is framed within the same motivation for self-sufficiency and conservation of natural resources that drives their organic management.

Extensive livestock requires a lot of labour, as herding and caring for the flock needs to be done every single day. However, the informant explains that, because the management of the sheep is integrated with the crops, it can also contribute to easing some of the farm workload or make work management more efficient; the sheep flock “takes on” tasks such as fertilization, controlling offshoots and weeding, so the farm members don’t have to allocate specific time for these tasks. Extensive livestock and rainfed crops, in this case olive, fodder crops and almond, are agricultural activities with different seasonality in terms of workload. While extensive livestock requires very similar workload and tasks throughout the year (they keep the flock together, so lamb production is steadier all year long), the crops have seasons of rest and seasons of work peaks, mainly harvest seasons.

In this farm, most of the agricultural tasks are handled by members of the household and they are able to assume more labour-intensive strategies because they have a task distribution based on the expertise of each member, while at the same time remaining flexible. Because all three members know a bit about the different tasks, from herding sheep to processing lamb and handling commercialization, they can take over any task if the need arises. At the same time, each member having their own expertise broadens the skills available and allows the project to take on new strategies and economic activities.

Flexibility in task distribution among the members of the household and the support from extended family makes it possible to handle both the steady tasks and the work peaks in a way that, even if the work rhythm is perceived as very intense during work peaks, members can still enjoy flexibility on their work schedules. Because they outsource the harvest service for fodder crops, which takes place during early summer months, their work peak seasons begins late August with almond harvest and stretches until late November or early December with olive harvest and olive oil manufacturing. Mechanization (own shaker) makes olive harvest less time consuming and combined with rainfed olives that fall more easily, they feel it is a very effective method.

They take control over commercialization to get a better price for their products, while also maintaining wholesale channels for part of the production. The informant explains that they came to that decision because they realized that *“when I buy, they set the price and when I sell, they also set the price! I go to the supermarket and they set the price, but when I have a [farm] product, I have olives or almonds, I go to sell them and they set the price for me, damn it! Well then, I’ll do direct selling and from now on I’ll set the price myself, it’s the only*

way”. However, this strategy entailed incorporating new tasks that also require learning new skills and increased the workload. Flexible task distribution within the collective household allowed them to assume the extra workload and in addition they can count on the support from relatives outside the household to handle some commercialization tasks, in this case the informant’s partner (woman, with an off-farm job).

In the case of olives, control over commercialization meant incorporating the manufacturing of olive oil. Instead of assuming manufacturing tasks on the farm, they outsource the manufacturing service to a local olive oil mill and thus, the required extra workload, making the strategy less time consuming and eliminating the need for more labourers or labour availability of farm members. For lamb, the other farm product they commercialize, flexible task distribution and a collective household where many members are involved in productive farm tasks allowed them again to assume labour intensive strategies without relying on external labour. In this case, the two brothers started the farm project, and later, their mother joined them. She trained to be a butcher so they could process their lamb and sell it more directly and became an active part of the project. As the informant puts it “*she [his mother] joined us. I think she saw we needed help, mostly with paperwork and bureaucracy, because they are becoming more and more annoying with the paperwork, you have to keep it very up to date, the farm’s books. So she does a bit of all that, on top of taking orders and processing the lamb*”. At the time of the interview, they stated that she is teaching her daughter (the informant’s younger sister, still 16 years old) how to process the lamb, in case she needs to take over, with the same aim of maintaining flexibility in task distribution.

As part of an income diversification strategy, the informant and his brother perform freelance agriculture jobs, most often machinery tasks such as harvesting for other local farmers. By doing these jobs, they aim to compensate for the insufficient income from farming products. However, external agriculture jobs exacerbate the farm’s work peaks, as the tasks they are hired for coincide with the work peaks at the farm. This generates a very intense workload that the informant particularly struggles with, as it makes it more difficult for him to spend time on domestic tasks and adjust his schedule to his partner’s. At the time of the interview, the informant was expecting his first child and he felt that when the kid is born it will be unsustainable for him and the other members of the household to spend as much time on external agricultural jobs. On top of that, he also stated that the work rhythm created by combining the work on their own farm project plus the external jobs would be unsustainable much longer, and they plan to dedicate less time on external jobs. Now, the project is more established, and they count on strategies such as manufacturing and commercialization which have improved their farming income.

Even though there is flexibility on task distribution between the members, the expertise and the tasks conducted normally by the farm’s members are largely based on a sexual division of labour. Manufacturing and commercialization tasks are mostly assumed by the mother, as she is in charge of processing the lamb and tending to the small store they have in the farm and she only participates on agriculture tasks during work peaks or exceptional moments. The two brothers take on agricultural tasks, particularly the ones that require machinery and they participate of commercialization tasks such as going to markets and fairs. The same occurs in administrative tasks, such as book keeping, keeping up to date with regulations and handling inspections, done

by the mother. The informant dislikes these types of tasks, that also requires specialized expertise, as he finds them difficult, unnecessary and too time consuming.

Table 6.4: Impact of viability strategies on the farm’s livelihood reproduction in an *Agroecological farm by an intergenerational household*

Viability strategies		Dimensions & attributes of livelihoods reproduction framework														
		Buffer capacity					Outwards self-organization & interdependence			Capacity for learning			Internal self-organization & interdependence			
		Human capital	Natural capital	Social capital	Physical capital	Financial capital	Reliance on own resources	Cooperation & networks	Decentralization & independence	Different types of knowledge & learning	Shared vision	Reflective and shared learning	Collective and flexible household	Fair labour relationships	Work satisfaction	Self-regulated ecosystem
Agricultural tasks	Disposing of OTPB															
	Harvest by hand (olives)															
	Harvest mechanization (olives): - done by household members - masculinized tasks - flexibility in task distribution				--	--	--				--		--	++		
	Harvest or sowing of cereal crops: - outsourced					--	--	++						++		
	Integration of extensive livestock (shepherding): - done by household members - flexibility in task distribution	--	++				++			++		++	++		+	++
	Organic agriculture: - done by household members - flexibility in task distribution	--	++				++			++		++	++		++	++
	Shredding OTPB: - done by household members - masculinized tasks - flexibility in task distribution	--	++		--	--	++							--	++	
Incorporate manufacturing (olive oil): outsourcing					--		++	++	++					++		
Incorporate manufacturing (lamb): - done by household members - feminized tasks	--							++					--	++		
Commercialization	Control over commercialization: - done by household members - feminized tasks - flexibility in task distribution - support from off-household members	--		+		++		++	++			++	++	--	++	
	Wholesale commercialization: - done by household members - flexibility in task distribution							--					--	+	--	
Income diversification	Crop diversification: - done by household members - flexibility in task distribution		++			++		++	--	++	++	++		++		
	External agri-jobs: - done by household members - masculinized tasks	--				++		++	++			--	--	--		
	Non- agricultural jobs															

Agroecological strategies, such as organic farming, integration of extensive livestock and shredding OTPB, strengthen the natural capital of the farm and its ability to rely on its own resources, as they generally contribute to the regeneration of the natural resources in the agroecosystem. They are also strategies rooted or that can benefit from using local and traditional knowledge, with the exception of shredding OTPB. However, they could put a strain on a farm's internal organization as they are labour intensive and can increase the workload. In this farm, most of the tasks linked to the different viability strategies implemented are handled collectively and with flexibility in task distribution between household members. This applies as well to agricultural tasks, which when handled with flexibility in task distribution, they contribute to a collective and flexible household. Moreover, the informant describes organic olive production as mostly “letting nature follow its course”, implying that even do they have to be attentive, it doesn't necessarily mean more work, allowing them to maintain a satisfactory work pace and workload. Similarly, taking care of the sheep flock is a demanding task, but because they can share it and it is integrated with tasks in olive and almond groves, household members can still find a satisfactory work pace and workload. Finally, they handle some agricultural tasks by outsourcing or mechanization to keep a satisfactory and sustainable workload, but in turn these strategies require rather than strengthen the buffer capacity of the farm, as financial and physical capital are needed to implement them.

Outsourcing olive oil manufacturing to a local olive oil mill contributes to a satisfactory work pace and workload, as it lessens the workload the strategy could bring if assumed otherwise, while still contributing to work satisfaction, as it is a strategy aimed at addressing the dissatisfaction and struggle generated by not being able to control the terms of commercialization and low price of farm products. Because the farmers have a long-term relationship with the local mill and they learn about the olive oil making process from them, it also contributes to the farms cooperation and networks (interdependence). On the other hand, when it comes to processing lamb to be sold directly, because it is assumed by household members based on gender role, the strategy requires human capital, more labourers (which is why the informant's mother decided to step in). It also has a more detrimental impact on internal organization, particularly on fair labour relationships and satisfactory work pace, as these manufacturing tasks can't be shared equally between members of the household.

As opposed to using wholesale commercialization channels, control over commercialization improves the farm's buffer capacity in terms of financial capital and its independence from global markets and middle men. On the other hand, it could be detrimental for the work pace and workload of farm members, as it is labour intensive. However, in this farm, support from relatives outside the household and the possibility to share commercialization tasks allows for a mostly satisfactory work pace and workload.

In this farm, external agricultural jobs, as an income diversification strategy, have a double impact on farm viability. On one hand, performing external agriculture jobs for other producers increases the farm's financial buffer capacity and brings in financial resources that allow farmers not to depend as much on loans to invest in further strategies, contributing to farms independence from commodity markets. However, these jobs are assumed based on gender role, which means they can't be shared as much among members of the household,

leading to a stressful work pace and workload and to being detrimental for a collective and flexible household, as they limit the availability of household members to assume farm tasks.

This farm tends to implement labour intensive strategies which contribute to strengthening its buffer capacity, ability to rely on its own resources and the farm’s decentralization and independence. Collectivity and flexibility in task distribution within the household are what allow the project to implement a wider and complex diversity of strategies even when they require more work and knowledge. However, traditional sexual division of labour guides task distribution among the farm’s household members affecting work satisfaction. In addition, support from relatives and outsourcing some tasks uphold the incorporation of manufacturing and controlling commercialization. Finally, external agriculture jobs contribute to income diversification and therefore, the farm’s financial capital, but create an unsustainable workload or rhythm as they exacerbate work peaks.

○ *Traditional olive oil farm by a spouses' household*

This is a family farm based on a household of two members, husband and wife (the informant), as their adult sons don't live with them anymore. The farm has roughly 40ha of land and the main product are olives, with 35ha of olive groves, while almonds are complementary product. They do extensive olive oil production. Around 75% of their olive groves is irrigated, using a drip system, implemented to lessen the alternate bearing characteristic of olive trees (one year high production, following year low production) and to guarantee a sufficient yield every year. The remaining hectares remain rainfed orchards, as they are in areas where water from irrigation canals is not accessible. With irrigation, they intensified their previously extensive cultivation framework by planting new trees between the old ones, while maintaining a distance of 6 per 6 meters to 8 per 8 meters between trees in rainfed orchards. Farming is at the base of the family's economy, but partly because farming doesn't bring sufficient or stable income, the informant has a job outside the farm, an administrative job in the town's olive oil cooperative. The farm project is part of the same olive oil cooperative, through which they manufacture and commercialize olive oil. In spite direct selling channels being traditionally used by olive oil cooperatives, they also have to deal with unfair competition from big producers and retailers and an insufficient sale price, which adds to the increasing cost of farming supplies.

Table 6.5: Diverse nature of work and labour of the viability strategies and common tasks in a *Traditional olive oil farm by a spouses’ household*

Farm 44		Features of labour and labour relationships											Features of work organization							
		Belonging to farm's social group		Remuneration		Associative labour		Temporality of labour relationship		Specialization of labour		Genderization		Intensity		Workforce requirements		Temporality		
Viability strategy implemented		Household	Outside household	Paid	Unpaid	Formal organization	Informal cooperation	Seasonal	Permanent	Unspecialized	Specialized	Masculinized	Feminized	Intense	Mild	More labourers	Less labourers	Seasonal	Routine	
Farming strategies	Disposing of OTPB	Clear separation of tasks										Household members			Less (than shredding OTPB)		Less (than shredding of OTPB)	Seasonal task		
	Harvest by hand (olives)	Clear separation of tasks	Hiring employees	Hiring employees				Temporary workers (same every year)		Doesn't require specialized labour		Household members & male employees		Higher workload and takes longer (than harvest mechanization)		Requires more labourers (than harvest mechanization)		Intense work peak		
	Harvest mechanization (olives)																			
	Harvest or sowing of cereal crops																			
	Integration of extensive livestock (shepherding)																			
	Organic agriculture																			
	Shredding OTPB																			
Incorporate manufacturing			Membership to olive oil cooperative	Membership fee to olive oil cooperative		Shared infrastructure and endeavour in olive oil cooperative			Long-time membership to olive oil cooperative		Knowledge				Lowers workload of farm members	More labourers (assumed by cooperative, not farm individually)		Seasonal task		
Comm.	Control over commercialization		Membership to olive oil cooperative	Membership fee to olive oil cooperative		Shared infrastructure & endeavour in olive oil cooperative			Long-time membership to olive oil cooperative		Knowledge				More work (than wholesale) assumed by cooperative	More labourers (assumed by cooperative)				
	Wholesale commercialization		Membership to olive oil cooperative	Membership fee to olive oil cooperative		Shared infrastructure and endeavour in olive oil cooperative			Long-time membership to olive oil cooperative	Doesn't require specialized knowledge					Less work (than control) assumed by cooperative		Less labourers (assumed by cooperative)			

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Income diversification	Crop diversification	Clear separation of tasks								Knowledge on more crops	Household members		More time consuming			Can be assumed by the same labourers		Steadier work throughout the year
	External agri-jobs																	
	Non- agricultural jobs	By members of the household								Knowledge (on off farm job)	Household members		More time consuming, increases the workload		Reduces labour availability for farm tasks of household members			Steadier work throughout the year
Domestic tasks	Clear separation of tasks	Support from off-household relatives (wife's mother)						Support from off-household relatives (wife's mother)			Household members and relatives							
Administrative (book-keeping tasks)	Clear separation of tasks	Membership to olive oil cooperative	Membership fee to olive oil cooperative					Long-time membership to olive oil cooperative		Knowledge	Household members							
Agricultural tasks in general	Clear separation of tasks	Hiring employees	Hiring employees				Temporary workers (same people every year)				Household members and male employees							

Household members take on most of the farm’s workload (productive and otherwise), but work management within the family is based on a clear separation of tasks, seemingly following a traditional sexual division of labour. The informant has a non-agricultural job outside the farm, at the local olive oil cooperative, and assumes non-productive tasks. Her husband whereas, manages the everyday work at the farm and takes on most farming tasks. In this case, the farm is managed from a perception of weeds as a hindrance for production. With irrigation, which stimulates the growth of such weeds, it can lead to a higher dependency on external inputs supplies, such as herbicides or fertilizers. This is in line with opting, as they do, to burn olive tree pruning biomass, instead of valorising it.

The only agricultural tasks for which they rely on external work is olive harvest, as they do it by hand, a method that is more time consuming and requires more labourers to assume the high workload. In this farm, olive harvest season, which coincides with olive oil production, is relatively long, from November to January, and it is the most intense in terms of work. However, their sons are not directly involved in the farm project. When she was younger, the informant used to work at her parents’ farm, helping out during harvest season. Now, the job at the cooperative doesn’t give her enough time to work on agricultural tasks, not even during work peaks, as they coincide with the work peak at the cooperative, during which the informant has to work even on weekends. The limitation on family labour availability, means that they opt for hiring temporary workers, who handle most of the harvest tasks, while her husband supervises and loads and unloads olives from the orchards to the cooperative mill.

For them, hiring temporary workers can be problematic. On one hand, paying the salaries during harvest season is one of the farm’s biggest expenses, but they prefer it for its efficacy and because mechanization would mean changing the morphology of the olive groves. On the other hand, she acknowledges that there is a generalized issue with temporary agriculture workers (“temporers” in Catalan) in the olive oil and other sectors, such as fruit production. These workers are often immigrants, hired informally and have to deal with precarious working conditions, from very low salaries to struggling to find adequate housing. The informant explains that it was and it still is common for olive producers to “hire” temporary workers without formal contracts, which would allow them to regularize their situation, because it is cheaper, a practice she looks down on as unfair; *“when farmers are right, I’m the first to defend them, but this [practice] of having people without insurance is a bad habit they’ve always had, because there was never any controls and they took advantage of others who are even poorer than them”*. In their case, for the past few years they have been hiring the same five men for every harvest season. During their work for the farm project, she and her husband house them in a warehouse, which she describes as not ideal but which has a fireplace, hot water, a kitchen and a bathroom.

In this farm, they incorporate the manufacturing of olive oil and the control of its commercialization using short and direct marketing channels. These strategies can strengthen a farm’s livelihood resilience, but they can also greatly increase the farm’s workload and its labour requirements. However, in this farm, manufacturing and commercialization tasks are assumed through associativity, as they are members of the local olive oil cooperative. Manufacturing work and the extra workers it requires and control over commercialization, which

is more labour intensive than bulk sales (also handled by the cooperative), take place off the farm and are assumed by the cooperative, not the farm individually, lowering the impact of these strategies on the farm’s labour requirements and work management.

Commercialization of farm products through an olive oil cooperative, as expressed by the informant, doesn’t fully address struggles such as insufficient prices or dependency on global markets and big distributors. This is because, despite selling directly to consumers being an inherent and traditional practice in olive oil cooperatives, they are also very dependent on selling olive oil in bulk. In their case, the cooperative sells half of the oil directly to consumers and the other half in bulk to olive oil packing companies. The sale price of the latter is nearly half of the sale price of the direct selling channels. For the informant, in both cases the olive oil prices are too low, “*with these prices, it [olive farming] is disastrous*”. They can’t set the price for the olive oil sold in bulk, it is set by big companies and retailers, and in the case of the olive oil sold directly by the cooperative, they opt to keep a low price so the product is affordable for most families and to be able to compete and differentiate themselves from other local cooperatives. The insufficient sale prices is exacerbated by the increasing cost of farming supplies, plus the cost of hiring workers, making the production of olive oil more and more difficult (cost – price squeeze).

As an income diversification strategy, the informant has a job at the local cooperative, which complements the farm project both in terms of income and with other resources, such as useful knowledge (olive oil making process, commercialization or bureaucracy knowledge). Her workload and rhythm, which she describes as stressful, is conditioned by her job at the cooperative and has a fixed schedule that limits her availability to do agricultural tasks at the farm. Her schedule contrasts with that of her husband, which she explains as being very flexible and autonomous, as he can self-manage and organize his own hours, especially during quieter seasons. As the informant explains, she and her husband could leave the farm for a few days and go on vacation if they wanted to and some years, they have done it, but generally, they don’t feel the need to do so. Actually, she explains that she often goes to the olive orchards during her days off at work and it is something she would want to do more often once she retires.

The informant’s workload is intensive as she also assumes the farm’s administrative work, which overlaps with her job at the cooperative and household’s domestic work. She handles the farm’s books, keeps up with regulations and handles inspections as she does for other members of the cooperative, as part of her administrative job, but she also handles the contracting process when they hire employees for the farm, a service they used to offer at the cooperative but they stopped because “*it became a hassle*”. For her farm work, on the orchards, is very enjoyable and fulfilling, as opposed to her administrative work; “*my husband prefers to spend a week at the plot [al tros] than touching a single paper*” she is the one that handles paperwork, “*I have no choice [quin remei], I don’t really like it, because the work is never ending and farm work is very relaxing, I should know, I’ve been to the harvest. When we were young, we started with the fruit, from campaign to campaign. Later, here, when it was time for almonds and olives, I also went [to harvest] many years. Not anymore, because I have no time*”.

The informant also takes on domestic and family care; she was responsible for taking care of their children when they were young and up until their recent passing, she took care of her parents. She explains that this arrangement is due to the fact that her husband spends too much time out the house, doing farm work, for him to be able to take on domestic and care work. However, she also explains that her husband has a more flexible schedule than hers and usually gets home earlier than her, especially during winter and rest seasons for the olive and almond crops.

Table 6.6: Impact of viability strategies on the farm’s livelihood reproduction in a *Traditional olive oil farm by a spouses’ household*

Farm 2 [44]		Dimensions & attributes of feminist livelihood resilience															
		Buffer capacity					Outwards self-organization & interdependence			Capacity for learning			Internal self-organization & interdependence				
	Viability strategy as implemented by the representative farm	Human capital	Natural capital	Social capital	Physical capital	Financial capital	Reliance on own resources	Cooperation & networks	Decentralization & independence	Different types of knowledge & learning	Shared vision	Reflective and shared learning	Collective and flexible household	Fair labour relationships	Work satisfaction	Self-regulated ecosystem	
Agricultural tasks	Disposing of OTPB : - done by household members - clear separation of tasks (gender roles)						--			++		--	--	--	+		
	Harvest by hand (olives): - temporary workers	+				--	--							-	--		
	Harvest mechanization																
	Harvest or sowing of cereal crops																
	Integration of extensive livestock (shepherding)																
	Organic agriculture																
	Shredding OTPB																
Incorporate manufacturing (olive oil): olive oil cooperative				++		--		++	++		++				++		
Commercialization	Control over commercialization: olive oil cooperative			++		--		++	++		++				++		
	Wholesale commercialization: - olive oil cooperative			++		--		++	--		++			--	--		
Income diversification	Crop diversification: - done by household members - clear separation of tasks (gender roles)		++			++			++	-- ++		--	--	--	++		
	External agri-jobs																
	Non-agricultural jobs: - done by household members - feminized task	--				++			++	++			--	--	--		
Domestic tasks: - done by household members - clear separation of tasks (gender roles) - feminized task - support from off-household relatives													--	--	--		
Administrative (book-keeping tasks): - done by household members - clear separation of tasks (gender roles) - feminized task							++					--	--	--	--		

Note: ++ (contributes), -- (detrimental), + (slightly contributes), - (slightly detrimental)

In this farm, all the strategies handled by household members follow a clear distribution of tasks generally based on gender roles. Agricultural tasks are masculinized and assumed almost exclusively by the husband, which is detrimental for both a collective & flexible household and fair labour relationships. Furthermore, temporary workers are used for olive harvest, done by hand, a strategy that requires both human and financial capital and is even more detrimental for fair working conditions; temporary workers have to do intense manual jobs and are offered low salaries, even if in this farm they are hired formally and offered labour insurances. Furthermore, hiring temporary workers is a source of dissatisfaction for the farmers, as a difficult process and generates a feeling of dependency on external paid labour.

For the manufacturing of olive oil and commercialization of farm products, farmers use the olive oil cooperative they are member of. As a formal associative organization, membership to the cooperative strengthens the farm's social capital, contributes to its cooperation & networks and to building a shared vision with the other members. Also, because most of the tasks associated to manufacturing and control over commercialization take place off the farm, membership to the olive oil cooperative contributes to a satisfactory work pace & workload instead of straining it as these strategies can do. On the other hand, wholesale commercialization and the dependency and financial pressure they create for the farm remain sources of work dissatisfaction even when done through a cooperative.

In this farm, income diversification strategies also fall under a clear and gendered distribution of tasks. It is the informant (wife) who has a job outside the farm, as a non-farming and supportive task (in this case financially supportive). Her job at the cooperative strengthens the farm's financial capital and contributes to knowledge of threats & opportunities, as her expertise at the cooperative is also helpful for the farm. On top of the clear task distribution, having a second job limits the informant availability to work at the farm, it creates a heavy workload that makes it difficult to sustain a satisfactory work pace & workload and finally, it is detrimental for work satisfaction as she is left to handle tasks she doesn't enjoy.

The same thing happens when it comes to domestic and administrative tasks. Both jobs are essential to sustain the farm and household and they are both the responsibility of the informant (wife) based on a gendered and clear distribution of tasks. Again, this way of distributing the work within the household is detrimental to fair labour relationships and to a collective & flexible household. Furthermore, it contributes to a workload too heavy to be satisfactory and to having to do tasks which are not enjoyed.

The olive oil cooperative is a central element in how work is organized within the farm project, it conditions its labour availability and the tasks it can assume. Membership to an olive oil cooperative allows the farm project to incorporate olive oil manufacturing and commercialization in a shared way, without requiring extra labour, and as a non-agricultural job for the informant (woman), contributes with income, knowledge and resources to the farm project. There is a clear distribution of tasks between the two spouses that make up the farm's household, apparently following a sexual division of labour, which leads to different work rhythms, one more flexible than the other. Although the wife rarely takes on agricultural tasks, managed by the husband, the tasks

she is responsible for are essential in sustaining both the farm and household. In spite incorporating control over commercialization through the cooperative, the insufficient price for farm products and the increased cost of farming supplies are important sources of work dissatisfaction. In addition, farm expenses are increased by the need to hire temporary workers to assume work peaks that household members can't assume.

○ *Family olive oil mill with olive production*

This is a collective farm project, managed by a father (informant) and son household. They have 115ha of farmland, most of it (around 80%) dedicated to herbaceous crops (rainfed and irrigated) and the rest, to olive groves, which they combine with olive oil production on their family mill. The olive oil mill was founded in 1939 by the grandparents of the informant, who took over in 1996. Now, the informant manages the mill and farm project with the fourth generation, his son. In this project, manufacturing and control of commercialization are inherited strategies in a way, as they were incorporated by previous generations, and they could count on previous infrastructure and immaterial resources to do so. Olive production, which is semi-intensive, is complementary for the farm project's income diversification, as olives produced on the farm represent only a small percentage of the olive oil produced by the mill, which buys olives to local olive producers. Perceiving that olive groves are being abandoned and every year there is less local production, pushed out by big industrial producers, they recently decided to increase their olive production and planted more olive trees. Now, rainfed olive groves on a traditional cultivation framework of 6 per 6 meters to 10 per 10 meter and irrigated intensive olive groves. They sell all their olive and olive oil production directly to consumers, through the olive oil mill, and use wholesale commercialization channels for the herbaceous crops.

Table 6.7: Features of labour (workforce) and work (jobs and tasks) requirements linked to different viability strategies in a *Family olive oil mill with olive production*

Farm 22		Features of labour and labour relationships											Features of work organization					
		Belonging to farm's social group		Remuneration		Associative labour		Temporality of labour relationship		Specialization of labour		Genderization		Intensity		Workforce requirements		Temporality
Viability strategy implemented	Household	Outside household	Paid	Unpaid	Formal organization	Informal cooperation	Seasonal	Permanent	Unspecialized	Specialized	Masculinized	Feminized	Intense	Mild	More labourers	Less labourers	Seasonal	Routine
Farming strategies	Disposing of OTPB	Task distribution by expertise Flexibility									Household members			Less work (than shredding OTPB)		Less (than shredding OTPB)	Seasonal task	
	Harvest by hand (olives)	Task distribution by expertise	Hiring employees	Hiring employees			Temporary workers		Doesn't require specialized labour		Household members		Higher workload & longer (than mechanization)		More (than harvest mechanization)		Intense work peak	
	Harvest mechanization (olives)		Outsourced	service				Often hire the same person		Machinery				Less workload to farm members		Less (than harvest by hand)	Softens intensity & duration of work peak	
	Harvest or sowing of cereal crops	Task distribution by expertise	Collaboration with other producers		Collaboration with other producers (based on exchange)		Collaboration with other producers		Collaboration with other producers		Machinery			Lowers workload & makes work less arduous				
	Shepherding																	
	Organic agriculture																	
	Shredding OTPB	Task distribution by expertise Flexibility										Household members		More work (than disposing of OTPB)		More (than disposing of OTPB)		Seasonal tasks
Incorporate manufacturing	Task distribution by expertise Flexibility	Hiring employees	Hiring employees				Temporary workers			Knowledge	Household members		Increases workload		More labourers		Exacerbates work peaks, it coincides with olive harvest	
Commercialization	Control over commercialization	Task distribution by expertise Flexibility								Knowledge	Household members			Inherited & inherent strategy		Inherited and inherent strategy		Mostly routine tasks
	Wholesale commercialization	Task distribution by expertise Flexibility							Doesn't require specialized knowledge		Household members			Less work			Concentrated tasks	

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Income diversification	Crop diversification	Task distribution by expertise Flexibility									Knowledge on more crops	Household members		More time consuming				Can be assumed by the same labourers		Steadier work throughout the year
	External agri-jobs																			
	Non- agric. jobs																			
Domestic tasks		Task distribution by expertise Flexibility										Household members								
Administrative (book-keeping tasks)		Task distribution by expertise									Knowledge	Household members								
Agricultural tasks in general		Task distribution by expertise Flexibility	Hiring employees Collaboration with other producers	Hiring employees	Collaboration with other producers (based on exchange)		Collaboration with other producers	Temporary workers	Collaboration with other producers			Household members								

Within the household, there is a lot of flexibility in the task distribution between father and son, as both of them can do most of the tasks. At the same time, each of them focusses more on certain jobs; the informant focuses on commercialization, olive oil production and administrative tasks, while his son focuses on agricultural tasks. Household members handle most agricultural tasks on their own and own most of the necessary machinery to do so, but for certain jobs that bring a heavier workload during a short period of time, such as harvest, they hire external labour. For the harvest of herbaceous crops, they count on associativity labour, as they share both the task and the harvester machine with another producer, as it is a task better done between two, “*to do it safely*”. For olive harvest, they use different methods, adapted to the different type of olive groves. In the new intensive olive plantation, which is not yet in production, they plan to outsource the harvest, hiring a straddle machine; this method makes harvest faster and by outsourcing it, the workload required wouldn’t be assumed by the farm. In traditional olive groves, with old trees, they harvest by hand and pay two or three men workers for the duration of the harvest. Even though it is not acknowledged by the informant, as he explains it as common practice, the situation of the temporary workers they hire could be described as precarious. As he explains, usually they hire different people every year and in the case of the men paid to handle the olive harvest, they do so informally, without employment contracts.

When it comes to managing olive tree pruning biomass, they use both strategies, either burning or shredding it and using it in the groves. Because burning is less labour intensive than shredding it, they opt for that strategy when they are more pressed for time or have less labour availability, even if shredding could contribute to the farm’s natural capital and reliance on its own resources.

Manufacturing olive oil is one of the central economic activities of the farm, in the family olive oil mill. Because they inherited this strategy and infrastructure from previous generations, it is not perceived as added work. Yet, the combination of olive production and olive oil manufacturing in the same farm, does exacerbate the work peaks. Olive harvest and olive oil manufacturing take place at the same time, from October to December, because olives need to be processed the same day, they are harvested to guarantee the quality of olive oil. To assume this increase in workload, they require more labourers. They hire one or two men (depending on the year) for three months to help with manufacturing tasks.

Similarly, control over commercialization, which usually entails a higher workload is not perceived as extra work, it is an inherited practice, part of the family’s olive oil mill. Also, they sell all their olive oil production through direct and short commercialization channels, contributing to the farm’s financial capital and independence and have regular long-term costumers for their olive oil, which means they rarely need to dedicate time to promotion tasks and they sell most of it locally, so they don’t have to invest time and labour in going to fairs or markets. They only use wholesale commercialization channels for the herbaceous crops. In addition, while usually control over commercialization is tied to a steadier work throughout the year and the informant also expressed that olive oil sales had become more stable and they have consumers all year round, they sell most of the olive oil the month right after or during harvest.

The informant expresses a struggle with having to deal with administrative tasks. Dealing with the bureaucracy needed to run a farm and the olive oil mill is a task that requires specialized knowledge and a source of work dissatisfaction for the informant, to the point he expresses that “*if it wasn't for that [administrative tasks], I wouldn't retire*”.

Table 6.8: Impact of viability strategies on the farm’s livelihood reproduction in a *Family olive oil mill with olive production*

		Dimensions & attributes of livelihood reproduction														
		Buffer capacity					Outwards self-organization & interdependence			Capacity for learning			Internal self-organization & interdependence			
	Viability strategy as implemented by the representative farm	Human capital	Natural capital	Social capital	Physical capital	Financial capital	Reliance on own resources	Cooperation & networks	Decentralization & independence	Different types of knowledge and learning	Shared vision	Reflective and shared learning	Collective and flexible household	Fair labour relationships	Work satisfaction	Self-regulated ecosystem
Agricultural tasks	Disposing of OTPB: – handled by household members – flexibility in task distribution						--					++	++	++	+	
	Harvest by hand (olives): – temporary workers	+				--	--							-		
	Harvest mechanization (olives): – outsourcing					--	--								++	
	Harvest or sowing of cereal crops: – collaboration with other producers			++				++						++	++	
	Integration of extensive livestock (shepherding)															
	Organic agriculture															
	Shredding OTPB: – handled by household members – flexibility in task distribution	--	++			--	--	++					++	++		--
Incorporate manufacturing (olive oil): – handled by household members – flexibility in task distribution – inherited olive oil mill – temporary workers	+					++		++	++			++	++	-	-	
Commercialization	Control over commercialization: – handled by household members – flexibility in task distribution			+		++			++			++	++		-	
	Wholesale commercialization (herbaceous crops): – handled by household members – flexibility in task distribution								--			++	++			
Income diversification	Crop diversification: – handled by household members – flexibility in task distribution		++			++			++	-- ++		++	++		++	
	External agri-jobs															
	Non- agricultural jobs															
Domestic tasks: – handled by household members – flexibility in task distribution													++			
Administrative (book-keeping tasks): – handled by household members – clear separation of tasks												--	--		--	

Note: ++ (contributes), -- (detrimental), + (slightly contributes), - (slightly detrimental)

In this farm, most of the strategies and tasks are handled following a flexible task distribution between household members. This is the case for most agricultural tasks, which are shared between them, and contributes to a collective & flexible household and to reflective & shared knowledge. There are a couple of exceptions when farmers rely on external labour to handle some of the tasks. For the olive groves designed to be harvested with a straddle harvester, they outsource the mechanized task. This strategy requires financial capital to pay for the service and can make the farm dependent on external paid labour, as the farmers don't have the skills or necessary machinery (physical capital) to assume it themselves. However, it contributes to a satisfactory work pace & workload for the farmers, as it lessens their workload tied to olive harvest and allows them to focus on jobs at the mill, which take place at the same time. For traditional olive groves, they harvest by hand and rely on hiring temporary workers. This strategy requires both human and financial capital but it also has a detrimental impact on fair labour relationships in the farm, as the conditions offered to the temporary workers are precarious; they work for low salaries and without a contract or insurance, doing a physically demanding job. Finally, for the specific job of harvesting herbaceous crops, the job and machinery is shared between the father and another producer, with which they have a long-term informal cooperation. By doing it in this way, they strengthen the farm's social capital and cooperation & networks, they contribute to a satisfactory work pace & workload and to work satisfaction, as cooperation makes a difficult and potentially dangerous task safer.

The manufacturing and control over the commercialization of olive oil are closely tied together in the inherited olive oil mill and contribute to the financial capital of the farm and to its decentralization and independence, as farmers fully control the price and commercialization channels. These strategies are fully integrated in the work management and design of the farm, where olive production is complementary to olive oil production as an economic activity. Farmers organize commercialization and manufacturing following a flexible task distribution, but the father has a higher expertise and is mostly responsible for them. In addition, hiring temporary workers to handle the work peak of manufacturing olive oil contributes to a satisfactory work pace & workload, as it compensates for the exacerbated work peak, but it is detrimental for fair labour relationships, as these workers have very short contracts and change every year.

Because in this farm all the members of the household are men, viability/resilience issues related to gender bias and how they impact fair labour relationships couldn't be explored. Administrative tasks are one of the few jobs in which there is a separation of tasks, as they are handled by father who has the specialized knowledge to do so. This stricter distribution detrimentally affects the satisfactory work pace & workload of the father and also his work satisfaction, as he dislikes having to deal with administrative tasks.

In this farm project, incorporation of manufacturing and control over commercialization are viability strategies which almost function as inherent features of the farm, inherited through the family olive oil mill. This means that manufacturing and direct commercialization tasks are not managed as added or extra work, but integrated in the work management strategies and human resources of the farm. However, the combination of agricultural production and olive oil manufacturing exacerbate both the work peaks and slower work seasons, as both these strategies are very seasonal. Thus, work management associated to the farm viability strategies are heavily

conditioned by the changes in labour requirement throughout the year. The seasonality of the tasks translates in flexible schedules for the farm members and even though the informant expresses that “*every day something comes up*”, they have clear work peaks and slower seasons, a work rhythm they enjoy. The flexibility in task distribution between father and son allows them to take time off the farm if they need or want to during the slower work seasons. The seasonality of the tasks associated to the viability strategies implemented by the farm also relates to the use of external paid labour, in the form of temporary workers. Seasonal or temporary workers are hired when household members can’t assume the higher workload during work peaks, but these workers have to deal with precarious working conditions and they don’t establish long term labour relationships with them.

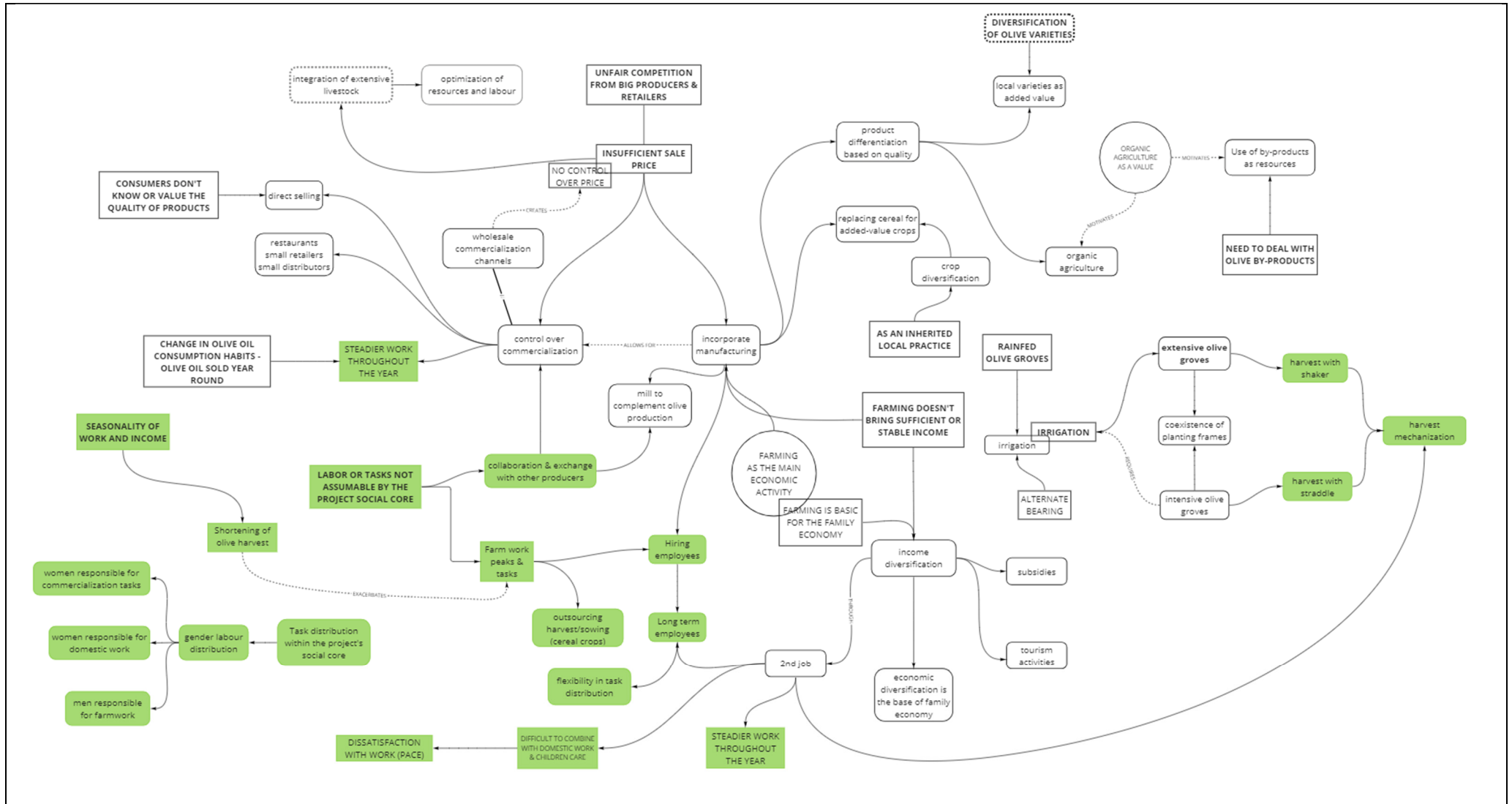
○ *Entrepreneurial farm with complementary partnership mill.*

This farm is based on an extended household: a husband (informant) a wife and an adult daughter who is planning to become an active part of the project in the near future. They also have an adult son who works outside the farm. In their 190ha of farmland, they produce olive groves and cereal and fodder crops. Their olive production is semi-intensive; all olive groves are irrigated, to combat alternate bearing and prevent the effects of climate change, and they combine extensive frameworks in the old trees, with a distance of 6 per 6 meters, and intensive frameworks in the groves they planted after they implemented irrigation. Farming is basic for the family’s economy, but they combine agricultural production with a second job or business, a small company through which they offer agricultural services and rent out agricultural machinery to other producers. In 2015, they decided to incorporate manufacturing to their project and created the olive oil mill, as a strategy to add value to their production and control the whole process, from production to reaching the end consumer. Before, they had always used conventional selling channels for both the olives and cereal crops, selling their products to manufacturers or big distributors. After a year of economic crisis, which affected the activity of their agricultural services business and extremely lowered the price of olives, they decided that they needed to further diversify their economy. The selling price of olives had become insufficient for farming to bring stable income to the household and project and by creating an olive oil mill to process their own olive production, they could add and control the value of their products.

Now, the farm is shifting towards the complementary oil mill being the economic centre of the farm and household, while still maintaining income diversification. The incorporation of manufacturing affected agricultural management, going from a focus on yield to a focus on quality creation and differentiation, implementing practices such as organic farming or diversifying the type of olive varieties, so they can produce different types of olive oil.

At the time of the interview, the informant explains they are about to start a new project, an extensive cattle farm in which they can use their cereal fields as pastures and to make fodder. As he explained, their plan is to follow the same model they are using for olive production, trying to control the whole process, from agricultural production to the end consumer. This project is going to start with the official incorporation of their daughter to the farm, who is currently about to finish her studies on agricultural science.

Figure 6.4: Factors and viability strategies in an *Entrepreneurial farm with complementary partnership mill*



Viability strategies implemented in the project are represented in boxes with rounded edges, internal and external factors affecting and addressed by the project in squares and capital letters and circles indicate explicit values that motivate certain strategies. Elements in green/shaded indicate that strategy or factor is directly related to labour and work organization.

Table 6.9: Features of labour (workforce) and work (jobs and tasks) requirements linked to different viability strategies in an *Entrepreneurial farm with complementary partnership mill*

Farm 59		Features of labour and labour relationships											Features of work organization					
		Belonging to farm's social group		Remuneration		Associative labour		Temporality of labour relationship		Specialization of labour		Genderization		Intensity		Workforce requirements		Temporality
Viability strategy implemented	Household	Outside household	Paid	Unpaid	Formal organization	Informal cooperation	Seasonal	Permanent	Unspecialized	Specialized	Masculinized	Feminized	Intense	Mild	More labourers	Less labourers	Seasonal	Routine
Farming strategies	Disposing of OTPB																	
	Harvest by hand (olives)																	
	Harvest mechanization (olives)	Clear task distribution	Outsourced. Hiring employees	Outsourced Hiring employees				Long term employees Hire the same person		Machinery	Household members			Faster & less arduous (than harvest by hand) When outsourced, lowers workload		Less labourers (than harvest by hand)	Exacerbates work peak as it shortens harvest time and manufacturing need to be fast	
	Harvest or sowing of cereal crops		Outsourced service	Outsourced service				Often hire the same person to do service		Machinery				Lowers workload of farm members			Softens intensity of work peak	
	Integration of extensive livestock (shepherding)	Clear task distribution								Knowledge	Household members			More attentive tasks & work (than intensive farming)		More labourers to maintain flexible schedule		Most tasks involved are routine work
	Organic agriculture	Clear task distribution	Hiring employees	Hiring employees				Long term employees		Knowledge	Household members			More attentive tasks & work (than conventional farming)				
	Shredding OTPB	Clear task distribution	Hiring employees	Hiring employees				Long term employees			Household members			More work (than disposing of OTPB)		More labourers (than disposing of OTPB)		Seasonal task
Comm.	Incorporate manufacturing	Flexibility	Partnership with other producers Hiring employees	Hiring employees		Partnership with other producers		Long term employees Business partnership with other producers		Specialized & new knowledge			Increases the workload		Requires more labourers		Exacerbates work peak as it coincides with olive harvest	
	Control over commercialization	Flexibility	Partnership with other producers			Partnership with other producers				Specialized & new knowledge		Commonly, household members	More work than wholesale		More labourers than wholesale			Mostly routine work

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	Wholesale commercialization	Flexibility								Not specialized knowledge				Less work (than control)		Less labourers (than control)	Concentrated tasks	
Income diversification	Crop diversification	Clear task distribution								Knowledge (on more crops)	Household members		Time consuming			Can be assumed by the same labourers		Steadier work throughout the year
	External agri-jobs	Done by members of the household								Knowledge (on agricultural tasks)	Household members		Time consuming, increases workload		Lowers household members availability for agricultural tasks		Exacerbates work peaks it coincides with farm's agricultural tasks	Steadier work throughout the year
	Non-agricultural jobs																	
	Domestic tasks	Clear task distribution										Household members						
	Administrative (book-keeping tasks)	Clear task distribution								Knowledge		Household members						
	Agricultural tasks in general	Clear task distribution	Hiring employees (flexibility)	Hiring employees					Long term employees		Household members							

There is a clear task distribution between the farm’s household members and in household labour, it is the husband who assumes agricultural tasks. However, they also count on external labour to assume agricultural tasks in the farm. The strict task distribution limits the household’s labour availability for agricultural tasks, as the wife focuses her work on commercialization, administrative and domestic jobs and the husband combines the work at the farm with external agricultural jobs. Thus, they opt for mechanizing olive harvest, which is less labour intensive, and outsource some of the more specialized tasks, such as olive harvest with a straddle machine and the harvest and sowing of the herbaceous crops. In addition, they employ three workers, all of them men, who have formal contract and work at the farm all year round. Two of the workers are formally hired through the olive oil mill and the third one is hired through the agricultural service company.

The husband and the three employees assume the agricultural workload and there is flexibility in task distribution between them. This contributes to the farm’s ability to assume more labour-intensive strategies, such as organic management, shredding olive tree pruning biomass or extensive livestock in the future, strategies that in turn contribute to the farm’s buffer capacity and reliance on its own resources. Also, having employees gives the informant flexibility in case he needs to leave the farm or dedicate time to other things. However, the informant expresses sometimes he struggles managing the employees, as he “*has to be the boss but you are also a worker*” and personal relationships can be difficult to navigate and can create tension.

In this farm, the incorporation of olive oil manufacturing is a recent strategy motivated by the desire to control the commercialization of their own products and gain autonomy. As the informant explains, they were able to assume the implementation of these strategies, both in terms of money and work, through associativity labour, in their case formally, through a business partnership with other producers. They started the olive oil mill on their own, but after the first year the informant explains he felt “*as if I was drowning*”, due to the amount of work and monetary investment required. Now, the olive oil mill is a shared enterprise, co-owned in partnership with another family farm and a third partner who is not a farmer, but who has “*interesting*” connections for commercialization. As manager and employee of the olive oil mill, the informant and his wife take on the everyday work management of the olive oil mill, as an extension to managing their own land and project. However, the partners bring in their expertise on commercialization (along with monetary capital) and share on commercialization and promotion tasks of the mill’s olive oil.

The incorporation of the olive oil manufacturing exacerbates the work peaks associated with olive production, as olive harvest and olive oil production coincide. During work peaks, household members and employees, work more hours and their workload increases, to the point of doubling the number of hours they work a day compared to slower seasons making these periods very stressful. Manufacturing also entails added workload, compared to just agricultural production. To manage it, instead of hiring temporary workers or counting on relatives, some of the long-term employees, who normally focus on agricultural tasks, help out at the mill during the months of olive oil production. The informant explains that, even though sustaining three extra salaries all year can be a monetary strain for the project, he prefers the option of “*holding on*” long term employees rather than hiring temporary workers. With this strategy, they make sure they have reliable and skilled workers, who

can adapt to flexible schedules, instead of having to find and train new workers every year, which can be challenging given the specialization of mill tasks.

Commercialization tasks are the focus of the wife’s productive work at the farm. For these, they count on the support from the olive oil mill partners, even though the informant also feels that using direct and short commercialization channels is more labour intensive. As opposed to manufacturing, control over commercialization tasks has made work steadier throughout the year, even though around 60% of their olive oil sales take place during olive oil making season or right after, because most clients buy new oil for the whole year.

Income diversification is a very central strategy in this farm and one of the ways they implement it is by doing external agricultural jobs, through the husband’s agricultural services business. This second job highly contributes to the farm’s financial buffer capacity and the informant explains it is what allowed them to start the olive oil mill and partly, makes possible having long term employees. This second job offers steadier work and income throughout the year. However, this second job is also a source of struggle and work dissatisfaction, as the informant expresses that often his work rhythm and workload are too intense, due to his job at the agricultural services business. He felt he couldn’t quit this second job, as they needed the extra money to keep the farm project afloat, and in recent years, it “*soften the risk of the [olive oil mill] adventure*”. To ease their work rhythm, the informant is hoping the olive oil mill project moves forward and they can gradually close the agricultural services business and fully dedicate themselves to the mill and their own farm. This would give him a more enjoyable workload, also allowing him to take days off the farm and enjoy their hobbies.

In spite of being a collective household, within the household, tasks are clearly distributed. As explained above, the informant (man) takes on agricultural tasks (shared with the employees), mainly the ones involving specific machinery, handles most of the work from the agricultural services company and manages manufacturing tasks during olive oil making season. With the incorporation of their daughter, they are planning to diversify even more their activities, by starting an extensive livestock farm and also, because she is expected to take on tourist activities at the mill, such as tastings.

His wife handles commercialization at the mill, manufacturing tasks during olive oil making season and takes on most domestic tasks. This task distribution follows a traditional sexual division of labour. The informant explains that he has a very heavy workload, combining agricultural services with their own farm and now, with the work of managing the olive oil mill. This meant he had to work every day of the week and he couldn’t participate as much on caring for his children, “*I didn’t see my son grow up, I was always out the house [doing agricultural services]. It is a problem*”.

Table 6.10: Impact of viability strategies on the farm’s livelihood reproduction in an *Entrepreneurial farm with complementary partnership mill*.

Farm 4 [59]		Dimensions & attributes of livelihood reproduction															
		Buffer capacity				Outwards self-organization & interdependence				Capacity for learning			Internal self-organization & interdependence				
Viability strategy as implemented by the representative farm		Human capital	Natural capital	Social capital	Physical capital	Financial capital	Reliance on own resources	Cooperation & networks	Decentralization & independence	Different types of knowledge & learning	Shared vision	Reflective & shared learning	Collective & flexible household	Fair labour relationships	Work satisfaction	Self-regulated ecosystem	
Agricultural tasks	Disposing of OTPB																
	Harvest by hand (olives)																
	Harvest mechanization (olives): – done by household members – Employees – clear separation of tasks (gender roles)	++			--	--	--					--	--	--	++		
	Harvest mechanization (intensive olives): outsourcing					--	--								++		
	Harvest or sowing of cereal crops: outsourced					--	--	++							++		
	Integration of extensive livestock (shepherding) – handled by household members – clear separation of tasks (gender roles)	--	++			--	++			++		--	--				++
	Organic agriculture: – handled by household members – clear separation of tasks (gender roles) – employees	-- ++	++			--	++					--	--	--	-		++
	Shredding OTPB: – handled by household members – clear separation of tasks (gender roles) – employees	-- ++	++		--	--	++					--	--	--	--		
	Incorporate manufacturing (olive oil): – handled by household members – Complementary partnership olive oil mill – employees	-- ++		++	--	--	++		++	++		++		++	++	--	
	Commercialization	Control over commercialization: – done by household members – clear separation of tasks (gender roles) – complementary partnership olive oil mill	--		++		++		++	++		++		--	--	++	-
Wholesale commercialization: – done by household members – clear separation of tasks (gender roles)									--				--	--	--	+	
Income diversification	Crop diversification: – done by household members – employees – clear separation of tasks (gender roles)	++	++			++			++	--	++				++		
	External agri-jobs: – done by household members – employees – clear separation of tasks (gender roles)	++				++			++				--	--	--		
	Non- agricultural jobs																
Domestic tasks: – done by household members – feminized task – clear separation of tasks (gender roles)													--	--			
Administrative (book-keeping tasks):														--			

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- done by household members															
- feminized task															

Note: ++ (contributes), -- (detrimental), + (slightly contributes), - (slightly detrimental)

In this farm, a clear separation of tasks based on gender roles and hiring long term employees condition the handling of the different tasks associated to the viability strategies they implement. In agricultural tasks, the clear separation between household members is detrimental for a collective & flexible household and for reflective & shared learning, as neither tasks nor the knowledge associated to them are actively shared within the household and the availability of household members to work on certain tasks becomes limited. Long term employees are actively involved in the handling of most agricultural strategies, which means these strategies require financial capital and can be detrimental for relying on its own resources, as the farm is dependent on paid external labour. On the other hand, counting on long term employees, who can share in the workload of agricultural tasks and some other strategies, can contribute to a satisfactory work pace & workload. At the same time, while having to assume the salaries of employees all year can put a strain on the farm’s financial capital, it fosters fair labour relationships, as employees can count on more stable and better working conditions.

By incorporating the manufacturing and control over the commercialization of olive oil through a private mill but in partnership with other producers, the farm contributes to several attributes of livelihood reproduction. These strategies require human capital and mostly, physical and financial capital in the form of investing in machinery and infrastructure. But by doing it in partnership, they also contribute to the farm’s social capital, cooperation & networks, decentralization & independence, as well as building a shared vision with the mill partners. While these strategies increase the workload and can be detrimental to sustain a satisfactory work pace & workload, relying on long term employees and associativity labour lessens the impact. In addition, these strategies contribute to work satisfaction, unlike the use of wholesale commercialization channels.

Income diversification, in this case through a second agricultural job, contributes a farm’s financial capital and to its decentralization & independence, making it possible for the farm to invest in strategies that require infrastructure without being as dependent on loans for example. However, they strain the internal organization of the farm, as they limit the household members’ labour availability and create an unsatisfactory work pace & workload, leading to work dissatisfaction. In this farm, the detrimental impact of the second agricultural job is also tied to how domestic tasks are handled, as the husband, who takes on the second job, doesn’t have the availability to assume domestic tasks, which fall to the wife, leading again to a situation detrimental for the collectivity & flexibility of the household and fair labour relationships within the household.

In this farm, work management is conditioned by the diversification of economic activities, as it affects the workload and the distribution of work throughout the year. The diverse economic activities are formally different enterprises, which require specific tasks and expertise, but in practice they often overlap and complement each other, as they are managed by the household as being sides of the same project. Economic diversification also broadens the number of tasks within the project, which the household is not able to fully assume on their own. They rely on external labour, both by partnering with other producers and by hiring long term employees. The latter, also contributes to flexible task distribution.

The incorporation of olive oil manufacturing has partially compensated the struggle with the low prices of agricultural products and dependency on global markets and allowed the farm to become more autonomous. However, the “squeeze of agriculture” remains a source of dissatisfaction for the informant, who feels that in spite of everything, the price they have to offer to reach the consumers is lower than what they would like. This monetary struggle is also the reason he cannot offer his employees the salaries and working conditions he would like to and he would deem fair. The perception of a low return for their work still remains and makes work peak seasons, when they have a heavy workload and very intense work rhythm. As the informant explains, they endure because farming is vocational, an autonomous job, which he values as an independent lifestyle. As he explains, he enjoys how even when there is a lot to do, it is the crops and the climate, not a boss or a fixed schedule what dictates his work and even when he tried to do something different when he was young, he came back to farming as he couldn’t see himself doing anything else.

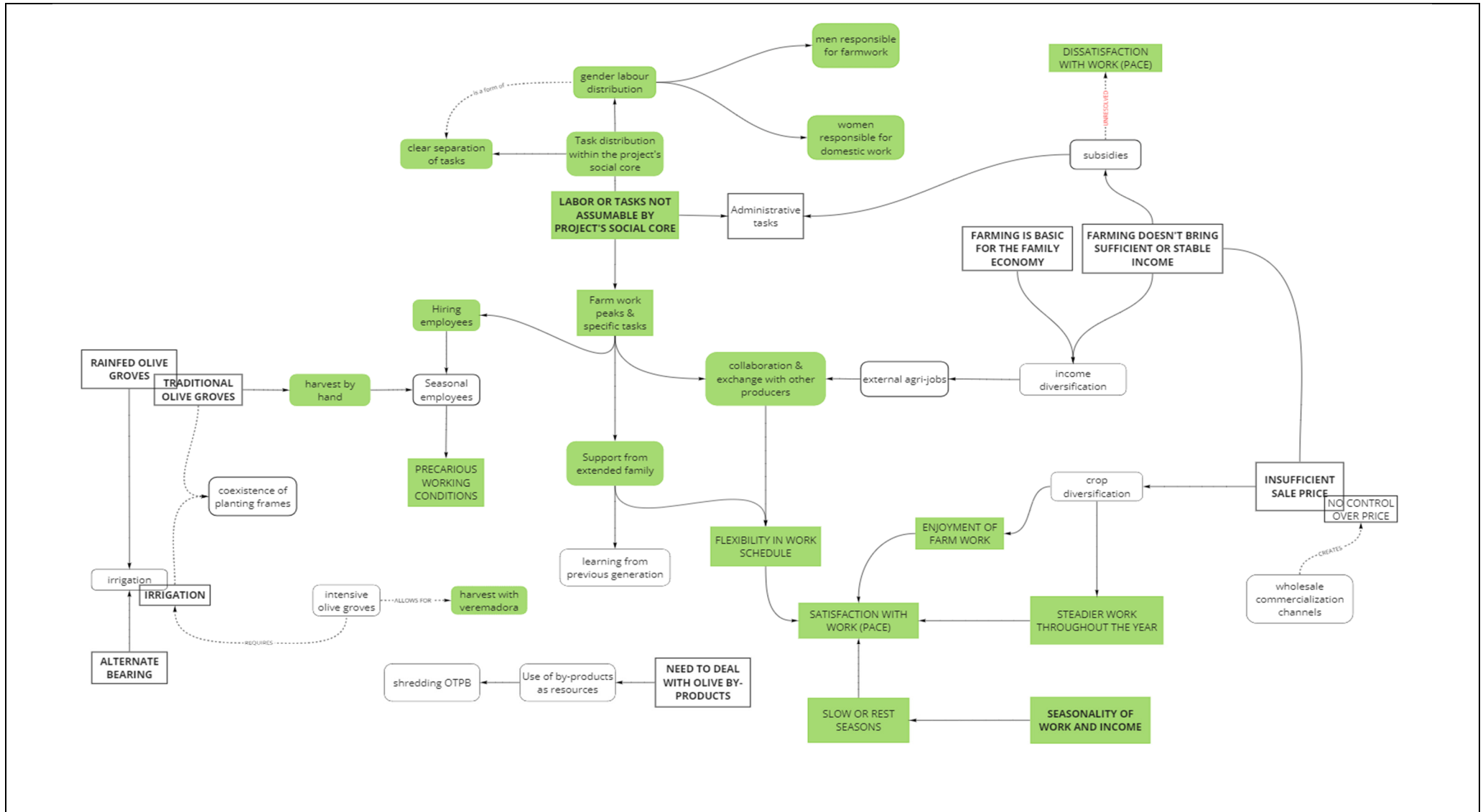
○ *Diversified farm with no manufacturing.*

This farm is explained as the individual project of the informant, who is the farm manager. However, he shares the household with his mother (over 70 years old), who is officially part of the farm as owner of some of the land but who doesn't participate in farm work. The informant explains “*we have always had farmland in the family*”, but it was in 2016, when the informant decided to take over the farm as his full-time job. Since then, there was a period during which he couldn't give the farm his full attention, as his father was very ill. After the recent death of his father, he is back at work full time and describes the situation of the farm, at the time of the interview, as being in a process of recovery.

The project has approximately 96ha of farmland, all of it rented from different family members. The farm combines olive, almond and fruit tree groves and herbaceous crops. They have a semi-intensive olive production, as they maintain a small number of groves in a traditional rainfed cultivation framework, while the rest of olive groves are irrigated, to ensure production every year and compensate the alternate bearing of trees. Olive and cereal are the main crops in terms of production yield, but crop diversification plays an important role in the viability of the farm.

All farm products are sold in bulk to distributors or private manufacturers. This means that the informant doesn't control the selling price of any of the farm's products, a price that can be often insufficient and varies every year, making income uncertain or unstable. Also, in these commercialization channels payment is often delayed, meaning he has to pay for the costs of farm inputs and costs of products he sold, but he might not get any income from them until a year after. Having a diversity of crops and therefore, a diversity of products and a diversity of buyers, is a strategy aimed at offsetting the uncertainty and instability of conventional selling channels. Accessing subsidies and doing some paid agricultural jobs for other producers are other strategies through which the informant addresses how farming on its own might not bring sufficient or stable income.

Figure 6.5: Factors and viability strategies in a *Diversified farm with no manufacturing*.



Viability strategies implemented in the project are represented in boxes with rounded edges, internal and external factors affecting and addressed by the project in squares and capital letters and circles indicate explicit values that motivate certain strategies. Elements in green/shaded indicate that strategy or factor is directly related to labour and work organization.

Table 6.11: Features of labour (workforce) and work (jobs and tasks) requirements linked to different viability strategies in a *Diversified farm with no manufacturing*

Farm 5 (49)		Features of labour and labour relationships											Features of work organization						
		Belonging to farm's social group		Remuneration		Associative labour		Temporality of labour relationship		Specialization of labour		Genderization		Intensity		Workforce requirements		Temporality	
Viability strategy implemented	Household	Outside household	Paid	Unpaid	Formal organization	Informal cooperation	Seasonal	Permanent	Unspecialized	Specialized	Masculinized	Feminized	Intense	Mild	More labourers	Less labourers	Seasonal	Routine	
Farming strategies	Disposing of OTPB																		
	Harvest by hand (olives)	Clear separation of tasks	Hiring employees	Hiring employees			Temporary workers		No		Household members		Higher workload & takes longer (than harvest mechanization)		Than harvest mechanization		Intense work peak		
	Harvest mechanization (olives)		Outsourced service	Outsourced service				Often hire the same person		Machinery			Faster & less arduous (than harvest by hand)		Less labourers (than harvest by hand)		Shortens work peak		
	Harvest or sowing of cereal crops		Collaboration with other producers (some also relatives)	Collaboration with other producers (some also relatives)		Collaboration with other producers	Collaboration with other producers (some also relatives)			Machinery			Lowers workload of farm members				Softens intensity of work peak		
	Integration of extensive livestock (shepherding)																		
	Organic agriculture																		
	Shredding OTPB	Clear task distribution										Household members		More work (than disposing of OTPB)		Than disposing of OTPB		Seasonal task	
Comm.	Incorporate manufacturing																		
	Control over commercialization																		
Income	Wholesale commercialization	Clear task distribution							No		Household members			Low workload			Concentrated tasks		
	Crop diversification	Clear task distribution								Knowledge on more crops	Household members		More time consuming			Assumed by the same labourers		Steadier work throughout the year	

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	External agri-jobs	Done by household members					In collaboration with other producers				Knowledge (on agricultural tasks)	Household members		More time consuming, increases the workload				Exacerbates work peaks as it coincides with farm's agricultural tasks	Steadier work throughout the year
	Non-agricultural jobs																		
	Domestic tasks	Clear task distribution											Household members						
	Administrative (book-keeping tasks)	Clear task distribution	Hiring employees								Knowledge	Household members							
	Agricultural tasks in general	Clear separation of tasks	Collaboration with other producers Support from off-household relatives (uncle)	Hiring employees	Collaboration with other producers Support from off-household relatives (uncle)	Collaboration with other producers Support from off-household relatives (uncle)	Collaboration with other producers Support from off-household relatives (uncle)	Temporary workers				Household members & relatives							

Within the farm’s household, shared between the informant and his mother (77 years old), there is a clear distribution of tasks. The informant handles most of the agricultural tasks in the farm and he relies on external labour for specific tasks that require specialized machinery or are too labour intensive for him to assume on his own. Because the farm has different olive groves, they combine two different harvest methods, which have different labour requirements, but are both handled using external paid labour. They harvest traditional olive groves by hand, a labour-intensive strategy, and they hire three or four short term workers, all men, for the duration of the work. Although the exact conditions of the working agreement are unclear, when asked about them, he refers to them as “*Moorish men, black men* [morets, negrets]” and he explains they are acquaintances and that most years he hires the same men. For the new intensive olive groves, they are planning on mechanizing the harvest and outsourcing the job, which is not only faster, but also lowers the farm’s workload.

On the day to day, the informant has associativity labour available to support him on agricultural tasks. On one hand, the farm has the support of off-the-household relatives, in this case the informant’s uncle, who advises them and helps out on the farm as he is a retired farmer. However, the informant sometimes struggles with this relationship, as he and his uncle have different views on how things should be done; his uncle “*wants to do things as they were done before* [in the past or previous generations]”. On the other hand, when it comes to managing agricultural tasks, the farm counts on a network of support and exchange with other producers in the same or neighbouring towns. Within this network, the informant shares machinery, shares tasks with other producers and they exchange favours in the form of work. One of the relationships within this network of support and exchange is with his cousin, who handles the sowing and harvest of the herbaceous crops for him; sometimes the informant pays him for the service, but most often they exchange work and services. In this way, associativity labour and the support and exchange with other producers in particular, eases the workload of the farm, but most important, it gives household members flexibility in work management. The informant counts on this network if for some reason he can’t do certain tasks or be at the farm at certain moments. This support, he explains, was especially important during the time of his father’s illness, when he couldn’t focus on farm tasks as much, and it kept the farm afloat. He does the same for them when they need to, “*we help each other a lot*”.

Because the farm doesn’t manufacture any of the products and sells all of them through wholesale channels, they don’t set the price or control the selling conditions, leaving the farm vulnerable to insufficient sale prices and unstable income. The informant does a few external agricultural jobs within the local producers’ network of exchange and support, for which he gets paid. But mainly, to increase the farm’s buffer capacity, they plant a diversity of crops and therefore, a variety of products, each of them sold to a different buyer and with different prices. Crop diversification requires specific knowledge on each crop and increases the overall workload of the farm. However, because the different crops are seasonally diverse, most big tasks associated with the different crops are staggered throughout the year and the increase in crops and work doesn’t increase the work peaks or the need to have more

labourers. Crop diversification also contributes to work satisfaction through the enjoyment of farm work, as the informant expresses that something he values about the work is that “*the rhythm is perfect, you never get tired of it, each day is something different*”.

Work and labour at the farm throughout the year are conditioned by the seasonality of crops. This means that there are slower or rest seasons, in this case the months of January and February, during which the informant explains “*I could go on holidays*” and periods when the workload is more intense and there is a higher need for labour. However, in the long term he would like to achieve a less intense work rhythm. He plans to work less hours through mechanizing some of the tasks.

The strict distribution of tasks within the household and the older age of his mother lower the labour availability of the farm’s household. However, the informant’s mother actively participates in the farm by assuming domestic work. As the informant explains, the fact that his mother takes on domestic and care tasks, allows him to fully dedicate himself to farm work, giving him more availability to do so, and in that way, he can manage the farm on his own, without needing employees.

Table 6.12: Impact of viability strategies on the farm’s livelihood reproduction in a *Diversified farm with no manufacturing*.

Farm 5 [49]		Dimensions & attributes of livelihood reproduction														
		Buffer capacity					Outwards self-organization & interdependence			Capacity for learning			Internal self-organization & interdependence			
	Viability strategy as implemented by the representative farm	Human capital	Natural capital	Social capital	Physical capital	Financial capital	Reliance on own resources	Cooperation & networks	Decentralization & independence	Different types of knowledge and learning	Shared vision	Reflective and shared learning	Collective and flexible household	Fair labour relationships	Work satisfaction	Self-regulated ecosystem
Agricultural tasks	Disposing of OTPB															
	Harvest by hand (olives): temporary workers	+				--	--							-		
	Harvest mechanization (olives): outsourcing					--	--								++	
	Harvest or sowing of cereal crops: - collaboration with other producers			++					++			++		++	++	
	Integration of extensive livestock (shepherding)															
	Organic agriculture															
	Shredding OTPB: - handled by household members - clear separation of tasks (gender roles) - support from off-household relatives - collaboration with other producers	--	++	++	--	--		++	++			++	--	--	--	-
Incorporate manufacturing (olive oil)																
Commercialization	Control over commercialization															
	Wholesale commercialization: - handled by household members - clear separation of tasks (gender roles)								-							
Income diversification	Crop diversification: - handled by household members - clear separation of tasks (gender roles) - support from off-household relatives - collaboration with other producers		++	++		++		++	++	--	++	--	--	--	++	
	External agri-jobs - handled by household members - clear separation of tasks (gender roles)	-		++		++		++	++		++	--	--	--	-	
	Non- agricultural jobs															
Domestic tasks: - handled by household members - clear separation of tasks (gender roles)												--	--	--		
Administrative (book-keeping tasks): - handled by household members - clear separation of tasks (gender roles)												--	--		--	

Note: ++ (contributes), -- (detrimental), + (slightly contributes), - (slightly detrimental)

Work management in the farm is conditioned by the use of informal associativity labour, support from relatives outside the household and a clear separation of tasks, between the informant and her elder mother, which are used to apply most of the viability strategies in the farm. In agricultural tasks, clear separation in task distribution is detrimental for a collective & flexible household and to fair labour relationships between household members. On the other hand, relying on collaboration with other producers and relatives contributes to the farmers maintaining a satisfactory work pace & workload, as it gives him leeway in his work schedule, even in strategies that are more labour intensive. The use of informal associativity labour, both in specific and everyday farming tasks, contributes to the social capital of the farm, cooperation & networks and to building a shared vision with other local producers.

Crop diversification, implemented in the same way as agricultural tasks, is a central strategy in the farm. It is used to compensate the dependency and detrimental impact on the viability of the farm generated by the reliance on wholesale commercialization channels. Crop diversification, strengthens natural capital, maybe not directly for the farm's agroecosystem, but for the local landscape. Because different crops have different commercialization channels, crop diversification strengthens the financial buffer capacity, as it stabilizes and insures income. It also contributes to decentralization & independence and to the farm's capacity for learning. The implementation of crop diversification as a traditional and inherited practice entails that knowledge of threat & opportunities is at the same time more specialized, for each crop and broader, for more crops. In addition, in this farm crop diversification contributes to work satisfaction, as the farmer expresses his enjoyment of farm work based on how diverse the tasks are.

In this farm, doing external agricultural jobs for other local producers falls within the same network of informal cooperation that contributes associativity labour for the farm. Doing external jobs, some of them paid, contributes to financial capital and to decentralization & independence as an extra source of income. But in this case, because these jobs are mostly done under a logic of exchange, it also strengthens social capital and contributes to cooperation & networks and a shared vision and compensate for the added workload of the jobs, which can be detrimental for a satisfactory work pace & workload.

In this case, work management is conditioned by crop diversification and the possibility to count on associativity labour, which compensate the dependency on global market and middle men and the low labour availability of the household, with few members and a strict task distribution between them. In spite of the strict separation of tasks, which follows a traditional sexual division of labour, flexibility is fostered by the seasonality of work, which allow for slower seasons, and the support from other producers and relatives. Collaboration and exchange with other producers and support from extended family are central strategies for farm viability and work management, contributing to work flexibility and satisfaction in a project described as individual.

6.4 Discussion: the impact of work organization on the livelihood reproduction of the farm.

The analysis of the five different representative cases shows the high diversity of farm typologies and circumstances. The implementation of one or other viability strategy is conditioned by both the farm features, the farmers’ motivations and world views and also the internal and external factors the viability strategies need to address. The different strategies can contribute to the viability of small farms by strengthening different attributes of livelihood reproduction. At the same time, these strategies entail certain labour requirements and determinants, in the forms of tasks, workload and knowledge or skills. This translates into the same viability strategies having different effects on a farm’s livelihood reproduction due mostly to the different work organization and type of labour used to implement them (see Table 13).

Table 6.13: Impact of the viability strategies on the farm livelihood reproduction depending on their work and labour requirements in small olive oil farms in Terres de Ponent in Catalonia (Spain).

			Buffer capacity					Outwards self-organization & interdependence			Internal self-organization & interdependence				Capacity for learning			
Viability strategy implemented	Type of labour	Work organization strategy	Human cap.	Natural cap.	Social cap.	Physical cap.	Financial cap.	Reliance on own resources	Cooperation & networks	Decentralization and independence	Fair labour relationships	Work satisfaction	Collective and flexible household (social groups)	Self-regulated ecosystem	Different types of knowledge & learning	Shared vision	Reflective and shared learning	
Agricultural strategies	Disposing of OTPB	Household	Clear separation of tasks		--				--			--	-	--	++		--	
			Flexibility in task distribution		--				--				-	++	--	++		
	Shredding OTPB	Household	Clear separation of tasks	--	++		--	--	++			--	--		++			--
			Flexibility in task distribution	--	++		--	--	++				--	++	++			++
	Harvest by hand (olives)	Paid labour	Temporary workers	++				--	--			--	--					
	Harvest mechanization (olives)	Household	Clear separation of tasks				--	--	++			--	++					--
			Outsourcing					--	■				++					
	Harvest or sowing of cereal crops	Paid labour	Long term workers				--	--	--			++	++					
			Outsourcing locally					--	■	++			++					
	Integration of extensive livestock (shepherding)	Household	Associative (informal)			++				++		++	++					
Flexibility in task distribution			--	++					++			+	++	++	++		++	
Organic agriculture	Household	Clear separation of tasks	--	++					++			-	++	++	++	++	++	
		Flexibility in task distribution	--	++					++			++	++	++	++	++	++	
		Clear separation of tasks	--	++					++			--	++	--	++		--	
Incorporate manufacturing	Paid labour	Outsourcing locally					--	■	++	++		--			++			
		Temporary workers	--				--			++	--	-						
	Household	Associative (coop/partnership)	--		++		--		++	++		++				++		
		Clear separation of tasks	--								++	--	++					
Commercialization	Household	Clear separation of tasks	--		+				++	++	--	++					--	
		Flexibility in task distribution	--		+				++	++	++		++				++	

			Buffer capacity					Outwards self-organization & interdependence			Internal self-organization & interdependence				Capacity for learning		
Viability strategy implemented	Type of labour	Work organization strategy	Human cap.	Natural cap.	Social cap.	Physical cap.	Financial cap.	Reliance on own resources	Cooperation & networks	Decentralization and independence	Fair labour relationships	Work satisfaction	Collective and flexible household (social groups)	Self-regulated ecosystem	Different types of knowledge & learning	Shared vision	Reflective and shared learning
Wholesale commercialization	Outside household	Associative (relatives)	--		+				++	--		++					
		Associative (coop/partnership)			+		--		++	--		++				++	
	Household	Flexibility in task distribution								--	--	--	++				++
		Clear separation of tasks								--	--	+	--				--
Income diversification	Household	Associative (coop)			++		--		++	--		--	--			++	
		Flexibility in task distribution		++			++		++	++		++	++		++		++
	Household	Clear separation of tasks		++			++		++	--	++	++	--		++		--
		Clear separation of tasks	--				++		++	++	--	--	--				
Household	Clear separation of tasks	--				++		++	--	--	--	--		++			
Domestic tasks	Household	Clear separation of tasks									--	--	--				
		Flexibility in task distribution										++	++				
Administrative (book-keeping tasks)	Household	Clear separation of tasks						++			--	--	--				--

Note: We colour code the different types of labour and work organization strategies to visualize where the impact of the viability strategy (based on a qualitative analysis) on the attributes of livelihood reproduction arises from; in black when we consider them inherent to the viability strategy and in specific colours when it relates to the type of labour and work organization strategy used to implement the strategy.

The examination of the five representative farms indicate that some viability strategies identified in the case study affect farm's reproduction due to inherent features of the strategy itself, in other strategies, the impact on attributes of livelihood reproduction is highly mediated by the specific labour and work strategies used in each farm and its internal factors, as summarized in Table 13. For instance, control over commercialization strengthens decentralization and independence as a strategy that makes small farms less dependent on global markets, but its impact on work satisfaction highly depends on farmers' views and values. Similarly, control over commercialization entails a higher workload, which could be detrimental to work satisfaction, but that impact is lesser in the cases where the strategy is inherited, as part of a family mill, and thus is well integrated and adjusted to the resources of the farm or it is done through collective strategies or there is flexibility. The examination of the five representative farms also point the existence of six main relevant domains where the role of farm labour and work management is particularly critical for the viability of small farms, namely: (i) agricultural management; (ii) the pursuit of autonomy; (iii) pluriactivity; (iv) work peak (olive harvest); (v) social networks; and (vi) internal organization.

○ *Agricultural management and internal self-organization and interdependence [work satisfaction].*

Agricultural management of the farm both conditions and is affected by labour availability and labour requirement of the farm and the work organization of farmers and farm workers (Aubron et al., 2016; Navarrete et al., 2014). In addition, work rhythm (intensity and duration of tasks) and work schedule (what tasks need to or can be done at any given time) are conditioned by both external (e.g. weather) and internal (e.g., seasonality of crops condition) factors (Yagi & Hayashi, 2021). Olive production is characterized by low amount of routine work and intense peaks of seasonal work, mainly during harvest, but also with yearly pruning. In the region, olive harvest season spans from late October to early December, but as shown in the description of the five representative farms, combination with other strategies and economic activities can shorten and intensify the harvest work peak. In fact, the work and labour requirements of olive production in small farms need to be assessed and understood within a broader farm management that includes other crops and economic activities.

One of the focus of current literature on labour and work in agriculture is the different impacts of conventional farming systems versus more agroecological alternative farming systems (Malanski, Schiavi, et al., 2019). Agroecological practices adapt farm management to ecological rhythms and practices that allow for the reproduction of natural resources within the farm, foster biodiversity and synergies between crops and between crops and livestock (D'Annolfo et al., 2017). In the present study we have identified four agroecological strategies: the integration of extensive livestock and crops; shredding olive tree pruning biomass and its recirculation in the fields; organic farming; and crop diversification. As shown in the results, these strategies contribute to the natural and financial buffer capacity of the farm, its ability to rely more on its own resources and to self-regulation of the ecosystem.

While crop diversification in the case study does not often take the form of different agricultural crops in the same field, but rather different crops are produced in the different plots, it is an agroecological strategy

contributing at the landscape level (traditional mosaic landscapes). Traditional olive production in the Mediterranean is done in combination with other crops and economic activities (Duarte et al., 2008) and it can be considered agroecological as it is distinguished by being rainfed, extensive and done by small family farms (Moragues-Faus, 2014).

The specialized literature shows a debate around the impact of agroecological and aligned strategies on labour requirements and work organization. On one hand, crop-livestock integration, organic farming and crop diversification can entail a higher workload for farmers due to higher requirements of manual labour (Fanchone et al., 2022), more time consuming (Sraïri et al., 2018) and higher mental load tied to planning and diagnosing (Dupré et al., 2017), pointing at working conditions as a potential obstacle for agroecological strategies (Fanchone et al., 2022). On the other hand, agroecological practices can also be labour efficient (Fanchone et al., 2022), particularly once transition is established and in relation to “*letting nature do their work*” (Aubron et al., 2016, p. 76). In addition, some authors also highlight the need to problematize or delve into the oftentimes assumed relationship between sustainable agriculture and better working conditions and work satisfaction (Bottazzi et al., 2020).

The examination of the representative farms shows that, in general, agroecological strategies can be slightly detrimental to work satisfaction as they increase farmers’ workload. Indeed, we have found that fear of increased workload can be an obstacle for the implementation of certain agroecological strategies, as exemplified by the reluctance to shred olive pruning biomass in case *Traditional olive oil farm by a spouses’ household*. However, we argue that the impact of agroecological strategies on work satisfaction is nuanced, as it also depends on farmer’s vision and perception, and it contributes to increase reliance on own resources (external self-organization). These strategies require farmers to spend more time in the fields and groves, putting more attention to early signs of pests and diseases and carrying out manual tasks such as managing a vegetable cover in olive groves, as opposed to farmers who view weeds as a hindrance and use herbicide to keep it at bay. In the particular case of crop-livestock integration, livestock adds a lot of routine work (Sraïri et al., 2018) and we have found it has a deep impact on farm workload and work management. Herding livestock is a practice that, unlike managing olive groves, remains steady throughout the year and needs to be done every day, therefore it is a time-consuming practice that requires more labourers to maintain a flexible schedule. Here, the impact on work satisfaction is related to the existence (or not) of flexible task distribution. Crop diversification, which is a traditional practice that allows farmers to diversify and stabilize potential commercialization channels and thus, sources of income, contributes to the farm decentralization and autonomy and financial capital. However, more crops to manage means that the farm project has to handle a bigger workload and also gain or have expertise on different crops.

However, agroecological strategies impact work organization and workload in such a way that they can still be assumed by the farm’s household or social group, without necessarily requiring extra labour. The case study shows how crop diversification is done with crops that have staggered harvest seasons and work peaks. Most often farms combine the crops that make up the traditional local agriculture mosaic; harvest season begins in

early summer with cereal crops, then harvesting fruit (apples, peaches, or pears), grapes during late summer, almond harvest in early autumn and finally, olive harvest in early winter, almost overlapping with sowing season. The staggering of crops generates more stable income and work throughout the year and both reduces the need for extra workforce and facilitates securing permanent workers (Moragues-Faus, 2014; Navarrete et al., 2014). Similarly, the addition of extensive livestock brings extra tasks, but as identified in the case study and supported by consulted literature, it requires mostly routine work (Fanchone et al., 2022). In this way, it complements crops such as olive and rainfed cereal that require a more seasonal work organization and the activity of the flock, through grazing for example, can reduce the workload of tasks associated to olive production, such as weeding. Thus, we argue that while agroecological strategies (including crop diversification) do increase workload and it can be challenging for some farms, by increasing mostly routine work it can mellow the intensity of seasonal work peaks. In this way, these strategies do not necessarily increase labour requirements or lead to situations of overwork, particularly when tied to flexible work organization strategies as seen in the case *Agroecological farm by an intergenerational household*.

Agroecological practices can also contribute to work satisfaction in terms of enjoyment and “*meaningful work*” (Timmermann & Félix, 2015), although this connection is understudied (Bezner Kerr et al., 2022). Farmers in the case study express that diversity of tasks is one of the reasons they enjoy the work they do, a quality they associate to farming in general but which is tied to crop diversification and can be increased by an agroecological management (Timmermann & Félix, 2015). Furthermore, agroecological tasks often are motivated by farmers’ worldviews on the environment and agriculture, as seen in cases *Entrepreneurial farm with complementary partnership mill* and *Agroecological farm by an intergenerational household*, and thus, they can contribute to work satisfaction inasmuch they better align with farmers’ values despite increases in workloads.

- *The pursuit of autonomy through commercialization and the complexity of work satisfaction.*

One of the characteristics of peasant economics is striving towards autonomy in the management and reproduction of the farm project (van der Ploeg, 2011). In fact, autonomy appeared as a motivation and benefit in all farms, as farmers pointed at their autonomy is one of the things they valued the most from their life as farmers. Autonomy plays an important role in farmers’ working conditions, more specifically in work satisfaction and fair labour relationships, as assessed by the LRF. Leeway (flexibility) is one of the dimensions of working conditions in the work assessment framework designed by Dumont and Baret (2017) and has been shown to have a direct impact on farmers’ health (Louazel, 2018). In addition, farm and work autonomy are also considered fundamental aspects of professional or work satisfaction (Bottazzi et al., 2020; Dupré et al., 2017).

While farm autonomy and work flexibility are tied to technical aspects of the farm (van der Ploeg, 2011), they also translate to economic aspects and are deeply affected by socio-economical context of the farm, that act as external limitations (Bottazzi et al., 2020; Umstätter et al., 2022). An increase of social and financial constraints,

which restrict the leeway of farmers, is tied to situations of acute dissatisfaction to the extreme cases of mental health problems (Louazel, 2018).

Farmers in the case study find themselves dependent on global centralized markets based on unequal commercial relationships, where they do not control marketing conditions or are able to set the price. This leads to unfair labour relationships and to a limitation of farmers' leeway when it comes to price, selling channels and added value. To address the low prices and the dependency generated by wholesale commercialization channels, farmers take control over commercialization. As described in the results section, this strategy is often implemented partially (with part of the production or with part of the farm products) and in combination with other strategies like crop diversification, which can also contribute to diversify and thus, be less dependent on selling channels. As we have also shown, in olive production, control over commercialization is enabled through the incorporation of manufacturing, the making of olive oil. With control over commercialization and incorporation of manufacturing, farmers aim to regain control over the conditions of the selling channels and the price of their products. They encourage direct sales and short marketing channels, which make it easier for them to also control the added value and narrative of their products, especially valuable for projects in which irrigated olive orchards are not feasible and cannot focus on intensification strategies.

Control over commercialization is tied to farm autonomy as it contributes to a farm's decentralization and independence, can increase its financial capital by allowing farmers to sell at higher prices, as also shown in other case studies (Navarrete, 2009), and fosters fairer labour relationships of producers with consumer and middlemen. However, the impact of these strategies on work satisfaction is more complex. Studies focusing on the social impacts of direct sales and commercialization have shown that these strategies increase farm tasks and the workload of farmers (Dupré et al., 2017; Navarrete et al., 2014), but the same studies argue that this increment could be compensated by the professional satisfaction brought by these strategies and alignment with farmer's vision. In some types of projects, represented in this chapter by the case *Family olive oil mill with olive production*, the main economic activity is the family olive oil mill and control over commercialization is an inherited and inherent strategy something they “[we] *have always done*”. In such cases, even if they would like to dedicate more time to promoting their products, they have established commercial relationships and regular customers making the strategy a less disruptive in terms of workload and expertise and can be assumed by household members. These projects do hire temporary employees, but to perform manufacturing tasks.

Control over commercialization is often assumed collectively or through associative labour, by partnering with other producers either through membership to an olive oil cooperative or through co-owning a private olive oil mill with other producers. In olive oil cooperatives, all commercialization tasks (also manufacturing) are assumed by cooperative's employees. These means that the added workload of these strategies doesn't affect farm members as much. However, we have found that olive oil cooperatives in the case study don't fully address the issue of insufficient sale prices and farmers dependency on global markets. Olive oil cooperatives sell part

of the member's olive oil production directly to consumers or local retailers, but they are also very dependent on bulk sales to be able to sell all their production. In bulk sales, cooperative members don't control the final destination of the olive oil, which might end up in less quality products, the price of olive oil is set by the buyer and usually half of what they set in more direct channels. Thus, selling through an olive oil cooperative can still be a source of dissatisfaction, as some farmers feel that in practice, self-organization in olive oil cooperatives is very limited. In partnership olive oil mills, the different members can divide up the tasks and areas of expertise, commercialization being one of them, or share commercialization tasks among the members, also contributing to flexibility in internal self-organization.

As a viability strategy, control over commercialization exemplifies the complexity of assessing and defining working conditions, which are affected by "*work orientation and work expectation, as well as by political issues*" and financial circumstances (Dumont & Baret, 2017). Like explained in Dupré et al. (2017) in relation to organic agriculture, control over commercialization has the paradox of being more stressful due to the higher workload it requires, also due to "*peaks of stress*", however, it provides "*great 'professional satisfaction'*" and, depending on what work strategies are used, the latter can compensate the former (Navarrete et al., 2014). Control over commercialization provides work satisfaction by contributing to farm's autonomy and fairer labour relationships, as well as contributing to farmers' work being better valued. It also highlights the importance of collectivity in achieving the balance between the demands of work (workload, intensity and continuity) and the leeway and enjoyment attached to it (Dupré et al., 2017). In taking control over commercialization, particularly with products that require processing to be consumed, there are a lot more tasks involved (manufacturing, storage, promotion, delivery, going to markets and fairs, managing the physical or online store, . . .) (Navarrete et al., 2014). Be it through formal organizations, support from off-household relatives or a flexible organization, collective labour strategies contribute to ease the strain on the farm's household of the increased workload, pointing at how interdependencies both internal and external, make global autonomy possible.

○ *Pluriactivity or the fine line between financial viability and farm abandonment*

Pluriactivity or income diversification is a way for small farmers to diversify their sources of income. In income diversification strategies, small farmers engage in economic activities other than farming or adjacent to farming. In doing so, small farmers can secure and stabilize their income and re-invest or financially sustain the farm project. It is a viability strategy characteristic of peasant economics and tied to small farmers' pursuit of autonomy (van der Ploeg, 2011). As such, it is not a recent practice and in fact, as we were able to observe in the case study, pluriactivity can be part of how farmers and farming families view their lifestyle. However, the need to seek for income sources outside of agriculture has increased due to low prices of agricultural products in a context of agricultural squeeze (López-i-Gelats et al., 2016; van der Ploeg, 2011).

Among the many strategies that small farmers use to diversify their income, some of them being adjacent to agricultural production, we highlight two specific strategies of pluriactivity: external agricultural jobs and non-agricultural jobs. What we have called external agricultural jobs are farming jobs, such as harvesting, sowing

or pruning, which farmers do for other local producers. These jobs are often mechanized and tied to owning specific machinery and are often based on informal social relationships between the farmers. Non-agricultural jobs are salaried jobs, professions rather, that take place outside the farms. While commonly non-agricultural jobs are not related to farming, in some cases, these jobs can bring in skills and knowledge that can be useful and complementary for the farm project. Project *Traditional olive oil farm by a spouses' household* is an example of this, as the informant has a salaried job outside the farm but her job in the local olive oil cooperative is tied and useful for the farm's activities and bring expertise to the farm. The importance in working hours and income that these outside non-agricultural jobs represent for the household varies greatly among farms, ranging from being secondary to situations of part-time farming.

In both types of pluriactivity we have found a general genderization of the strategy. On one hand, external agricultural jobs are done by men, tied to the occupational closure that limits women's access to agricultural tasks (Shortall et al., 2020), which we found is maximized in tasks that involve machinery. On the other hand, in most cases women in the farm's household are the ones taking a job or having a profession other than farming, often putting them in the role of “*farmer's wife*” (Shortall, 1999). There are also cases in which the person taking on agricultural tasks, combines it with a second non-agricultural job.

In this way, pluriactivity can lead to situations of overwork or self-exploitation. In Europe, family farms have been found to be dealing with an overload of work hours, a situation that is exacerbated in diversified and part-time farms (Umstätter et al., 2022). Self-exploitation is a classic concept in agrarian political economy used to explain how family farms reproduce and can even compete with capitalist farms and explain their resistance in spite of low profit (Chayanov, 1966; Galt, 2013). It is however a problematic concept as it includes an acceptance of capitalist values and hides values, beyond monetary, that are essential in society and economy in a broader definition, such as the one at play in peasant economics (Galt, 2013). Thus, while self-exploitation doesn't entail lack of work satisfaction or overwork in itself, it is an important issue to consider, as precarious financial situations and situations of burnout “—*that is, working too hard without adequate compensation (spiritual, monetary, or otherwise)*” are a cause for poor working conditions and work dissatisfaction (Galt, 2013, p. 7) that can put in danger the viability of the farm and lead to abandonment.

While in most farms farming is basic for the household's economy, in terms of dedication and income, in many cases the income from agricultural activity is not stable or sufficient to sustain the household. In that way, income diversification strategies play a very important role on a household's livelihood reproduction and sustaining the farm. Having different sources of income can both stabilize it and increase it (Moragues-Faus, 2014), contributing to the financial capital of the farm's household and strengthening its buffer capacity. It can also contribute to decentralization and independence, as small farmers don't have to depend as much on the banking system (van der Ploeg, 2011). Although, by the same strategy, small farms become dependent on those external and non-agricultural jobs (van der Ploeg, 2011). In the case *Entrepreneurial farm with complementary partnership mill*, doing external agricultural jobs (as a parallel service and machinery renting business), allowed

them to invest in building the mill and not have to depend as much on loans from banks. Second or non-agricultural jobs that have a fixed salary can financially support the farm in bad years increasing its buffer capacity. But it also works the other way around, as the farming project can offer financial support and professional or labour opportunities to household members who had lost their job, as in the case *Agroecological farm by an intergenerational household*.

Pluriactivity strategies, can however have a negative impact on the internal self-organization and interdependence of small farms and requires human capital (Lecegui et al., 2022). On one hand, the way they are often implemented based on traditional gender roles leads to unfair labour relationships between household members, while at the same time limiting their availability to work on the farm and holds back a collective and flexible household. Also, external agricultural work can lead to having to dedicate less hours to their own production (Moragues-Faus, 2014). On the other hand, in spite its financial rewards and contribution to financial security which are important for work satisfaction (Dumont & Baret, 2017; Duval et al., 2021), pluriactivity can lead to work dissatisfaction. The workload generated by income diversification can create situations of overwork (Lecegui et al., 2022), as small farmers have to engage in off-farm work to compensate with fluctuating and insufficient farm prices (Galt, 2013). Also, balance between family and work life plays an important role in farmers’ work satisfaction and it can be thrown off due to external agricultural and non-agricultural jobs. As seen in case *Agroecological farm by an intergenerational household*, excessive workload from external agricultural jobs was an obstacle for the informant’s dedication to tasks and time spend with his family and in this way, a source of struggle. In other cases, particularly when the household is made of a couple where one member works on the farm (most often the husband) and the other (most often the wife) has a profession outside agriculture, the different work rhythms and timing of moments of rest and leisure can put a strain on personal relations.

Thus, income diversification is a fundamental strategy for small farmers, stemming from diversification as a cross-cutting dimension of the livelihood reproduction of small farms; it provides financial stability, security and global independence and is part of a peasant lifestyle. However, when implemented to the point of overwork or self-exploitation, exacerbated by global context of agricultural squeeze, pluriactivity can put a strain on internal organization, particularly work satisfaction, leading to farm abandonment (Galt, 2013).

○ *Handling the work peak of olive harvest: seasonal workers, mechanization and outsourcing.*

The mechanization and outsourcing of agricultural tasks, particularly harvest but also pruning, are significant strategies in olive oil production due to their impact on farm’s work organization. Generally, these strategies are aimed at increasing labour productivity in a context where farm workforce has decreased (Aubron et al., 2016) and hiring workers has become more and more costly for olive farmers (Bernardi et al., 2021).

Traditionally, olives are harvested by hand, a method that is still one of the most effective as olives are combed out of the branches rather than shaken (since arbequina is a variety of small fruits that “hold” to the branches). As explained by the informants, a few generations ago olive harvest was fully done by hand, and it was an

extended family affair that spanned for a few months. In recent decades however, a tendency to increase production to sustain income, changes in rural families and the higher need of off-farm jobs lead farmers to resort to hiring temporary workers to handle olive harvest. As a very seasonal crop, olive production, particularly when managed fully extensively and rainfed, requires relatively little routine work, but creates work peaks that are most intense during harvest season (from October to January in the case study). Farm seasonal work peaks often require off-farm labour (Sraïri et al., 2018), even more so in manual tasks, as the work is more intense and requires more labourers (Weiler et al., 2016).

Hiring temporary workers to assume olive harvest by hand can have a positive impact on internal self-organization as it can prevent household members from overworking (Dumont & Baret, 2017) and it offers flexibility. With this strategy, small farmers adjust the amount of labourers to the farm’s labour needs and can assume tasks and strategies that the farm’s household alone cannot take on (Navarrete et al., 2014). However, the way it is currently implemented, it can have the opposite effect on internal self-organization and interdependence and on the farm’s financial capital. Small farms generally offer precarious conditions to paid workers, particularly for temporary workers (Weiler et al., 2016), leading to unfair labour relationships between farmers and workers. Not only small farmers offer relatively low salaries, but some farmers in the case study don’t offer contracts, creating job insecurity. Olive harvest season in the case study starts in early November and can extend to late January, but the specific duration and time of harvest is different for each farm and it is also affected by climate conditions. This means that the work hours offered to temporary workers are very irregular and unpredictable, to do a job that is very physically demanding and that is affected by the pressure to do it in a short time. Although some farmers try to hire the same people every year, some farmers just hire different people every harvest, which means they don’t establish long working relationships with the workers, who have no guarantee of work the next year. The situation of precariousness is even more acute for migrant workers (Weiler et al., 2016), which are dependent on formal contracts to formalize their stay in the country and are in need of accommodation, as is common in olive production (Moragues-Faus, 2014). These situations showcase how power relationships seep into internal self-organization in this case, as (even though we couldn’t explore it fully in the present research) the relationship between small farmers and the temporary workers they hire is intersected by issues of race and class (Harrison & Getz, 2015).

One of the reasons small farmers struggle with this strategy is precisely the precarious conditions they feel that they have to offer paid workers, due to their own economic precariousness (Weiler et al., 2016). Some farmers in the case study expressing they would like to offer higher salaries and better working conditions to their workers, but they felt they couldn’t afford it. Additionally, small farmers express having difficulties finding people willing to do farm work and to find them exactly when they need it. Not only it is difficult to find workers, particularly temporary workers for the short and sometimes unpredictable duration of work peaks, but it is difficult to find the *right* workers. Farmers express struggling with finding experienced workers and people that they can fully get along with. In general, small farmers perceive both the hiring process and managing employees as an unwelcomed responsibility and a hassle. It can be extra work and responsibility that can hinder

the farmer’s ability to work autonomously and at their own rhythm, impacting negatively their work satisfaction or even, their reliance on own resources.

The struggle is also a financial one, as workers’ salaries are perceived as one of the biggest expenses in small farms, an expense that becomes more difficult to assume due to the low selling price of farm products. In spite the relatively low salaries they offer, hiring workers, even seasonally, has a high financial cost for small farms (even higher in years when the selling price of olives is low or years of low yields), being the main cost in small olive farms (Bernardi et al., 2021; Moragues-Faus, 2014).

The struggle and costs of hiring temporary employees, highly tied to harvest by hand in olive production, are important drivers for the mechanization or outsourcing of harvest and other arduous tasks. Studies that focus on profitability, point at harvest mechanization as a priority in Mediterranean olive sector, even in traditional orchards, due to the high economical and organizational impact that traditional harvest (by hand) has on the farm (Bernardi et al., 2021). The case study shows how in fact, the possibility to mechanize harvest, alongside increasing or stabilizing income through production, is one of the motivations for small farmers to intensify, to different degrees, the planting frames of their olive orchards.

As a labour productivity strategy, mechanization of agricultural tasks (mostly olive harvesting but also olive pruning and cereal harvest and sowing) is tied to outsourcing the service. While some farmers invest in an olive shaker, others prefer to pay other local producers who own the machinery to do the task. In this case, there is a fine line between outsourcing and collaboration, where interdependence overlaps with monetary relationships, since as we have also found in the case study, outsourcing is often based on relationships of trust and cooperation, even though there is a financial arrangement (Moragues-Faus, 2014). In the case of super intensive olive orchards, planted in hedgerows, harvest is always mechanized and outsourced, as the straddle machine required is extremely costly, often to companies that specialize in the service. Both harvest mechanization and outsourcing lower the workload of farm members (Dumont & Baret, 2017), making olive harvest a less intense and time consuming task compared to harvesting by hand, while lowering the need for labour, particularly hired workers (Fanchone et al., 2022). However, these strategies still have a financial cost, either in paying for the service or investing in machinery, and in the case of outsourcing, the farm is dependent on the availability of the person offering it.

- *Social networks and the weaving of external interdependence*

Social relationships, established through local associative networks and cooperation, play an important role in the work organization of small farms and in this way, highlight the importance of external interdependence, also explored as embeddedness (Moragues-Faus, 2014), alongside self-organization in farm reproduction and viability. Another foundation of (human) life as conceptualized by ecofeminism is interdependence (Herrero, 2015). Interdependence comes into play at different stages of human life and at different scales of social network (Carrasco & Tello, 2013); particularly, small farms benefit from embedding themselves in their local community as they build external interdependence through social networks and collaboration with other producers (Cabell

& Oelofse, 2012; Moragues-Faus, 2014), which in turn build the farm’s buffer capacity and cooperation and networks. Expanding the social network beyond the farm project and farm’s household benefits the labour availability and the work rhythm of the farm. In formal types of associativity, such as olive oil cooperatives, small farmers can share ownership on infrastructure and the tasks associated with manufacturing and commercialization, in a way that is similar to outsourcing. Informal networks, based on personal relationships and build between neighbours, friends, colleagues and relatives, are equally important and have a more direct effect on the work management strategies of the farm.

Through informal relationships, small farmers exchange and support each other with labour, as well as advice, information and other resources. This labour support can translate into doing labour intensive tasks, such as harvest, together or covering each other when one of them needs to be out of the farm. This allows small farmers to do tasks that otherwise wouldn’t be assumable just by household members (Navarrete et al., 2014), but mostly it gives more flexibility to their work schedules, even with time sensitive tasks, and allows them accommodate personal and family needs. Most commonly, labour obtained through informal cooperation networks is based on an exchange of services, but in some cases it overlaps with paid labour and outsourcing tasks. However, through associative labour, small farmers can avoid the dependency on external resources and unfair labour relationships often generated by paid labour strategies (Dumont & Baret, 2017).

A form of informal associativity is the support small farmers get from relatives outside the household. Rural and farm households have changed in the last century to become more nuclear, but the support from extended family members outside the household remains relevant in small farms. The participation in terms of labour from relatives is a type of unpaid labour that can support the farm during work peaks or assume part of the workload of specific tasks. Having that support and additional labour availability is an important factor for small farmers when it comes to implementing and maintaining certain viability strategies in the farm.

Thus, associativity in the form of formal organizations or informal relationships (including family relationships outside the household) are fundamental viability strategies in themselves. On one hand they contribute to social capital, through the cooperation and networks a farm can count on, also building a local shared vision through “*the sharing of ideas*” (Colombo et al., 2020) and different types of knowledge and learning. On the other hand, associativity, as a way to embed the farm and farmers in local interdependence networks, can contribute to work satisfaction in two ways; satisfying social needs and creating financial security (Arancibia et al., 2016), as they facilitate the implementation of other viability strategies, by reducing the need for it or by bringing in additional labour. The social entourage, family but also associativity relations, are the main resource to find solutions to the external (financial or social) pressures that lead to situations of stress and mental health problems (Louazel, 2018) and more generally, they are essential for the economic performance of farming (Moragues-Faus, 2014).

- *Hindering internal self-organization and interdependence due to strict sexual division of labour/gender roles.*

Family labour is the fundamental workforce of small olive oil farms, even if it is not the only one. As it is characteristic in small and family farms, family members in the farm’s household take on most of the farm’s

overall workload; agricultural tasks, marketing and manufacturing tasks, off-farm or extra jobs, but also domestic tasks and management of the household are all interwoven in the farm’s workload, since farm and household can’t be analysed independently from one another (Rissing et al., 2021). The use of the livelihood reproduction framework allows for a deeper understanding of the role of family labour on the farm’s reproduction and viability, particularly, how task distribution between family members in the household directly affects the functioning of the farm.

Taking a feminist perspective in our analysis, we understand a farm’s family or household as a social network between its members, instead of analysing it as a unified agent (Siliprandi, 2002 in Ferreira et al., 2020). With this perspective, task distribution within the farm’s household emerged as relevant on farm viability, tied to internal interdependence and self-organization of the farm. Interdependence and self-organization is not only a dimension that takes place in the relationship of the farm, as a social group, with other producers and local agents, but it is equally relevant within the farm’s family and household. We looked at work management practices within the farm and household, with the aim to answer *who does what*, and distinguished between three strategies that guide task distribution between household members: distribution by expertise, flexibility in task distribution, and clear distribution of tasks.

Generally, family workers offer more flexibility in work organization, adapting to the timing of the crops for example (Dupré et al., 2017). However, not all strategies of task distribution within the household contribute in the same way to a collective and flexible household that can foster internal interdependence and self-organization. Within a farm’s household, task distribution based on expertise refers to task distribution in which the different members have an area or certain tasks they are most knowledgeable or skilled at and thus, they are the main person responsible for those tasks. Distribution based on expertise can be implemented alongside flexibility and strict task distribution, which are alternative strategies. We define flexibility in task distribution when all working members of the household can take on almost all the tasks necessary to farm management, from agricultural tasks to commercialization. That doesn’t mean that all members do all the tasks indistinctively or on an everyday basis, but rather that all members are able to handle almost every task if there are unforeseen or special circumstances that require them to do so, for example in case of work peaks tied to a certain task or aspect of the farm or in case of one of the household members being indisposed. Flexibility is based in an exchange of knowledge between the farm and household members and it needs to be actively sought. This strategy, similar to associative labour, allows a farm to take on more strategies and tasks and contributes to internal self-organization and interdependence by building a collective and flexible household, fostering fair labour relationships and in addition, it contributes to a shared vision among household members.

On the contrary, a strict task distribution between the farm’s household members means that most members of the farm are limited to taking on certain tasks and aspects of the farm and they don’t need to have the skills or knowledge to assume other tasks or aspects of the farm, even exceptionally. Farm household relationships in terms of labour distribution in the case study echo the findings of previous studies, which found that traditional gender identities and roles are still prominent in European family farms, in spite of broader socio-economic

changes (Shortall, 2014; Shortall et al., 2020). Gender roles highly determine task distribution within small olive farms' households and we have found that they are often the criteria behind work organization within the household, leading most often to strict distribution of tasks.

Women's role in the farm is still considered support or complimentary to farm tasks, handled by men, in fact the work of women farmers in the farm and household is often considered to be solely domestic (Arce et al., 2022). The role of women in farms has been examined in recent studies. Women often take on farm tasks that are related to kid work, feeding and milking (in livestock farms), manufacturing, commercialization and cleaning (Arce et al., 2022). Also, as we have seen in the case study, women take on administrative work, paperwork for example, partly because it is something that male farmers do not want to do or struggle with, and are often the ones taking on off farm jobs while men stay as farmers and farm managers (Shortall, 2014). Thus, women still provide labour for the farm, but because the feminized tasks are related to farming but not directly productive, mostly unpaid and tied to care work, they are undervalued and hidden (Ferreira et al., 2020; Shortall, 2014). On top of that, women are still seen as responsible for domestic work (Arce et al., 2022; Ferreira et al., 2020), a perception also found in the case study.

In this way, task distribution based on gender roles, lead to a lack of equality in farm households (Arce et al., 2022) and highlights the occupational closure in farming, as informal limitations remain, limiting the options for women to be farm managers (Shortall et al., 2020), obstructing the building of fair labour relationships between household members. In addition, this also leads to household members being unsatisfied with their work at the farm, as it affects their well-being (Arce et al., 2022). Women often combine their work at the farm with domestic work, and often as in our case study, with a job outside the farm. This causes situations of overwork or double work, limitations on "*recreation time or other activities outside the farm and home*" (Arce et al., 2022, p. 6) and situations of stress (Arce et al., 2022; Rissing et al., 2021; Shortall et al., 2020). As studies point at, women express more tensions, isolation and discontent (loss of identity as farmers) due to gendered distribution of labour, while men expressed more the difficulty of finding professional and personal life balance (Rissing et al., 2021), their loneliness exacerbated by rural depopulation and "*reduced presence of significant others*" (Shortall, 2014).

6.5 Conclusions

Work is central to understand the functioning and reproduction of small farms. But work is not a single homogeneous nor static element in small farms, but rather a complex dimension that comprises multiple configurations of work organization, labour or working conditions. This clearly points the need to give more relevance to the comprehension of the social dimensions to better make sense the viability of small farms. The examination of the work organization and types of labour used by five representative small farms showed, in line with (Dumont & Baret, 2017), that working conditions highly depend on the specific context of each farm and the trade-offs farmers make between social, ecological and economic dimensions, which in turn depend on production system, inheritance, socio-cultural heritage and values of the producers.

Small farmers, as we have seen in the specific case of small olive oil producers, have to face the tendency of a reduction on the availability of family labour and a global situation of agriculture squeeze, which mainly through financial insecurity, can deeply affect working conditions and organization. Thus, work organization and labour availability have a deep impact on the livelihood reproduction of small farms, both as they facilitate or obstruct the implementation of viability strategies and inasmuch they condition the contribution of viability strategy to the different attributes of livelihood reproduction.

Labour availability directly conditions farmers’ agricultural decisions (Dupré et al., 2017) and as shown here, the impact (whether is mostly positive or mostly negative) of a viability strategy on livelihood reproduction highly depends on whether its implementation in terms of work and labour is able to achieve the balance between the arduousness and benefits of the work, which lays at the base of peasant economics (Chayanov, 1966; Van Der Ploeg, 2013). Similarly, organization strategies are oriented not only at autonomy, but at building self-organization *alongside* interdependence. In fact, the feminist perspective integrated in the livelihood reproduction framework, allowed to highlight how work organization strategies contribute to internal and external self-organization and interdependence and the centrality of social relationships and well-being in work satisfaction, cooperation and networks, fair labour relationships and collective and flexible households.

7 Discussion

The examination of small olive oil farms in Terres de Ponent reveals the complexity of small farms, revealing not only how these farms operate and reproduce in areas other than the economy, and the need to consider social and ecological elements in the matter, but also how the notions of economy and viability themselves need to be widened. The diversity of viability strategies identified among small olive oil farms in Terres de Ponent and the diverse factors that play a role in implementing and driving such strategies evidence small farms do not operate as productive commodity enterprises, rather they follow a more complex peasant logic (van der Ploeg, 2016). Small olive oil farms operate in the confluence of farming and household (Van Der Ploeg, 2013) and in them, farming is a livelihood and a way of life (Darnhofer, 2010; Lecegui et al., 2022) based on the management of an agroecosystem, as a system in which human socio-economic activities are integrated with ecological functions (Gallardo-López et al., 2018; Stephen Gliessman et al., 2013).

In this thesis we aimed to advance on the understanding of the viability and endurance of small farms, within the debate around the *agrarian question* (Holt-Giménez et al., 2021; Shucksmith & Rønningen, 2011), by shifting the perspective to a comprehensive and holistic approach that could account for the complexity and the peasant characteristics of small farms. We did so by developing the livelihood reproduction framework and using it in the identification and examination of viability strategies used by small olive oil farmers in Terres de Ponent. Livelihood reproduction as an approach to small farm viability develops from holistic frameworks such as sustainable livelihoods (Natarajan et al., 2022; Scoones, 2015) and livelihood resilience (Ifejika Speranza et al., 2014) critically revised from a feminist economics perspective (Ezquerro, 2011; Federici, 2013), in order to further develop the notion of reproduction, central in peasant farms (Padró et al., 2019; Van Der Ploeg, 2013), and bring forward under-explained issues in small farm viability and sustainable agriculture (Ferreira et al., 2020; Siliprandi, 2018).

7.1 Revision of the livelihood reproduction framework

One of the fundamental objectives of this thesis was to develop a conceptual framework suited to understand the viability of small farms, in a way that could fill in the gaps of existing approaches. This framework would need to be comprehensive and holistic to account for the realities of small farms, in which, as embodying peasant agriculture, resources are largely self-controlled and self-produced (van der Ploeg, 2016), the relationships between farm and ecosystem is one of balance (Van Der Ploeg, 2013) and the goal of the farm is the reproduction of the farm itself and its resources as patrimony (Padró et al., 2019). In Chapter 4, we introduced the livelihood reproduction framework as a theoretical approach to explore the viability and reproduction of small farms. To develop a first proposal of the livelihood reproduction framework, we used the sustainable livelihoods framework and the livelihood resilience framework as a starting point and incorporated a feminist approach to build on them.

Throughout the next chapters of the thesis, we have used this first proposal of the livelihood reproduction framework to examine the diverse viability strategies implemented by small olive oil farmers and their specific effect on two issues affecting small olive oil farms, labour and work organization and olive oil by-product

valorisation strategies. The use of the framework allowed us to gain insight on the different dimensions in which small olive oil farmers implement viability strategies and deepened our understanding of how small farmers sustain their farms and households. Moreover, in using the framework to analyse specific strategies and cases, we gained theoretical insight on how the framework could be improved. In this section, we explain some revisions to the dimensions and attributes as initially defined based on what we learnt through the use of the livelihood reproduction framework in previous chapters.

7.1.1 Buffer capacity is rather a resource base than a farm's capability

When analysing the impact of viability strategies in the different attributes of the livelihood reproduction framework, the distinction between buffer capacity, as made of capitals with the potential to be quantified, and the other three dimensions, made of attributes or abilities, became apparent. On one hand, the impact of viability strategies on capacity for learning and internal and external self-organization & interdependence could be explained in terms of either a strategy *strengthening* or *hindering* the development of a certain attribute of the farm, as in the farm being able to fulfil and attribute or being detrimental for its development. On the other, the analysis of the impact of viability strategies on the different capitals of buffer capacity as a dimension called for an analysis in terms of a strategy requiring a certain amount or type of capital or conversely, the strategy contributing or adding a certain type or amount of capital to the farm.

The analysis also hinted at the particular relationship between buffer capacity, as defined in *Chapter 4*, and the other three dimensions. In most cases, the impact of a viability strategy in hindering or strengthening a livelihood reproduction attribute, was mediated through the same strategy requiring or contributing to a certain capital as defined by Scoones (1998). For instance, shredding pruning biomass and recirculating it in the olive groves is a viability strategy that requires human capital, since it takes more work and more people than burning, and requires physical and oftentimes, financial capital, as a machine is needed to shred the branches and farmers might need to buy or hire such machine; these capitals are not hindered, but rather required for the strategy to be implemented. At the same time, it provides natural capital to the farm, as the shredded branches can provide organic matter for the soil. And because the strategy requires human capital, it could hinder work satisfaction in increasing the workload or hinder decentralization & independence if the farmers go into debt to acquire the required financial capital for the shredding machinery. Inversely, in bringing in natural capital, shredding pruning biomass can contribute to the development of a self-regulated ecosystem or in other words, strengthen the farm's ability of its ecosystem to self-regulate.

In the first proposal of the framework, we incorporated buffer capacity to the livelihood reproduction as defined in the livelihood resilience framework (Ifejika Speranza et al., 2014). But because of how the different capitals operate within the *livelihood reproduction framework*, with a central role as a resource base, in this first revision we suggest as more fitting the terminology and definition used in the sustainable livelihoods framework (Natarajan et al., 2022; Scoones, 1998). Thus, we categorize the different capitals at play in farm reproduction under the dimension *livelihood resources*, while considering buffer capacity a broader outcome achieved not

only through assets or resources, but also through organizational and learning attributes of livelihood reproduction.

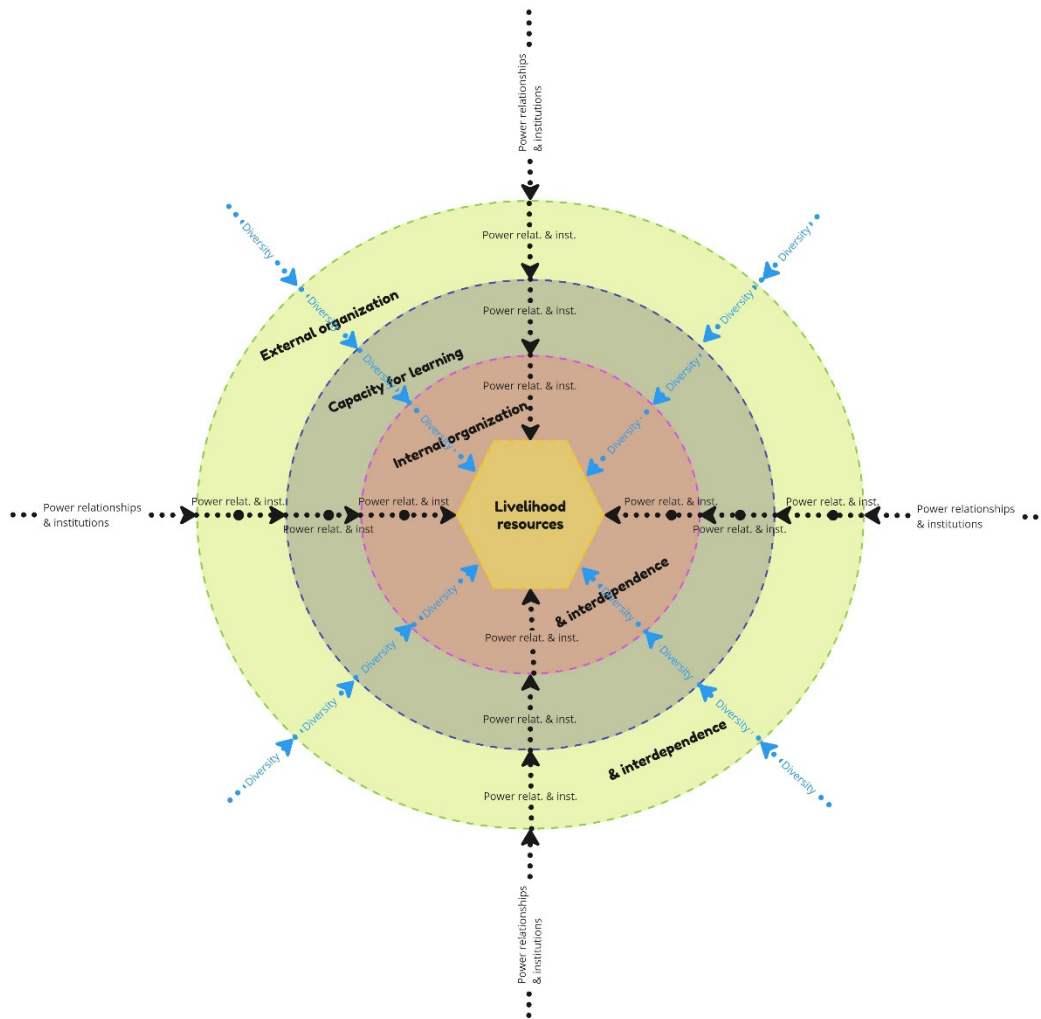
As visualized in Figure 7.1, livelihood resources operate as the centre or base of livelihood reproduction. As we have seen in our analysis of viability strategies, counting on certain resources, categorized in different capitals, facilitates the implementation of certain strategies, while the lack of certain resources, acts as an obstacle. In this way, livelihood resources are similar to what we have identified as internal factors throughout our analysis; they act as specific starting points in each farm case, as drivers or incentive for viability strategies. As also considered in the livelihood resilience and sustainable livelihood approaches, the relationship between resources, strategies and attributes or capabilities is multi-directional and dynamic. Once implemented, a viability strategy changes the resource base (DFID, 1999 in Natarajan et al., 2022), which can be depleted or improved (Ifejika Speranza et al., 2014).

Finally, after using the livelihood reproduction framework throughout the thesis, we consider it important to include *non-material capital* within livelihood resources, as indicated by the analysis of differentiation strategies and work satisfaction. One of the ways strategies such as traditional olive groves, organic agriculture or direct selling contribute to farm's livelihood reproduction is through a process of differentiation, of creating quality, a process in which small farmers both create and add symbolic capital to their products, projects and even, production processes (Moragues-Faus & Sonnino, 2012). Symbolic capital is a type of non-material resource (Conway et al., 2016) that small farms can tap into to reproduce their farms and livelihoods and that viability strategies aim to maintain, as peasant farmers aim at reproducing the farm resources not only as tangible assets, but also as patrimony (Van Der Ploeg, 2013). Non-material resources could also contribute to strengthening self-organization attributes, as we have seen in the case of work satisfaction. For example, organic agricultures as a strategy, could contribute to work satisfaction in spite increasing the workload, thus requiring human capital, through bringing in non-material capital as a strategy connected to the farmer's values and identity as a farmer.

7.1.2 A horizontal inter-linked framework

When first proposing the livelihood reproduction framework we focused on defining the dimensions and the attributes within them. However, in the application and use of the framework to examine different viability strategies and issues faced by small olive oil farmers, relevant relationships between the dimensions emerged. We propose a framework in which the dimensions should not be understood as isolated nor in a hierarchical order, but rather organized in a way that communicates how livelihood reproduction is context specific, emerging from the particular circumstances of a farm project, as illustrated in Figure 7.1. As a framework meant to be applied to farm systems and examine how they are able to sustain and reproduce themselves, it is centred on the farm's resource base, including material and non-material resources, and it spreads outwards through dimensions that explore organization attributes and interdependencies within the agroecosystem and household, how farmers engage in learning and social networking and how the farm and its members organize and foster interdependence in relationship to other agents in the system and as embedded in its local context.

Figure 7.1: Revised proposal of the livelihood reproduction framework



As explained in the previous section, livelihood resources acts as the basic or central dimension of livelihood reproduction and includes human, social, financial, natural, physical and non-material symbolic capitals. In this way, the framework can be context specific and take into account local and particular circumstances of each farm project in the examination of its viability. From its livelihood resources, a farm, as agroecosystem and household (or social group) interlinked, develops the attributes related to how farm and household members organize themselves and their work, in a way that allows for autonomy (Cabell & Oelofse, 2012) and fosters interdependence between farm members and with the farm’s ecosystem as a fundamental principle of social organization (Herrero, 2015); this includes developing a collective and flexible household or social group, a self-regulated ecosystem, work satisfaction and fair labour relationships.

Capacity for learning, which includes developing different types of knowledge and learning, a shared vision and reflective and shared learning, largely has to do with how a farm acquires and creates knowledge and information and is able to apply it in a way that is suited for the farm and its reproduction, sustaining the projects

to changes and seizing opportunities (Jacobi et al., 2018). However, a farm's capacity for learning is largely grown through social networks, with exchanges of knowledge and information and shared learning, and the attributes within this dimension are developed within the farm and in the embeddedness of the farm in its socio-ecological context. This is why capacity for learning can be explained as acting as a hinge between internal and external self-organization and interdependence, emphasizing how the different dimensions seep into each other and achieve livelihood reproduction in their interlinkage. In external self-organization and interdependence, we highlighted how autonomy is created alongside interdependence, in cooperation relationships and communities (Cabell & Oelofse, 2012), with the latter being as important as self-organization when it comes to the reproduction of small farms, as it has also been studied through the notion of social embeddedness (Moragues-Faus, 2014). This dimension includes developing the reliance on own resources, decentralization and independence and cooperation and networks.

In the livelihood reproduction framework we propose two crosscutting dimensions, diversity and power relationships and institutions, which are not analysed as context, but as cutting through the other dimensions and attributes of livelihood reproduction, similar to what Natarajan et al. (2022) propose in their revision of the sustainable livelihoods framework. Diversity is fundamental in a farm's livelihood reproduction overall, as diversity contributes to resilience by facilitating the flexibility and room for manoeuvre needed for a farm project to face or adapt to change. As we have seen in our analysis of small olive oil farmers, diversity is present in most of livelihood reproduction attributes and the several diversification strategies identified contribute to all dimensions.

Similarly, we propose to analyse power relationships and institutions as a dimension of livelihood reproduction that cuts through all the other dimensions of the framework and areas of the farm and its food system. We found power relationships at play in limiting and driving the strategies aimed at making the farm more independent from global powers and at decentralizing its socioeconomic relationships (Gonzalez de Molina, 2013; Ma & Sexton, 2021; McDonagh et al., 2017b). Power relationships and institutions also affect farmers' capacity for learning, as social institutions give different value to different types of knowledge for example (Gliessman, 2014; Lucas et al., 2019; Mier y Terán Giménez Cacho et al., 2018). They don't only act as external conditioners, but are also enforced by the farmers themselves in their internal organization; as we saw in the case study, power relationships are present in how small farmers relate with their workers, particularly seasonal workers, with issues of race and class coming into play and traditional family structures and gender roles, as social institutions, often determine the labour relationships between household members and do so in a constrictive way (Gashi Nulleshi & Kalonaityte, 2022; Shortall et al., 2017).

7.2 Livelihood reproduction as a framework to understand small farm viability

One of the fundamental objectives of this thesis was to develop a conceptual framework suited to understand the viability of small farms, in a way that could fill in the gaps of existing frameworks. This framework would need to be comprehensive and holistic to account for the realities of small farms, in which, as embodying peasant

agriculture, resources are largely self-controlled and self-produced (van der Ploeg, 2016), the relationships between farm and ecosystem is one of balance (Van Der Ploeg, 2013) and the goal of the farm is the reproduction of the farm itself and its resources as patrimony (Padró et al., 2019). As explored in *Chapter 4*, we used the sustainable livelihoods framework and the livelihood resilience framework as a starting point and incorporated a feminist approach to build on them and develop a first proposal of the *livelihood reproduction framework*. In the next chapters, we have used the livelihood reproduction framework to examine the diverse viability strategies implemented by small olive oil farmers and their specific effect on two issues affecting small olive oil farms.

Conceptually, in the development of the *livelihood reproduction framework* our approach to small farm viability comes full circle through the exploration of the notion of reproduction and its application to small farm viability. Peasant economics is the theoretical starting point of our approach. In it, reproduction is introduced as the base of production, in one of the balances that make up peasant agriculture (Van Der Ploeg, 2013), and defined as a renovation of the farm's funds, including but not limited to natural resources (Padró et al., 2019; Van Der Ploeg, 2013). It is an understanding of economics that goes beyond profit, but in peasant agriculture as a theoretical approach, reproduction or reproductive economy are not fully developed. As explored in *Chapter 4*, the sustainable livelihoods approach contributes to further concretize specific attributes of viability, in the form of assets, and akin peasant farmers' goal to reproduce their way of life. By incorporating resilience as an approach, the livelihood resilience framework (Ifejika Speranza et al., 2014) adds a temporal dimension to viability, lacking from livelihood centred frameworks, and aims to explain how small farms are able to sustain themselves over time, while expanding and developing the dimensions of viability. Finally, we go back to the notion of reproduction as central to understand the viability and functioning of small farms through a feminist economics approach. In taking a feminist economics perspective, reproduction applied to the understanding of farm viability and the examining of small farms, is expanded to incorporate reproductive economy and reproductive labour, as the condition of possibility for any productive work (Ezquerria, 2011). This approach, crystalized in the *livelihood reproduction framework*, sheds light to blindspots of previous frameworks. It highlights the relevance of power relationships in viability, both within and outside the farm, the importance of reproductive spheres and labour in the managing and sustaining of the farm and interdependence, alongside autonomy, as a fundamental aspect of farm viability and reproduction (Cabell & Oelofse, 2012; Herrero, 2015).

The *livelihood reproduction framework* succeeds in shifting the perspective on small farm viability, from reductionist approaches, to a wider understanding of viability and even, economy. It is a framework able to account for small farms being rooted in reproduction and multifunctionality and thus, unexplainable in approaches limited to assessing viability or productive economy dimensions. The management of olive oil by-products is both a challenge and an opportunity in the olive oil sector (Donner & Radic, 2021), one that has been exacerbated by intensification (Krzywoszynska, 2012), but as we have identified in our case study, also affects small olive oil farmers. Circular economy models and strategies have been put forward as solutions to valorise olive oil by-products as resources and to minimize the environmental impact of disposing them (Donner

& Radic, 2021). As we identified among small olive oil farmers, small farmers are key agents in the implementation of circular economy strategies, as they are drivers of agroecology strategies (van der Ploeg, 2011) based on the recirculation of resources within the farm (Miguel A. Altieri & Rosset, 1996). However, conventional circular economy debates seldom take into account the needs and circumstances of small farmers (Krzywoszynska, 2012), in a debate that often focuses on techno-economic solutions and also shows gaps when integrating social sustainability and well-being aspects (Alba-Patiño et al., 2021).

The analysis of olive oil by-product valorisation strategies used by small olive oil farmers through the livelihood reproduction frameworks, re-centres the role and impact of circular strategies around small farmers' needs and values. The livelihoods reproduction approach is able to showcase the obstacles and drivers that come into play when small farmers implement circular strategies. With this shift in the approach, olive oil by-product valorisation strategies and more broadly, circular economy practices, emerged as the most valuable to small olive oil farmers when they contribute to the reproduction of the farm's natural resources and autonomy. A value different from conventional approaches in circular economy, which prioritizes human consumption and monetary and technological uses when assessing the added value of a valorisation strategy. The livelihood reproduction approach to circular economy strategies, essential in the olive oil sector and a need for small olive oil farmers, could contribute to circular economy models that are truly transformative inasmuch they are framed within a concept of the economy that considers the lack of sustainability and social justice caused by the dominant productive economy (Yáñez, 2021).

In this shift to approaching viability strategies, the livelihood reproduction framework is able to take into account power relationships, which in the case of examining olive oil by-product valorisation strategies allows us to analyse, not only the value they potentially bring, but where and who retains such value. With this same approach, the livelihoods reproduction framework allowed us to examine labour and work management strategies in their complexity. The framework accounts for and deepens the examination of the farm's household and the relationships and strategies that take place in it, while incorporating power relationships and institutions as a crosscutting dimension in the farm and its relationship with its socioeconomic context. In doing so, we were able to bring elements such as task distribution, domestic and care work, well-being and equality (particularly from a gender perspective and in economic relationships) into the discussion around farm viability.

By widening the definition of viability, within a more comprehensive understanding of the economy based on feminist economics, the livelihoods reproduction framework is able to examine strategies and aspects of small farms that have been under-explained. The examination of labour and work management strategies from this perspective shows how small farms not only rely on family labour, as a homogeneous category, but rather on a sexual division of labour, that tends to hide and de-value feminized labour. Similarly, it highlights the importance of well-being and satisfaction in the viability and reproduction of small farms (Arancibia et al., 2016; Dupré et al., 2017), as well as stressing the impact of social networks and cooperation in fostering interdependence (Lucas et al., 2019; Moragues-Faus, 2014), not only in local relationships but within the farm's social group.

Thus, the *livelihoods reproduction framework* as first proposed in Chapter 4 and operationalized in the following chapters, contributes to expanding the understanding of small farm viability by incorporating a feminist perspective to peasant economics and farm resilience and sustainability approaches. It proved a useful tool in providing a deep and comprehensive examination of viability strategies used by small olive oil farmers and more broadly, of how small farms sustain and reproduce themselves in a context of both sustainable transitions and the financialization and industrialization of agriculture. However, the implementation of the framework in the examination of specific viability strategies, related to by-product valorisation and work and labour strategies, also showed the framework as a first proposal that can benefit from further development and in need of revision.

7.3 How do farmers persist in an adverse context? Revisiting the agrarian question.

7.3.1 Small olive oil farming in an adverse socio-economic context.

The examination of small olive oil farms in Terres de Ponent showcases how small farms are still able to sustain and reproduce themselves in a way that makes them distinct from industrial farming. While the answer remains complex, to the *agrarian question*, the results of this research would indicate that peasantry as a way of farming and livelihoods remains in how small olive oil farms are able to continue and resist in farm projects that conventional or reductive notions of viability would deem unviable. And they do so while adapting and resisting socio-economic contexts and internal circumstances that pose a challenge for their reproduction and viability.

Like small farming worldwide, small olive oil farms in Terres de Ponent face the cost – price squeeze generated by the global commodity market and led by large, industrialized and vertically integrated farm holdings (Berti & Mulligan, 2016; P. M. Rosset & Altieri, 1997). Small farms and their activities are “squeezed” between increasing costs of production and selling prices for their products that are too low, making it more challenging for small farms to obtain sufficient income and exacerbating their vulnerability and dependency on debt and subsidies (P. M. Rosset & Altieri, 1997). Thus, increasing the risk of rural depopulation and de-agrarianisation of the countryside (Berti & Mulligan, 2016). A food market organized around the needs and agenda of large agricultural holdings and food retailers, disembedded from local realities and circumstances, also acts as a barrier for small farmers to access certain selling channels (Akram-Lodhi & Kay, 2009) and limits their marketing agency, as small farmers can’t compete on the same terms in modern agricultural markets (Fernandez Escobar et al., 2013; Sexton, 2013).

In the case study of small olive oil farms in Terres de Ponent, this agricultural squeeze over small farms appeared as several interlinked external and internal factors, which drove and were addressed by small farmers’ viability strategies. Small farmers in the case study expressed having to deal with *insufficient sale prices* for their products, to the point that sometimes the selling price wouldn’t even cover the cost of production. This was worse when selling raw or unprocessed in wholesale commercialization through delocalized channels. At the same time, small farmers identified high *costs of farming supplies* (including things such as fuel or phytosanitary products), which kept on increasing. Another obstructive external factor for small farmers in the case study was the perceived *unfair economic competition from big producers and retailers*. Small olive oil farmers expressed

their struggle in competing with big producers, both local or from other countries, in terms of volume of production and selling price, a situation very similar to when they compared themselves as sellers with big retailers such as supermarkets, to the prices and conditions they were able to offer consumers and small retailers. In using conventional and wholesale selling channels, small farmers also have to face *price instability*, as the prices are set based on the logic of global commodity markets (Darnhofer et al., 2010), and can drastically change from year to year, as is the case of olives, but also cereal or nuts. These external factors worsen the internal reality of many of the olive oil farms in the case study in which *farming doesn't bring stable nor sufficient income* to the household, not only in farms where farming is managed as a complement for the household's economy, but also in projects where farming is basic for the family economy.

The agriculture squeeze stems from a global situation affecting not only small farms, but arguably also larger and more entrepreneurial farms which find themselves inserted in an industrialized food system's "Empire" (van der Ploeg, 2018). More specifically, Mediterranean olive production has some internal features, operating as internal factors in small olive oil farms, which play into this global squeeze. *Traditional olive production* is the starting point of all the olive farmers in the case study and is characterized by extensive groves, rainfed and oftentimes, old trees. Olive trees, in a traditional Mediterranean production, are very resistant to most of the environmental stresses that characterize a Mediterranean climate (Gucci & Caruso, 2011). However, it offers a relatively low production, when compared to other fruit trees and more intensified management, with the addition of irrigation and denser groves, as olive trees *alternate low yield years and high yield years* rather than offering a stable production, a feature that is more apparent in traditional management (Fraga et al., 2021). Furthermore, climate change in the Mediterranean basin threatens both olive production and olive oil quality, due to the increase in temperature and frequency of drought and the expectation of reduction in production (Ben-Ari et al., 2021). Again, relatively low productivity and alternate bearing translate to *unstable production and thus, unstable farming income*, not only in olive production, but also in other crops, since agriculture production in general is inherently affected by environmental conditions or plagues that make production fluctuate year to year.

Small farming, as peasant socio-productive system, is defined by a fundamental relationship between farm and household or family. This relation is organized through the importance of family labour in running and sustaining the farm and household reproduction being the aim of farm economical activities. As such, small farming and particularly in Europe, has been affected by cultural and demographic changes that have transformed the European countryside in recent years (Camarero Rioja & Del Pino Artacho, 2014). In Europe, like many contexts worldwide, countryside has suffered an exodus, with population leaving rural areas and abandoning socioeconomic activities tied to land and agriculture for cities and urban socioeconomic activities and now suffer from depopulation and lack of services. Not only rural population has highly decreased, but it has also suffered a process of masculinization (Camarero Rioja & Del Pino Artacho, 2014). In turn, these changes in their social context have affected the structure of rural households, which while still remaining large families, have tended to structures more similar to nuclear families (Camarero Rioja & Del Pino Artacho, 2014).

These social and demographic changes in rural areas are not disconnected from the changes local and global food systems had gone through. In fact, the commodification of agriculture is one of the causes of the decline of the extended family structure, characteristic of peasantry, in rural households; the agriculture squeeze small farms find themselves in pushes household members off the farm, looking for new sources of income (Camarero Rioja & Del Pino Artacho, 2014). In the case study of small olive oil farms, we have found these general circumstances translate to the informants facing the factor of having *tasks, which are either necessary for farm viability or to manage the farm how they want to, which can't be assumed by household members*. This internal factor is linked to an external one, also related to labour availability and accessibility, the *high cost of hiring employees*. Traditional olive production often requires manual labour during harvest, with many farms relying on seasonal workers, but for olive oil farms, harvest is one of the most important financial costs (Fernandez Escobar et al., 2013). A cost that, as we have seen in the case study, is not only financial, as small farmers struggle with lack of labour availability, managing and hiring workers.

7.3.2 Building farm reproduction and resilience through peasant strategies.

As we have exposed throughout the thesis, small olive oil farmers in Terres de Ponent employ peasant strategies to address the adverse socio-economic context (Darnhofer, 2010; Holt-Giménez et al., 2021) that arises from outside circumstances and internal farm features. The viability strategies we have identified and analysed, even if many are related to income and farm costs, are not aimed at increasing financial profit, but rather at towards the resilience and reproduction of the farm as significant for the household and thus, cannot be examined in a profitability assessment. These viability strategies largely follow the logic of peasant farming, based on the reliance on family labour, striving towards self-sufficiency by focusing on the recirculation and use of internal resources and the common use of pluriactivity and diversification (Chaparro Africano & Calle Collado, 2017; van der Ploeg, 2018; Van Der Ploeg, 2013).

7.3.2.1 Diversification

One of the most relevant strategies for small farm viability is diversification, which is both considered as characteristic of peasant farming (van der Ploeg, 2011) and deemed as essential for resilience of family farms (Darnhofer, 2010; de Roest et al., 2018; Ifejika Speranza et al., 2014). Diversification in its different forms contributes to farm adaptability in the face of change and opportunities (Darnhofer et al., 2010) and buffers the farm to shocks (Cabell & Oelofse, 2012). Diversification is a cross-cutting rationale in small and peasant farms, since it is applied and developed in several farm dimensions (Darnhofer, 2010). To begin with, we have found diversification in the implementation of diverse viability strategies, oftentimes with differing and even opposing aims, within the same farms. This strategy has been examined among small Mediterranean olive oil farmers in how they combine diverse marketing strategies, using informal markets and reciprocity relationships while at the same time using formal and disembedded markets (Karanikolas et al., 2021). In our case study, we have also found it in how small olive oil farmers use different harvest methods or different types of olive groves, within the same farm project. Diversification in viability strategies allows small farms flexibility and experimentation,

since through this diversity they can avoid risks and absorb shocks caused by both environmental and economic (market) uncertainty (de Roest et al., 2018).

The peasant logic of diversity is also translated to crop diversification. Like we observed in the case study, where crop diversification appears as an inherited internal factor that most farmers choose to continue as a strategy, crop diversification is a feature of traditional olive oil farms (Duarte et al., 2008; Karanikolas et al., 2021). In small Mediterranean olive farms, like in the case study, farm income and management are based on a diversity of crops and products and only recently, following a global agricultural trend towards specialization and technical efficiency, pushed by agrarian policies and modernization of food systems (de Roest et al., 2018), olive farms have become more specialized in olive and olive oil production. Crop diversification increases farm resilience by creating “*synergetic loops*” (van der Ploeg et al., 2019), even when crops aren’t on the same plot, and as a diversification strategy, it makes a farm’s financial economy less dependent on external marketing agents (de Roest et al., 2018).

We have found that understanding olive production within the crop diversification of olive oil farms is crucial in the understanding of their viability and the challenges faced by small and extensive olive oil producers. In a context of crop and product diversification, the relatively low productivity of traditional, rainfed and extensive olive production, pointed as a weakness of small olive oil farms (Fernandez Escobar et al., 2013; Lo Bianco et al., 2021), can be compensated. Furthermore, in a diversified farm system, where olive production is one of several crops and even activities, traditional, rainfed and extensive olive production can be sustained as a type of farm management that foster agroecological practices and thus, contribute to farm’s ecological and economic resilience (Francis et al., 2003; van der Ploeg et al., 2019). However, approaches that assess farm viability in terms of profitability, often don’t approach an olive farm as a system with diverse crops and activities, but rather analyse olive production as an isolated activity, further exacerbating the narrowness of the approach.

Like crop diversification, the diversification of sources of incomes outside the farm or pluriactivity is another peasant viability strategy in which the logic of diversification is implemented. While in many farms in the case study farming is basic for the family and household economy, most of them complement farming with other jobs and economic activities to different degrees. In small and family farms, pluriactivity is fundamental to build the farm’s financial buffer capacity (also a way to build cooperation networks), particularly aimed at addressing the instability of farming income (Darnhofer, 2010) and as a self-financing strategy for the farm project (van der Ploeg, 2011). However, pluriactivity as a peasant viability strategy also exemplifies the challenging balances at the heart of peasant economics. The balances between work and income and work and well-being are central to explain how small farms are sustained and reproduced (Chayanov, 1966; Galt, 2013), also the balance between autonomy and dependence. When engaging in pluriactivity, small olive oil farmers struggle to find the balance between obtaining the necessary income to sustain both farm and household, while being less dependent on the banking system and financial debt, and the generated dependency on off-farm jobs (van der Ploeg, 2011). Furthermore, as we have explored, pluriactivity can strain farmers’ wellbeing by generating situation of overwork and making work distribution more challenging (Darnhofer, 2010), which combined with part-time

farming being common among small olive oil farmers in the Mediterranean (Moragues-Faus, 2014), could be a first step towards abandon (López-i-Gelats et al., 2016) rather than contributing to viability.

7.3.2.2 *Embeddedness*

Embeddedness is a complex and comprehensive concept that, when used as a framework, takes into account the dynamism of socio-economic relationships, is able to analyse power relationships and emphasizes the territorial aspect (Moragues-Faus, 2014). However, here we use embeddedness to describe an overarching strategy through which farmers incorporate territorially based ecological and cultural elements into their economic activities through social relationships (Moragues-Faus, 2014, p. 143). We use embeddedness more specifically, to group short circuit and direct selling and product differentiation as viability strategies characteristic of peasant farms (van der Ploeg et al., 2019), through which farmers integrate their activities, by socio-economic and ecological relations, into their local territory. In the specific case of the olive oil sector, differentiation strategies based on valorising the quality and territoriality of olive can also be considered peasant strategies inasmuch they resist the tendency towards the commodification of olive oil systems (Sanz-Cañada & Muchnik, 2016).

By using these strategies, small farmers integrate their activity in the local socio-geographical context, fostering what Cabell & Oelofse (2012) called the globally autonomous and locally interdependent feature of resilient agroecosystems and their participation in alternative socio-economic networks (Moragues-Faus & Sonnino, 2012). As we have seen in the case study, embeddedness strategies are aimed at breaking from the agricultural squeeze of global markets, particularly when it comes to unfair selling prices and unequal competition with big producers and retailers. These strategies, which indicate a quality over quantity focus when addressing the agricultural squeeze, are used by small olive oil farmers as alternatives to intensification strategies, even though both alternatives can and often are, used concurrently.

By integrating their marketing channels in more local shorter relationships, small olive oil farms become less dependent on disembedded global markets where they struggle to compete and control the conditions and price, as they allow small olive farmers to sell at higher (more adjusted) prices (Karanikolas et al., 2021). In direct and short circuit selling, farmers act as a symbolic and physical link between the end consumer and the territory the farm and product are integrated in (Moragues-Faus & Sonnino, 2012). Thus, these strategies are fundamental for small farmers' ability to self-organize within the territory, tapping into and building social networks and cultural or symbolic capital (Moragues-Faus & Sonnino, 2012).

Integrated selling channels where small olive oil farmers can control commercialization are not only viability strategies in themselves, but are also part of a strategy of product differentiation and adding value by making quality products (Moragues-Faus & Sonnino, 2012). Creating quality products, defined by localness, and participating in territorially embedded selling channels, are ways to re-value and add value to farm products and small farm themselves (Karanikolas et al., 2021). Difficult competition in terms of prices and volume of production pushes small olive oil farmers to focus on quality (Karanikolas et al., 2021) and they do so by integrating themselves and their products to localness and territoriality (Moragues-Faus, 2014). As explored by

Moragues-Faus & Sonnino (2012, p. 225) also in the case of Mediterranean olive oil production, small olive oil farmers construct quality as a mix of factors, “*the bioprocess, the provenance of the product and the selling channel (i.e., the spatial network) utilized*”. In the case study, we have identified organic production, rainfed and extensive groves, century-old trees and an almost fully circular milling process as elements of the bioprocess that contribute to defining the quality and added value of olive oil, compensating in part through quality what these strategies cannot achieve through yield.

7.3.2.3 *Social interdependence*

One of the distinctive features of small farms and peasant farming is the reliance on family labour (Van Der Ploeg, 2013). Counting on these type of labour relationships is fundamental for the viability of small farms and partly, what explains their ability to reproduce in spite lacking or struggling to achieve profitability (Chaparro Africano & Calle Collado, 2017; Czekaj et al., 2020). In our analysis of the viability strategies used by small olive oil farmers, we looked into the use or reliance on family labour as a complex strategy based on social relationships and which includes more specific strategies in terms of task distribution and knowledge exchange. This analysis, carried out from a feminist perspective, leads us to conclude that the sustainability and reproduction of small olive oil farms is based on the fostering of interdependence, as defined from ecofeminism (Herrero, 2015), beyond relying on a certain type of labour. As we have explored, interdependence takes place in the relationships and tasks assumed within the farm’s household, but also in the social relationships established by farmers in their local networks and organizations.

While the different strategies of employing workers are present and relevant in the case study, family and household remain as the basic source of human capital for small olive oil farms. Family labour offers flexibility and allows farmers to reduce monetary costs, as family labour is oftentimes not or less remunerated (Chaparro Africano & Calle Collado, 2017). Our analysis has shown that, in addition to family labour, more collective households and even more those where there is flexibility in sharing the workload and an exchange of knowledge, further contribute to small farm reproduction. Collective and flexible households have more room for manoeuvre and a better ability to implement viability strategies that might require a bigger workload, but could contribute to adding value to the farm and be more aligned with farmers’ values. These households are better able to address the lack and cost of labour that affects small olive oil farms, resonating with findings in other fields where extended families and households that integrate several generations in rural areas are resilient to socioeconomic changes (Camarero Rioja & Del Pino Artacho, 2014).

In small olive oil farms, agricultural production tasks are mostly masculinized. Like in other agricultural sectors, task distribution on farms are still largely based on a sexual division of labour, in which women in farms are responsible for domestic, care and off farm work and their farm work is devaluated (Ferreira et al., 2020; Rissing et al., 2021; Shortall et al., 2017). In our case study, we have shown how some of the viability strategies that make possible the sustainability and reproduction of the farm and household, as intertwined, are not only highly feminized, but also their relevance overlooked by both informants and researchers.

When family labour is not enough and small olive oil farmers face lack of labour availability, fostering external interdependency in social networks and organizations become even more important for small farm viability. Associativity and the building of cooperation with other farmers, neighbours and other agents is fundamental in small farm resilience (Cabell & Oelofse, 2012; Darnhofer, 2010). Through exchanges and cooperation with other farmers, small olive oil farmers are able to access material and immaterial resources, from machinery, to labour and knowledge, support and information. In the Mediterranean olive oil production, cooperatives are essential for many farmers to be able to access strategies such as manufacturing olive oil and open the possibility for control over commercialization and we have shown how farmers in the case study enter formal partnerships with other producers to create their own olive oil mills where they can fully control their production. Associativity, particularly in informal strategies, is also very important for farm viability in terms of farmers' well-being. Social networks offer support in a context where isolation is a threat for farmer's health and well-being (Louazel, 2018) and they can offer a literal helping hand to small farmers facing situations of overwork (Umstätter et al., 2022).

7.3.2.4 *Circular agriculture practices*

While the analysis of specific agricultural practices has not been the main focus of our research, there is a large body of literature investigating the connection between peasantry and agroecological practices (Miguel A. Altieri & Toledo, 2011; Holt-Giménez & Altieri, 2013; van der Ploeg, 2011), which has shown how an agroecological management of the agroecosystem highly contributes to small farm resilience and reproduction (Miguel A. Altieri, 2002; D'Annolfo et al., 2017; Nicholls et al., 2015). In our case study, we have identified strategies that recirculate and reproduce resources within the farm system and strategies that reduce the need from external inputs and allow the agroecosystem to self-regulate to be fundamental in small olive oil farms.

Organic management of olive groves and using olive oil by-products as resources within the farm, rather than selling or disposing them, are strategies in which resources are produced *within* the farm in a circular manner. Olive trees are resilient and very well adapted to the Mediterranean climate and require very few inputs, compared to other few trees, which makes the transition towards organic and sustainable agriculture smooth (Gucci & Caruso, 2011). For farmers in the case study, transition was even easier in rainfed and extensive olive groves, in which organic management also contributed to the added value of the production while allowing to reduce costs, as few external inputs were necessary. Similarly, through the recirculation of olive oil by-products, such as pruning biomass and olive pomace, which in the case study are closely related to organic farming, small olive oil farmers nourish the agroecosystem (Diacono et al., 2019; Labrador et al., 2011) without having to rely on external strategies.

7.3.2.5 *Intensification as a peasant strategy?*

The intensification of production in olive oil farms in super-intensive groves in specialized olive farms are led by investors from outside the agriculture sector or by large commercialization groups (Tous, 2011). However, in the case study, intensification strategies play an important role in how small olive oil farmers manage the

farm and are implemented alongside more peasant like strategies. Based on the findings from the case study, intensification strategies in small olive farming include denser cultivation frameworks, from intensive to super intensive, a high use of phytosanitary products and fertilizers, irrigation and the mechanization of harvest and pruning. Intensification strategies, particularly intensive cultivation frameworks, which require irrigation and a higher use of phytosanitary products, can degrade the agroecosystem. As opposed to extensive crops and groves (which are traditionally associated with small farming), this type of management, degrades the soil and leads to an overuse of natural resources, due to an increase in water demand (Fernandez Escobar et al., 2013). As we have examined intensification strategies also make farmers more dependent on global agents, as they have to rely on external resources and are often combined with marketing channels in which small farmers don't control the conditions, nor the added value of their products.

However, in the short term, intensification strategies are able to address the struggles faced by small olive oil farmers, even if at the expense of agroecosystem resilience and the farm's long-term reproduction. By implementing intensification strategies, small olive oil farmers can address the cost – price squeeze and difficulties to generate income by increasing yields and reducing labour costs, monetary or otherwise. From a sector perspective, the general trend towards the intensification of olive oil production is driven by an increase on global demand, a shortage of human labour or the need for farms to generate income, as intensification allows to increase profitability (Fraga et al., 2021), favour by policies such as the CAP. The financialization of agriculture has driven peasant farms to entrepreneurial agriculture, in which small farms leave behind their peasant mode of farming, adopting a capitalist logic (van der Ploeg, 2016). In this “*forward escape*”, small farmers are forced to keep expanding and increasing production, in order to repay debts and be able to afford inputs (van der Ploeg, 2016, p. 10).

Like most of the other viability strategies identified in the case study, intensification strategies are implemented to different extents; small olive oil farmers choose to intensify some plots but not others, might mechanize harvest and install irrigation, but keep extensive cultivation frameworks. This diversity of implementation of intensification strategies is an example of how the difference between peasant and entrepreneurial farming styles is not clear cut, but rather there is a range (van der Ploeg, 2016). As we have seen in the case study, depending on the farm project, intensification strategies could be short time pathway to finance the implementation of agroecological strategies (both economic and agricultural strategies) or support the farm while more peasant like strategies pay off, as these strategies often require longer processes of experimentation and adaptation before they can be fully implemented. On the other hand, as we have seen in projects where intensification is more widespread within the different areas of the farm, intensification strategies could be a step towards entrepreneurial farming, more integrated in a capitalist mode of production, integrated (and thus dependent on) on “imperial” food systems but maintaining a cultural attachment to small farming through a sense of identity.

7.4 The *livelihood reproduction framework* as a work in progress: gaps and future research.

The livelihood reproduction framework, which we proposed, developed and used in this thesis, expands the understanding of how small farms continue to exist and sustain themselves. It does so by taking an approach to viability that is holistic and accounts for the reality of small farms, building on peasant economics, sustainable livelihoods approach and farm resilience frameworks. As such, it is able to not only include social, economic and ecological issues, but by incorporating a feminist economics and ecofeminism as conceptual perspectives, the framework can overcome some of the blindspots of previous proposals, such as the role of power relationships and institutions, the importance of well-being, the centrality of reproduction and the examination of relationships within the household. However, this research progress in general and the livelihood reproduction framework in particular are works in progress, which leave and explain gaps and set the base for future research.

The design of our research had some limitations. The design of the case study methodology, based on semi-structured interviews, was aimed at gathering a large enough sample to be representative of Terres de Ponent and the questionnaire, designed to be as comprehensive as possible to gather information on viability strategies used in the several areas of a farm project, including its household. The downside of this approach was that the data gathered didn't allow us to go in as much depth as we would have liked in some of the issues that, throughout data analysis and the iterative process of designing the framework emerged as fundamental. As we have shown, internal organization and interdependence is a fundamental dimension of farm viability, one that is traversed by gender power relationships, and currently understudied in the fields of agroecology and sustainable agriculture (Álvarez Vispo & Begiristain, 2019). While the data gathered allowed for the identification of several strategies within this dimension and a first proposal of livelihood reproduction attributes, more and more in depth research is needed to fully examine the nuanced and complex relationships that take place within the household and the quantification and identification of the several productive and reproductive tasks that household members engage in.

Similarly, more and specifically designed research is needed on power relationships and institutions in the context of examining small farm reproduction. Power relationships and institutions emerged in our research as an important aspect of small farm livelihood reproduction and we argued that it is fundamental to take into account its cross cutting characteristic, instead of including it conceptually as external conditioning agents that act over the farm, but also as relationships and institutions that are developed within the farm and its household. However, is a complex issue that requires more in depth examining, both as an object of study and as a dimension of livelihood reproduction. While highlighting its importance, power relationships and institutions is different from other dimensions, since in the current version of the livelihood reproduction framework, it doesn't include attributes to be fulfilled, but rather the framework highlights the need to acknowledge and examine it when assessing small farm livelihood reproduction. Thus, more research and revisions are needed to fully incorporate power relationships (and the different types of power) and institutions in the theoretical understanding of livelihood reproduction.

In its current version, the livelihood reproduction framework can be a starting point to develop other analysis and theoretical tools. Our research has shown that the dimensions and attributes within the framework are highly interconnected, but we didn't delve into these connections. A potential path for future research could be to explore the trade-offs between the different attributes and dimensions of the framework and the impact of these relationships in the overall livelihood reproduction of a farm and household. Balances between strategies and their outcomes are an important part of small farms, as studied in peasant economics (Van Der Ploeg, 2013) and the development of the livelihood reproduction framework through the study of trade-offs, could turn it into a theoretical tool to explore different pathways towards small farm viability and reproduction.

The study of trade-offs between dimensions and attributes could also contribute to further defining work satisfaction as an attribute of the livelihood reproduction framework. As our research has shown, work satisfaction is a complex attribute, which can not only be impacted differently by the same viability strategy depending on the farm project, but the same strategy within the same project can both strengthen or strain work satisfaction. This is due to work satisfaction, as we have defined it, being fulfilled in two interwoven spheres, one that is more quantifiable and physical, such as workload or work rhythm, and the other, more subjective, which includes elements of pride, enjoyment or values. These two aspects of work satisfaction are difficult to separate, but while we couldn't delve into it, we hypothesis that work satisfaction could be the result of a balance between them, a satisfactory trade-off between physical and subjective aspects that would be highly dependent on each farm project and even farmer.

Finally, our research points at the potential for the livelihood reproduction framework to become a viability or sustainability assessment tool. While the goal of the present research wasn't to design a framework to the level of quantifiable or assessable indicators, context specific indicators could be developed. Inasmuch they could be quantified or further developed into smaller qualitative categories, livelihood resources could be explored as indicators for the potential implementation of viability strategies or to assess the presence or development of attributes of livelihood reproduction in specific farm projects. In this way, the conceptual livelihood reproduction framework could be developed into an assessment tool for both farmers and researches to identify potential weak points or interesting viability strategies.

8 Conclusions

- This thesis contributes to the debate about the *agrarian question*, i.e., how small farms (as peasant farms) remain and sustain themselves. In line with peasant studies, this thesis confirms that narrow definitions that limit viability to a single or few indicators, monetary and productive aspects mostly, offer incomplete pictures of the reality of small farming.
- Several frameworks take a comprehensive approach to small farm viability, such as sustainable livelihoods and livelihoods resilience, and go beyond monetary and even economic dimensions of viability, including social and ecological dimensions. *However*, a critical review of these frameworks show that they tend to overlook or under-explain power relations and institutions, relationships and strategies within the farm's household or well-being, which are aspects of small farms that are fundamental to make sense their viability. We have shown that feminist economics, along with ecofeminism, can enrich and further the debate around small farm viability and agrarian questions, with notions such as the centrality of life and reproductive economy. A feminist approach highlights the need to consider power relationships, both outside and inside the farm, when analysing farm livelihoods and the need to theoretically open up the farm's household, instead of understanding families as monolithic units. Furthermore, these approaches inform the development of a framework that can comprehensively assess small farm viability, by deepening and expanding reproduction as the central element of small farms as guided by peasant economics.
- We have developed the livelihood reproduction framework to delve into under-explained aspects of farm viability. In addition to livelihood resources, capacity for learning, external self-organization and diversity, defined in sustainable livelihoods and livelihood resilience frameworks, we define internal self-organization and power relationships and institutions as relevant dimensions to assess small farm reproduction.
- The livelihood reproduction framework uses a comprehensive definition of viability and economy, including reproduction as central in peasant farms, expanding it with a feminist economics approach to incorporate reproductive economy and reproductive labour, as the condition of possibility for any productive work. In doing so, it can account for small farms being rooted in reproduction and multifunctionality and thus, it has allowed us to examine small olive oil farms in a way that accounts for the different aspects at play in the farm project, from the need to consider olive oil production alongside other crops and economic activities in the assessment of viability, to the need to consider relationships and attributes within the farm's household as well as the external social network. It also allowed us to both identify and analyse viability strategies such as work management within the household and examine their impact on farm reproduction taking into account aspects such as satisfaction or fairness, highlighting the importance of taking labour and work relationships into account when examining small farm viability.
- Of particular relevance in the framework developed in this thesis is the consideration of the internal self-organization, which explicitly opens the analysis to the relationships, practices and aspects taking

place within the farm's household, understood as a dynamic community rather than a unit and allows for the assessment of fair labour relationships, flexible and collective household, work satisfaction and ecological self-regulation as attributes of small farm reproduction. The introduction of this dimension brings forward how small farm reproduction builds not only on organizational strategies that make them more autonomous, but by fostering as well their interdependence, in local relationships within the farm's social group. This highlights again the importance of social networks and cooperation already taken into account in previous frameworks and approaches, but in addition it allows us to determine that such interdependence and cooperation also needs to be developed within the household. This approach also highlights the relevance of power relationships in viability, both within and outside the farm, the importance of reproductive spheres and labour in the managing and sustaining of the farm and interdependence, alongside autonomy, as a fundamental aspect of farm viability and reproduction.

- Small farmers conduct a great diversity of viability strategies. In the examination of the olive oil farmers in Terres de Ponent, we identified 34 specific strategies, which can be grouped in the following clusters: associativity strategies, diversification of income and crops, manufacturing and control over commercialization, traditional extensive farming, intensification and labour and work management strategies. These clusters of viability strategies follow the logic of peasant farming, based on the reliance on family labour, striving towards autonomy and the building of self-organization, by focusing on the recirculation and use of internal resources and the common use of pluriactivity and diversification, the trust in mutual support expressed both in cooperation strategies and the importance of family labour or diversification in almost all dimensions of the farm project.
- The reduction on the availability of family labour and a global situation of agriculture cost-price squeeze can deeply affect working conditions and organization. Labour and work are central elements in the understanding of how small farms function and reproduce and they are complex and dynamic elements, highly dependent on the specific circumstances of each farm, comprising multiple configurations of work organization, labour or working conditions. In the case of small olive oil farmers, the number of members in a household or their ability to count on extended family and neighbours, highly impacts the viability strategies available and how they are implemented, if for example they can be taken on by the household or its social network or, on the other hand, they have to resort to alternative strategies such as mechanization or hiring workers. Not only the number, but the availability of household members play a role in work organization and working conditions, and the nature of the work itself, whether its routine or seasonal work, or how much it aligns with the specific farmer's values and motivations. Furthermore, work organization and labour strategies operate as mediators of other viability strategies. The same viability strategy can be implemented with different strategies to access labour, by hiring workers or relying on social network for instance, and different strategies of work organization, by a flexible or strict work distribution for instance, and how it is implemented conditions the contribution of viability strategy to the different attributes of livelihood reproduction. Thus, the impact of a viability strategy on livelihood reproduction highly depends on whether its implementation in terms of work and labour is

able to achieve the balance between the arduousness and benefits of the work, which lays at the base of peasant economics. This means that negative impacts of strategies often considered as beneficial for small farms, such as pluriactivity, should also be taken into account; as in the case of pluriactivity, it could lead to weakening a farm due to causing overwork, putting a strain on household flexibility and threatening work satisfaction.

- The use of the livelihood reproduction framework in the examination of labour and work management in small farms indicates that not only small farms rely on family labour, but they also do so through a sexual division of labour. In the case of small olive oil farms, this work organization strategy hides and de-valuate feminized labour, since men in the farm's household take on most of the productive farm work, while women take on domestic and care tasks and often assume administrative work and jobs outside the farm, which are described as playing a role of support towards the farm project, in spite their importance in the overall reproduction of the farm.
- The number and intensity of external factors threatening the viability of small farmers is great. In the case of the small olive oil farmers, the agricultural cost-price squeeze and the loss of family labour were the most pressing consequences. Viability strategies implemented by small olive oil farmers are driven by farmers' motivations and values, but also greatly to address these external factors.
- Not only small farmers implement a diversity of strategies, but an important aspect of farm viability is the implementation of alternative or even contradictory viability strategies. In the case of small olive oil farmers, farmers combine rainfed olive groves with intensified irrigated olive groves within the same farm. This combination of alternative strategies, which is another form of diversity, allows them flexibility and the seizing of opportunities while averting risks.
- The livelihood reproduction framework, in dialogue with the circular economy debate, also shifts the perspective on the value that olive oil by product valorisation strategies hold in small olive oil farms. While the circular economy debate prioritizes highly technical valorisation strategies that can return high monetary and social value, centring the assessment around the realities of small farms, highlights the value of strategies that allow small farmers to control the added value generated and recirculate resources within the farm.

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10.1 Questionnaire used during semi-structured interviews

Catalan version (original)

QÜESTIONARI EXPLOTACIO AGROECOLOGICA

OLIVERAR

Núm. entrevista		Lloc	
Entrevistador/a			
Nom de l'informant			
Data de l'entrevista			
Telèfon/ a. electrònica			
Permís ús del nom/anonimat			
Nom del projecte agrícola		Any inici	
Certificacions/segells			
Forma jurídica			
<i>I a la pràctica?</i>			

1 HISTÒRIA DE VIDA I DESCRIPCIÓ DEL PROJECTE

1.1 –SITUACIÓ ACTUAL DEL PROJECTE AGRÍCOLA

Producte o activitat principal, altres productes o activitats, elaboració.

1.2 ORIGEN DEL PROJECTE – COM HEU ARRIBAT FINS AQUÍ? PER QUÈ T'HI DEDIQUES?

D'on ve el projecte, professions prèvies, punts d'inflexió o grans canvis, motivacions i detonants, **gestió de les inversions**

2 COMPTABILITZACIÓ I CARACTERITZACIÓ DELS RECURSOS DE L'EXPLOTACIÓ

2.1 TERRES/BESTIAR

2.1.1 Núm. total d'hectàrees (que porten i/o que tenen a la DUN):

2.1.2 Accés a la terra:

Herència	
Compra a un familiar	
Compra	
Lloguer a un familiar	
Lloguer (arrendament o parceria)	

2.1.3 DISTRIBUCIÓ DE LES TERRES

Ús	SUP. (HA)	TINENÇA (HA)	LLOGUER (€/HA)	SITUACIÓ/DISTÀNCIA
Oliverar				
Herbació (cereal, llegums, panís, . . .)				
Herbació farratgers				
Ametlla				
Vinya				

Fruiters				
Horta				

2.1.4 Quin és el marc de plantació de les finques d'oliveres?

2.1.5 CULTIUS (olivera, horta, ametllers, avellana, cereal, fruiters, . . .)

TIPUS	VARIETAT	VOLUM DE PRODUCCIÓ (ANUAL)	REGADIU/SECÀ

2.1.6 En els darrers anys, heu comprat o arrendat més terres? N'heu venut o cedit?

2.1.7 Heu fet noves plantacions o canvis de cultius?

2.1.8 BESTIAR

TIPUS	CAPS DE BESTIAR	INTENSIU/EXTENSIU	INTEGRACIÓ AMB ELS CULTIUS	VENTA/ AUTOCONSUM

2.1.9 Us genera problemes la fauna salvatge? Com els gestioneu?

A les finques més properes al bosc, tenien molts problemes amb els animals salvatges, sobretot amb els Recursos hídrics i gestió de l'aigua (olivera)

REGADIU:	
TIPUS DE REG:	
FREQÜÈNCIA DE REG:	
ACCÉS (COMUNITAT DE REGANTS/CANAL):	
DESPESA ANUAL (L/€): <i>o percepció de la despesa</i>	

2.2 INFRAESTRUCTURA I MAQUINÀRIA

Coberts, molí, magatzem, corral/estable, tractor, moticultor, paraigua vibrador, cosetxadora, veremadora, per fitosanitaris, picadora, sembradora, . . .

	QUANT.	OBSERVACIONS	TINENÇA

2.3 RECURSOS EXTERNS (FULL DE SUPORT)

Preguntar per tipus de tractaments i freqüència, inputs principals (llavors, productes fitosanitaris, herbicides, . . .), elaboració i productes que surten.

2.3.1 MATERIAL I SERVEIS

	ACCÉS	PREU	FREQÜÈNCIA DE COMPRA/ÚS
ADV			
Molí			
Treball mecànic contractats			

2.3.2 Mètode de collita (olivera)

2.3.3 Valoritzeu d'alguna manera els sub-productes generats per l'activitat principal?

Quins?

Sansa	Fulles	Fusta	Poda
-------	--------	-------	------

Com?

Venta com a matèria primera		Re-circulació dins finca	
Producte d'alt valor	biomassa	farratge	adob

2.4 PRODUCCIÓ I INGRESSOS

2.4.1 PRODUCCIÓ (dades anuals)

PRODUCTE	VOLUM DE PRODUCCIÓ	FINALITATS	%

2.4.2 INGRESSOS SEGONS CANALS DE COMERCIALIZACIÓ

PRODUCTES	CANALS	PREU DE VENDA	% INGRESSOS

2.4.3 Què marca el preu de venda de cada producte/canal?

2.4.4 Per què vàreu apostar per l'elaboració o la comercialització directa?

2.4.5 Quin és el canal de venda que valoreu més positivament? Per què?

2.4.6 AJUTS I SUBVENCIONS

TIPUS
DUN/PAC
CCPAE
Jove agricultor/nova incorporació

2.4.7 Us resulta fàcil demanar i gestionar els ajuts?

2.4.8 Quina valoració en feu?

2.4.9 Com gestioneu econòmicament les inversions?

2.4.10 INGRESSOS DE LA UNITAT FAMILIAR

FONT D'INGRESSOS FAMILIARS	% APROXIMAT DE LA RENDA FAMILIAR	GUANY ANUAL
Ramaderia		
Agricultura		
Sector serveis/turisme		
Jubilació		
Ajuts i primes		
Feina externa (de la parela		
Segona feina		

2.4.11 Quin tipus d'activitats turístiques feu?

3 ORGANITZACIÓ INTERNA I GESTIÓ DE TASQUES

3.1.1 ESTRUCTURA FAMILIAR A L'EXPLOTACIÓ

Qui forma part de l'explotació?

MEMBRES DE LA UNITAT FAMILIAR	DESCRIPCIÓ	EDAT	GÈNERE	FORMACIÓ	UTA	TREBALLA FORA (SECTOR/DEDICACIÓ/JUBILACIÓ)
	Titular explotació					

3.1.2 TREBALLADORS CONTRACTATS

	EDAT	GÈNERE	FORMACIÓ	UTA	PERÍODE DE CONTRACTACIÓ	DURADA DEL CONTRACTE

3.1.3 MÀ D'OBRA INFORMAL

	EDAT	GENERE	VINCLE	TIPUS DE FEINA

3.2 DISTRIBUCIÓ DE LES TASQUES A L'EXPLOTACIÓ I DINS LA UNITAT FAMILIAR (FULL DE SUPORT)

Qui fa què i per què? Identificació de les tasques.

CAMP –

COMERCIALITZACIÓ –

ELABORACIÓ –

ADMINISTRACIÓ –

PROMOCIÓ –

ALTRES –

3.2.1 Si s'escau, tothom pot fer totes les tasques?

3.2.2 Com preneu les decisions importants i feu plans a llarg termini?

Individualment	Conjuntament (informal)	Espai específic de presa de decisions
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3.2.3 Teniu pics de feina al llarg de l'any o períodes més inactius? *Incloent producció, comercialització, temps familiar i personal, . . .*

La diversitat de cultius fruiters fa que tinguin una campanya o època de collita llarga, de juny a octubre.

3.2.4 Com els gestioneu?

3.3 PERCEPCIÓ DEL RITME DE TREBALL ANUAL

3.3.1 Com afecta la pràctica agrícola a (les hores dedicades, el bon funcionament o no de l'explotació) a altres vessants vitals com la familiar o la personal?

3.3.2 Es compagina bé amb les vostres (de la unitat familiar) necessitats personals? Podeu dedicar temps a casa?

3.3.3 Com gestioneu situacions de malaltia o fora de l'explotació?

3.3.4 Com definiríeu el vostre ritme de treball/ritme de vida?

N'esteu satisfets? El mantindríeu a llarg termini?

3.4 ENXARXAMENT

3.4.1 Formeu part d'alguna cooperativa o associació?

Fruites Apyfa.

3.4.2 Per què (què us aporta)?

Recursos econòmics:	x
Assessorament/coneixement:	
Accés a canals de comercialització:	
Més eficiència en els costos de producció:	
Promoció del producte:	
Intercanvi de productes:	
Més poder de negociació:	
Capacitat transformadora:	
Satisfacció amb la feina:	
Espai de socialització:	

Tot i que la cooperativa no té línia en ecològic i es van plantejar si seguir-hi quan van fer la conversió, perquè no poden fer servir els mateixos canals de comercialització, els hi és útil ser-ne socis perquè poden fer servir les instal·lacions de la cooperativa (càmeres refrigerades) per guardar-hi la fruita i anar-la venent a poc a poc o quan està més bé de preu.

3.4.3 Com funciona (què hi aporteu)?

Quota:	
Hores de feina:	
% de la producció:	

3.4.4 Intercanvieu recursos amb d'altres productors o agents de la cadena (família, amics, veïns, . . .)?

Productes, serveis, maquinària, espais, consells, . . .

3.4.5 Us agradaria col·laborar-hi més o més estretament?

En quina dimensió (social, econòmica, ambiental) situen la resposta.

3.4.6 Com decidiu els tractaments o el que cal fer en cada moment?

3.5 CONEIXEMENT

3.5.1 Com vàreu aprendre el maneig agrícola/ramader? Teniu alguna formació formal?

3.5.2 Fas les coses diferents de com les feien els teus pares o avis?

4 VALORACIÓ GENERAL

4.1 PER QUE US DEDIQUEU A L'AGRICULTURA? QUÈ ÉS EL QUE MÉS VALOREU DE LA VOTRA FEINA COM A PAGESES/OS?

Herència/tradició familiar	Estil de vida més saludable/benestar	Contacte amb la natura
Identitat	Guany econòmic	Contribució socio-ambiental (sobirania alimentària)

Ja des de petit li agradava; "el meu germà no ho porta tant al cor, però no ens queda més remei".

4.1.1 Voldries que s'hi dediquessin els teus fills?

4.2 QUINS CREIEU QUE SÓN ELS PUNTS FORTS DEL PROJECTE (ALLÒ QUE FA QUE TIRI ENDAVANT)?

Qualitat del producte	Producte diferenciat	Manera de fer (maneig)
Manera de fer (comercialització/elaboració)	Tradició	Localitat
Venda directa/circuit curt	Valors/creure-hi	Coneixement/experiència
Projecte familiar	Projecte cooperatiu	Autonomia/adaptabilitat

La diversificació de cultius fruiters facilita la comercialització, fa que no depenguis tant de produir grans quantitats i dóna estabilitat d'any a any a nivell de volums de producció i preu.

4.3 QUINS SÓN ELS PUNTS FEBLES DEL PROJECTE? QUÈ CALDRIA O US AGRADARIA CANVIAR

Ritme de treball	Volum de producció	Satisfacció
Estil de vida a llarg termini	Despeses en recursos externs	Dependència del mercat
Ingressos/preu	Volum de producció	Coneixement/experiència
<i>Solitud</i>	<i>Recursos humans</i>	

4.4 PLANS DE FUTUR

Previsions a mig i llarg termini, plans, transicions en marxa, cap a on es vol tirar

Treballen amb la tendència de posar menys arbres per facilitar la comercialització, és a dir tenir menys arbres i per tant menys quilos, però més varietats.

4.5 QUINS IMPEDIMENTS US TROBEU A NIVELL SECTORIAL O DE CADENA AGROALIMENTÀRIA? SI DEPENDUÉS NOMÉS DE VOSALTRES, QUÈ FARIÉU DIFERENT O CANVIARÍEU?

English version

QÜESTIONARI EXPLOTACIO AGROECOLOGICA

OLIVERAR

Interview number		Place	
Interviewer			
Name of the informant			
Interview date			
Phone number/email address			
Name of the farm project		Starting year	
Certifications			
Legal form			
<i>And in practice?</i>			

1 LIFE HISTORY & DESCRIPTION OF THE PROJECT

1.1 –CURRENT SITUATION OF THE FARM PROJECT

Main activity or farm product, other products or activities, manufacturing, . . .

1.2 BEGINNING OF THE PROJECT – HOW DID YOU GET HERE? WHY DO YOU WORK IN THE FARM PROJECT?

Starting point of the farm project, previous professions, turning points or big changes, motivations or triggers, . . .

2 ACCOUNT & CARACTERIZATION OF FARM PROJECT'S RESOURCES

2.1 LAND & LIVESTOCK

2.1.1 Total number of hectares (managed by the farm project and/or included in the DUN-):

2.1.2 Land access & ownership:

Inheritance	
Bought from a family member	
Purchase	
Renting from a family member	
Tenant farming (formal or informal)	

2.1.3 Land distribution

USE	AREA (HA)	OWNERSHIP (HA)	RENTING (€ / HA)	DISTANCE
Olives				
Arable crops (cereal, legumes, corn, . . .)				
Forage crops				
Almonds				
Vineyards				
Fruit trees				

Horticultural crops				
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2.1.4 What are the cultivation frameworks of olive orchards?

2.1.5 Crops

CROP	VARIETY	YIELD (YEARLY)	IRRIGATED/RAINFED

2.1.6 In the last few years, have you bought or rented new land? Have you sold or handed over land?

2.1.7 Did you plant new orchards or crops or changed any of the crops?

2.1.8 Livestock

TYPE	HEADS	INTENSIVE/EXTENSIVE	INTEGRATION WITH CROPS	SALE/SELF-SUPPLY

2.1.9 Do you have problems with wild fauna? How do you manage it?

2.2 WATER RESOURCES & MANAGEMENT (FOR OLIVE ORCHARDS)

IRRIGATION:	
IRRIGATION SYSTEM:	
FREQUENCY OF IRRIGATION:	
ACCESS (IRRIGATION ASSOCIATION, WELL, . . .):	
ANNUAL SPENDING (L/€): <i>or perception of the spending</i>	

2.3 MACHINERY & INFRASTRUCTURE

Sheds, olive oil mil, warehouses, stable, tractors, shaker, straddle machine, . . . sembradora, . . .

	QUANTITY	OBSERVATIONS	OWNERSHIP

2.4 EXTERNAL RESOURCES

Ask about type of treatments and agricultural practices, frequency, main inputs of the farm, manufacturing, outputs, . . .

2.4.1 MATERIALS & SERVICES

	ACCESS	PRICE	FREQUENCY OF USE
Technical agricultural advice			
Olive oil mill			
Outsourced mechanical services			

2.4.2 Olive harvest methods

2.4.3 How do you valorize olive and olive oil by-products?

Which by-products?

Olive pomace	Olive leaves	Wood	Olive tree pruning biomass
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How?

Sold as raw matter		Re-circulation in the farm	
High value product	Biomass (energy)	Fodder	Fertilizer

2.5 PRODUCTION & INCOME

2.5.1 Production (yearly)

PRODUCT	YIELD	USE	%

2.5.2 Income per commercialization channel

PRODUCT	CHANNEL	PRICE	% INCOME

2.5.3 What determines the selling price of each product and commercialization channel?

2.5.4 Why did you opt to manufacture or for direct selling?

2.5.5 What selling channel do you value the most? Why?

2.5.6 Subsidies & grants (CAP related or other)

TYPE AND SOURCE

2.5.7 Is it easy to apply and manage subsidies?

2.5.8 How do you value the subsidies you get?

2.5.9 How do you manage investments for the farm?

2.5.10 Sources of income of the household:

HOUSEHOLD'S SOURCE OF INCOME	% OF HOUSEHOLD'S INCOME	QUANTY ANUAL
Livestock farming		
Agriculture		
Tourism/service sector		
Retirement		
Subsidies		
External job (of non-farmer household members)		
Second job		

2.5.11 What type of tourist activities do you do in the farm (if any)?

3 INTERNAL ORGANIZATION & JOB MANAGEMENT

3.1.1 Household structure

Who is part of the farm's household?

HOUSEHOLD MEMBERS	DESCRIPTION	AGE	GENDER	TRAINING	AWU	WORKS OUTSIDE THE FARM
	Owner of the farm					

3.1.2 Employees

	AGE	GENDER	TRAINING	AWU	HIRING PERIOD	LENGTH OF THE CONTRACT

3.1.3 Informal workers

	AGE	GENDER	RELATIONSHIP	TYPE OF JOB

3.2 TASK DISTRIBUTION IN THE FARM AND HOUSEHOLD

Who does what?.

Farming tasks –

Selling –

Manufacturing –

“book keeping” –

promotion –

other –

3.2.1 If need be, does everyone in the household can handle every task?

3.2.2 How do you make important decisions and long term plans?

Individually	Together (informally)	Designated time for decision making
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3.2.3 *Do you have work peaks throughout the year and less busy periods? Inculding production, selling, family and personal time, . .*

3.2.4 How do you manage them?

3.3 PERCEPTION OF WORK RHYTHM AND WORKLOAD THROUGHOUT THE YEAR

3.3.1 How does farming (the time dedicated to farm management) affect other aspects of your personal or family life?

3.3.2 How do you balance it with you and your family needs? Can you spend time on house work?

3.3.3 How do you manage work when you are sick or you need to leave the farm?

3.3.4 How would you define your work rhythm and workload? Are you happy with it? Also on the long term?

3.4 ASSOCIATIVITY

3.4.1 Are you part of any cooperatives or associations?

3.4.2 Why (what does it bring)?

Monetary resources:	x
Counsel/knowledge:	
Access to selling channels:	
More efficiency in production costs:	
Product promotion:	
Exchange of products:	
Lobbying capacity:	
Capacity for change:	
Work satisfaction:	
Socialization space:	

3.4.3 How does it work (*what do you bring*)?

Fee:	
Work and time:	
% of production:	

3.4.4 Do you exchange resources with other producers or agents in the production system (family, ,friends, neighbors, . . .)? *Products, services, machinery, spaces, advice, . . .*

3.4.5 Would you like to collaborate more?

3.4.6 How do you decide agricultural treatments or farming practices?

3.5 KNOWLEDGE

3.5.1 How did you learn about farming and agriculture? Do you have formal training?

3.5.2 Do you manage the farm differently from your parents or grandparents?

4 GENERAL ASSESSEMENT

4.1 WHY ARE YOU A FARMER? WHAT DO YOU VALUE THE MOST FROM THIS JOB?

Family tradition	Healthy lifestyle and wellbeing	Connection with nature
Identity	Profit or income	Social and environmental contribution

4.1.1 Would you like your kids to be farmers?

4.2 WHICH ARE THE STRENGTHS OF YOU FARM PROJECT (THE ELEMENTS THAT MAKE IT VIABLE)?

Quality of the product	Specialty of the product	Way of doing things (Farming)
Way of doing things (sales/manufacturing)	Tradition	Locality
Direct sales	Values	Knowledge/experience
Family project	Cooperative project	Autonomy

4.3 WHAT ARE THE WEAKNESSES OF YOUR FARM PROJECT? WHAT ASPECTS NEED OR YOU WOULD LIKE TO CHANGE?

Work rhythm	Production yield	Satisfaction
Lifestyle in the long term	Cost of external inputs	Market dependency
Income/price		Knowledge/experience

4.4 FUTURE PLANS

4.5 WHAT OBSTACLES DO YOU ENCOUNTER IN THE AGRI-FOOD SECTOR? IF IT WAS UP TO YOU, WHAT WOULD YOU CHANGE OR DO DIFFERENTLY?