WildFood

WildFood Project

Eating the wild: Improving the value-chain of Mediterranean Wild Food Products (WFP)

Living lab sessions on innovative and feasible business models for the wild food products sector

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Executive summary

This study was an attempt to provide ideas on innovative business models for the wild food products sector, that would overcome some of key issues that stakeholders along the supply chain are dealing with. It was designed as a series of living lab (LL) sessions done in parallel in five countries: Italy, Spain, Portugal, Tunisia and Slovenia. At least one issues was defined per country, and that one was dealt with in a LL, where intensive creation process was facilitated in order to come to a best solution for each issue. Seven different cases were addressed in LL, which varied considerably whether they focused on either supply or demand of WFP; in the type of business models innovation; whether they were grounded on innovative production process, connecting stakeholders, fostering fair trade of WFPs, or raising awareness of consumers, etc. LL sessions also raised challenges, starting with designing the LLs, trying to engage stakeholders, completing the series of LL sessions, and providing clear outcomes, however all those were successfully overcame. LL provided a rich amount of information on potential and best solutions, delivered six ideas on innovative business models for the WFP sector, and offered a platform for different stakeholders to connect and exchange their experiences and know-hows.

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1. The aim of Creating new business models (Task 4.2)

The second task of the fourth work package of WildFood project was to investigate the current state of business models (BM) in wild-food products (WFP) sector, assess the shortcomings or potential solutions and then to materialize that information within a series of living-lab sessions, where innovation of business models was to take place. The latter action is captured within deliverable 4.4 (Report on living-lab sessions on innovative and feasible business models for the WFP sector), which is presented in this report.

The innovation process took place in all partnering countries within WildFood and has been to some extent grounded on outputs of previous deliverable 4.3 (Report on comparison of relevant business models of the WFP sector), where state-of-art of currently implemented business models was sampled. Innovation process was to result in 3 proposals of innovative business models, and at least one per wild food product. Aspects that are to be focused on in innovative BMs are social inclusion, fair distribution of income and sustainability. In this way, WildFood tries to contribute to pushing the development of wild food sector, especially in terms of finding new ways to support businesses in making it more sustainable, economically viable and even more important source of new jobs.

2. Methodological approach

Living Labs are a highly participatory, user-centric approach for sensing, prototyping, validating and refining complex solutions in multiple and evolving real life contexts (Eriksson, Niitamo et al. 2006). The concept was first used in the early 1990s in the case of students' experimentation to solve problems in a Philadelphia neighbourhood and was later further developed by prof. Mitchell from MIT, Boston. The use of Living Labs gained momentum after they were recognized as an effective approach to provide a creative environment, where people making use of a solution or innovation or benefiting from it are continuously involved in the process of co-creation. They can act as equal contributors or as those designing solutions themselves. Thus, the idea of Living Labs is to build partnerships between different stakeholders – public organizations, private companies, academia and the general public – that facilitate intentional collaborative experimentation to create innovative solutions for either specific or more general issues (Lupp, Zingraff-Hamed et al. 2021). Those can also be related to climate change, sustainable management of environment, fair business models etc. The element of creativity can be bolstered by having more people of different backgrounds, expertise and experiences involved in the design of the solution.

The flow-work of the Living Lab usually follows several key phases, which involve key actions. Different authors suggest 3-8 phases (Lupp, Zingraff-Hamed et al. 2021), however at minimum three are necessary (Fohlmeister, Zingraff-Hamed et al. 2018):

- phase 1: understand, investigate, plan, explore,
- phase 2: creative co-design and refinement,
- phase 3: evaluation and testing.

The aim of the *first phase* is to **understand the problem** that needs to be solved, and for that we must (1) frame the innovation in terms of what for are we designing it, (2) define the target or to decide who are the end-users of the innovation, (3) pick the most relevant stakeholders that will act as co-creators and plan their involvement, and (4) explore the state-of-art of already known/implemented solutions.

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The *second phase* involves **creation of the innovation** that is to address the problem defined from the first phase and its testing. There are several methodological approaches of co-creation, such as storyboards, brain writing, designing concept maps, SCAMPER technique, Walt Disney method, SWOT etc.

Final, *third, phase* is dedicated to the **evaluation** of the designed solution, which involves **testing** for its usability, benefits, and acceptance. This occur iteratively though the design process and can apply to either single components of the solution or complete design. There are different methods on testing the solutions, however they are very context-specific and must meet the specifics of the solution. After the evaluation is done and if the outcome is not satisfactory, the process of co-creation loops back at the beginning and starts again.

Having *right stakeholders* is vital for a successful Living Lab and commonly grounded on so called Quadruple Helix Innovation Model (Carayannis and Campbell 2009), which predicts intertwining competences and knowledge from four key sectors – public organizations, private companies, (end-) users and academia (Figure 1). Those are usually stakeholders that are to be included in the Living Labs, however this also depends upon the context of the problem and its potential solution(s).

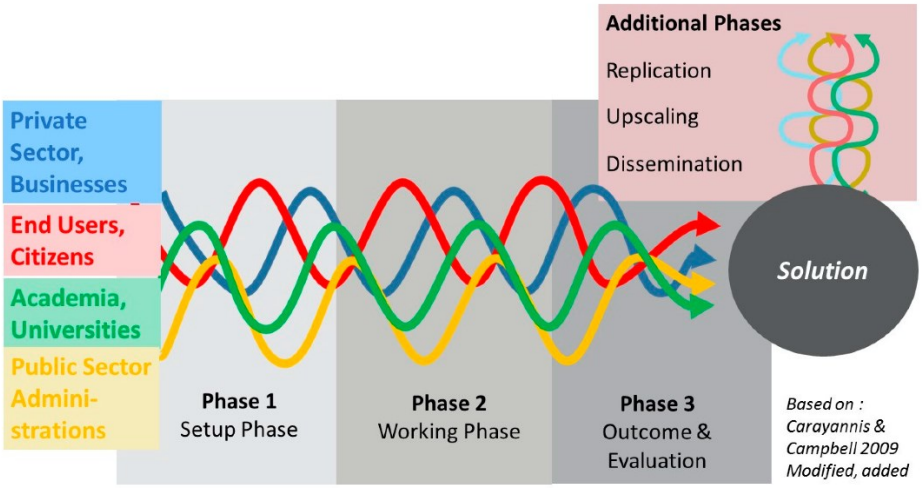

Figure 1: Living Lab phases as presented in Lupp, Zingraff-Hamed et al. (2021) with indication of participatory workshops as planned in WP4 of WildFood.

Three phases of a LL were placed within the WildFood context so that sessions were linked to project events, being either participatory workshops holding a number of stakeholders at once or smaller one-to-one meetings. This was a way to engage stakeholders needed to implement LL sessions and to collect information required to define the problems, potential solutions and how effective could proposed solutions be in addressing the issues.

Each partnering country picked one or more WFPs in the context of which LL innovative business models were proposed (Table 1).

Table 1: List of wild food products focused on in LL sessions in each partnering country.

Country	Wild food product	Goal of innovation
Italy	truffles	Stable supply of wild and semi-wild truffles in the IT truffle value chain

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Spain	black truffle	Use of fertilizers in black truffle cultivation
Portugal	acorns, pennyroyal, pine nuts	Economic and environmental sustainability of Portuguese value chain
Tunisia	aromatic and medical plants	Development of an innovative BM for the WF sector, and for aromatic and medicinal plants
Slovenia	truffles	Standardized quality testing facility (know-how) for truffles

Each of the three LL phases was framed in format of sequential question, which served as guiding points for carrying out LL sessions. A set of questions for each phase (with some accompanying text setting the grounds for each phase) is presented in the next section.

3. Phases of living lab sessions

The set-up phase

Prior having a creative stage of LL there are several points that need to be addressed to have grounds for an effective search of solutions. Those points are:

- setting a clear purpose, scope of the LL, and pre-assessment of user demands,
- analysis of the context of LL,
- defining a strategy on how to involve stakeholders,
- selecting the right stakeholders and LL-facilitators,
- incentive analysis and design.

Purpose and scope of LL

Defining "Why we need a LL?" is a prerequisite for a successful dialog and effective co-creation. This might be obvious from the start or needs to be developed though an iterative process, however this step of *scope setting* followed key questions defined below. Answering those helped in having a refined idea on both, the purpose and scope of LL.

Key questions	**Aim of the question**
Why is a LL process needed and meaningful?	Overall goal of the LL
Which purpose shall the LL serve?	Purpose of the LL
Which spatial / temporal / thematic scope shall the LL have?	Scope of the LL
When in the process of developing innovative BM and to what extent is stakeholder involvement necessary, and for which aims?	Intended participation goals
Which roles shall LL stakeholders have in the process?	Intended tole distribution
What is the scope for influence the LL is intended to have upon WF sector?	Scope for influence
What are the (assumed) needs and knowledge demands of the local end-users and other LL participants?	Needs and knowledge demands
What are the (assumed) key topics of joint interest for the LL to work on? What are the (hitherto) priorities of the actors in charge of the LL process?	Key topics

Context of the LL

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Analysis of the LL context helped in detecting important lessons learnt in past and to identify *relevant policy factors*, which needed to be considered. Via framing of the context, it was also possible to overcame gaps between stakeholders to accommodate LL process in the future. Like in previous chapter we laid several basic questions[1], answers to which supported contextual analysis.

Key questions	**Aim of the question**
What are the exact drivers of the local LL process and the choice for BM solutions?	Drivers
Which experiences have been made with stakeholder participation processes at the case site (or nationally) in the realm of WF BM?	History / expertise with stakeholder involvement processes for BM innovation
What does the local stakeholder arena look like? Are there any noteworthy conflicts? What has been done to resolve these conflicts?	Local stakeholder network characteristics and history
Which are the relevant local / regional policy and governance frameworks for the intended LL process to support BM innovation?	Policy and governance framework
Are there any existing initiatives which the LL could be linked to?	Potential for nested approach

Stakeholders

Having the *right stakeholders* is one key premises for a successful LL, and while this aspect was already mentioned in the closing part of the previous chapter, we elaborated this aspect in more detail. Those being involved in either the setting-up of the LL, process of co-creation, evaluation of the solutions or various combinations of those three phases could be selected unsystematically in a snow-ball fashion or by simple brainstorming, however a more structured approach can bring a more representative group. *Mapping of stakeholders* was already done in relation to the first project workshop (D4.1 An innovation network design) thus if a PP focused on a wild food product and relevant BM in LL sessions as it did for D4.1, the previous list of stakeholders could be used. The list was extended if needed. If there was no initial list of stakeholders, the approach developed in the PHUSICOS project was used. In a similar manner as in two previous sections, we provided a set of supporting questions that were used as guidance in identifying stakeholders that were involved in the LL.

Key questions	**Aim of the question**
What is the geographical focus of the planned BM innovation, and which stakeholder arena is connected to it?	Arena
Who is directly affected by the planned BM innovation? Who benefits from the BM innovation? (= beneficiaries) Who is adversely affected by the BM innovation? (= burden)	Primary stakeholders (beneficiaries and burden)
Who is indirectly affected be the planned BM innovation? Who could have any interest to support or block the BM innovation?	Secondary stakeholders
Who are key actors related to the BM innovation? Who possesses power in terms of legitimacy; networks and/or resources?	Key players
Who are real and/or potential veto-players of the planned BM innovation? (veto players are those who have the ability to decline an innovation being implemented in real life)	Veto players
Who are real and/or potential supporters of the planned BM innovation?	Supporters

[1] developed in PHUSICOS project

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Who are the relevant knowledge keepers to be able to contribute to the planned BM innovation?	Type of knowledge meaningful to BM innovation

Additionally, it was important to know which might be *incentives* for stakeholders to be willing to participate in a LL. If the incentive is extrinsic (financial gains, securing harvesting rights, achieving competitive edge, etc.) or intrinsic (social inclusion, fair trade, consumer safety, etc.), stakeholders' stakes might be different and so could be the roles stakeholders play in a LL.

Working phase on co-creation

Co-creation (also co-design or co-production) is an innovation process that involves end-users as *actors* in innovating instead of them being just *factors* in design process. This is different from traditional top-down linear design thinking where end-users may only be responsible for reviewing or providing feedback on the close-to-final solution (Fohlmeister, Augenstein et al. 2020).

As defined pearlier, co-creation phase relied strongly on previous LL set-up phase, where the problem at stake was thoroughly assessed and defined in detail, with a comprehensive overview of possible implications. Co-creation was aimed to **provide solutions** for those problems, by creating innovative BM. The innovation aspect can exist in various forms, but in case of WildFood, a generally proposed definition is: "*A business model innovation changes one or more dimensions of a business model so that a novel configuration of the elements is created and implemented (Labbe and Mazet 2005).*"

The **innovative BM** was to **address** one or more following **dimensions**:

- increased social inclusion (e.g., involving marginalized communities),
- fostering fair distribution of profitability (throughout the value chain),
- strengthening ecological sustainability (either increasing the ecosystem capacity for production or decreasing pressure on natural resource),

or any other aspect, which might be relevant in special context of the PP's pilot study. There are several **BM innovation types**, which could and were employed for LL discussions:

- start-ups (there is no current BM, and a new BM is created),
- business model transformation (there is a current BM that is changed into another BM),
- business model diversification (current BM stays in place, and an additional BM is created),
- business model acquisition (an additional BM is identified, acquired, and integrated).

The following set of key questions below ware used to facilitate elaboration on a proposed solution – BM innovation for specific wild food product. Those are general in nature as they needed to fit very different contexts of LL but were possible to apply with some flexibility.

Key questions	**Aim of the question**
Describe possible solutions to problems / challenges / issues defined in the first (set-up) phase of LL	Spectrum of possible solutions
Describe the proposed solution	The selected solution (the best[1] BM innovation)
What would the best solution resolve if it was implemented	The benefits of selected solution*
Who proposed the selected solution	The proponent
How feasible is the selected solution	The feasibility*

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Who can implement the solution	Go-getter (the doer)
What are the means needed to keep the sustain the proposed solution	Necessary means
To what extent did stakeholders approve the proposed solution	Acceptability*
Which element of sustainability does the proposed solution strengthen	Assessing the sustainability
Does the proposed solution have negative outcomes as well	Negative externalities
Who owns (if applicable) the proposed solution	Solution ownership
How transferable is the proposed solution into other geographical and cultural areas	Transferability
Which innovation type would be relevant for the proposed solution	Innovation type

Note: questions marked with asterisk (*) are related to the monitoring & evaluation phase as well (next chapter)

Monitoring and evaluation of the living lab

Monitoring enabled to continuously assess the progress of stakeholders' engagement, their activities, satisfaction and compare those with the optimal course of LL that they had planned. The key question is "Are we doing the things right?" If necessary, facilitators could implement actions to steer the process within desired direction towards the goal of LL. Since partners did not run LLs as a set of several consecutive events, but just one or two at most workshops, monitoring aspect was not as relevant as it might have been. Thus, information was collected refers to one-time assessment of stakeholders' engagement in a LL. The table below provides a general overview of aspects that are to be assessed by each PP for their own LL process.

Key questions	**Aim of the question**
Which stakeholders were actively involved in LL process	Engaging stakeholders
The degree to which stakeholders' knowledge and know-how served as input in co-design of the solution	Capture and leverage of stakeholders' knowledge
The degree to which stakeholders' demands on characteristics of the solution were considered	Capture of stakeholders' demands
Any lessons learned that might be important as 'take-home' messages for the entire WildFood consortium.	Lessons learned

Evaluation aspect was in fact already included in the previous co-creation phase. Given the fact that WildFood project consortium did not (in all cases except to some extent in the example of Italy) truly implement the solutions developed and proposed in LLs, the evaluation step was addressed somehow hypothetically. Thus, it was traced to expected outcomes of the innovative solutions indicated in the previous co-creation phase. Three questions in table in section on co-creation related to benefits, feasibility and acceptance (marked with asterisk in the co-creation-related table) are reliable indicators of potential success of the innovation developed and proposed in LLs. Thus, no additional questions on evaluation aspect ware included in the last table of questions.

4. Administering the living labs in partnering countries

LLs have been implemented in five countries via different formats of engaging stakeholders and those are reported in Table 2. Furthermore, every country addressed innovation of business models in the context of at least one wild food product, Portugal being an example of having covered three WFPs and Tunisia with two WFPs.

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Table 2: Means of implementing living labs in partnering countries, where individual events possibly covered more than one LL phase.

Country	Wild food product	Means of implementing LLs		
		Set-up	Co-creation	Monitoring & Evaluation
Italy	truffles	Workshop	Workshop	
Spain	black truffle	Workshop	Workshop	
Portugal	acorns, pennyroyal, pine nuts	Workshop	On-line event	
Tunisia	aromatic and medical plants	Workshop	Workshop	
Slovenia	truffles	Face-to-face interviews	Face-to-face interviews	

All project partners have prepared individual reports on their LLs, where they have according to guiding questions presented previously in this document registered key information on all three phases of a LL. The reports are attached as annexes.

Information from country reports were summarised in a way that comparison across all eight innovation cases (one case – one WFP) and synthesis could be done. This is presented in the following section of the report.

5. Innovative business models: outcomes of living labs

Presentation of results follow the structure of LL phases or sections of questions respectively:

- set-up phase,
- co-creation phase,
- monitoring and evaluation.

The set-up phase

Firstly, responses on guiding questions for the set-up phase are presented in the table below, with interpretation given here.

Initiatives for all seven cases (that is WFPs) in five countries are quite different in terms of the purpose, the needs of stakeholders and consequently needed impact of business models innovation and related living-labs sessions respectively. Some seem to be more general in nature as are those implemented in Portugal and Tunisia that aim to support sustainability (economic, environmental and social) and leveraging legitimacy and networking. Others might be considered as more focused on a specific issue, like sufficient and stable provision of raw material (Italy), increasing yields (Spain) and the need to provide effective quality assurance for transparent trade and consumer safety (Slovenia).

The case of an Italian example, where the innovation process of living-labs was to foster business models supporting constant supply of wild and semi-wild truffles reflects a typical format of innovation, which relates to *community-based enterprises or associations*, and *collaborative partnerships* as well. This model involves either local communities or commercially dependent agents

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who are directly participating in management or commercialization of FWPs (truffles in this case). Those stakeholders can establish cooperatives, enterprises or simply draft a common agreement that can provide credibility and assurance of sustainable production practices in WFP supply chain. This can ensure equitable and constant distribution of WFPs.

Several innovation initiatives can be related to *fair trade, certification and regulation* of collection of WFPs. Living-lab in Portugal focusing on pine nuts was to address issues of illegal trafficking, lack of regulation and control, which is similar to the need for clear harvesting regulation in Tunis and Slovenia. Clear rules on harvesting of WFP are needed widely as they are grounds for setting transparent relationships among collectors, landowners, and buyers (final consumers, traders or processors). This provides credibility and assurance of sustainable practices in WFPs supply chains. Moreover, harvesting certification for example was highlighted as a challenge in both Portugal and Tunisia, whereas quality assurance was the focus in the context of Slovenia, where a standardized species identification is needed as a system solution on a national level. Both would contribute to sustainable harvesting, ethical trade especially for final consumers and socio-economic development as harvesting would need to be agreed upon from the landowner as well.

The third segment of business model innovation fits the concept of *sustainable cultivation*, where looking at the potential of fertilization of truffle plantations to increase yields in case of Spain and trying to develop new collecting/processing opportunities in case of acorn, pine nut and pennyroyal production in Portugal, are all addressing the issue of fostering production capacities.
All cases of innovation are also examples trying to support collaborative partnerships, as cooperation among stakeholders across WFP value chains is imperative for success of new business models. This involves partnerships among forest owners, collectors, processors, traders, retailers, and consumers. Collaborative approaches ensure transparent supply chains, knowledge sharing, and joint decision-making for sustainable management of WFPs and support inclusive socio-economic development, especially of rural areas.

Investigating countries' reports on set-up phases of the living-labs also pinpoints the need to high-level of technical knowledge and transfer of know-how from research organisation (academia) to practitioners. Of concern is also an obvious lack of already existing policy or governance frameworks that would support living-lab process, except for the Italian case, where frequent roundtable-like events are organised by the directorate of forestry (Ministry of agriculture).
On of positive elements is also the fact that lots of stakeholders that might act as supporters for the innovation were identified and almost no blocker of veto-players. This indicates that business model innovation in WFP-sector have a good chance of success.

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Set-up phase	Partnering country						
	Italy	**Spain**	**Portugal: acorn**	**Portugal: pennyroyal**	**Portugal: nuts**	**Tunisia**	**Slovenia**
Purpose and scope of LL							
Why is a LL process needed and meaningful?	LL facilitates participation	LL facilitates participation	LL facilitates participation			LL facilitates participation	LL facilitates participation
Which purpose shall the LL serve?	To ensure the supply of wild and semi-wild truffles	To advance the use and knowledge of fertilizers in truffle plantations	To ensure economic and environmental sustainability			Developing innovative business models for the wild food sector	To develop quality certification scheme
Which spatial / temporal / thematic scope shall the LL have?	It has a national level scope; temporal scale 2021-2023	National	It has regional to national scope; temporal scale 2021-2023	National scope; start in 2021	Regional to national scope; start in 2021	It has a national level scope; temporal scale 2021-2023	It has a national level scope, despite the fact only several stakeholders were engaged; temporal scale 2021-2023
When in the process of developing innovative BM and to what extent is stakeholder involvement necessary, and for which aims?	Companies are the key stakeholders and their involvement has been crucial	Stakeholders are planned to be involved in all stages of BM development	Stakeholders are planned to be involved in all stages of BM development			Stakeholders are planned to be involved in all stages of BM development	Stakeholders are planned to be involved in all stages of BM development
Which roles shall LL stakeholders have in the process?	Acting as consultants and as co-creators	Acting as consultants and as co-creators	Acting as consultants, co-creators in some cases are only informed			Acting as consultants, co-creators in some cases are only informed	Acting as consultants and as co-creators

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What is the scope for influence the LL is intended to have upon WF sector?	To control price volatility	To increase knowledge on fertilization practices among truffle growers	To coordinate activities of partners for promotion of WFPs and strengthening value chains		To have a general impact on WF sector	To increase consumer safety – species identification
What are the (assumed) needs and knowledge demands of the local end-users and other LL participants?	Production stability is needed to facilitate environmental sustainability	Use of fertilizers in cases when spore traps are made; how fertilization affects truffle yields	Need of new business opportunities, sustainability and consumer safety		Need of clear framework of conditions for collectors, better regulation, and market opportunities	Need of standardized quality assurance
What are the (assumed) key topics of joint interest for the LL to work on? What are the (hitherto) priorities of the actors in charge of the LL process?	The stability of truffle production (investment into cultivation) Creation of a supply chain contract and a national association		The development of collecting / processing sector (business opportunities) Connecting stakeholders	To address illegal product trafficking; decreasing production due to climate change impacts; lack of regulation and control; challenges in harvesting; certification Connecting stakeholders	The national and regional barriers for collection, access to resources, and certification	Correct and easy-to-implement species identification
The context of the LL						
What are the exact drivers of the local LL process and the choice for BM solutions?	The lack and/or high volatility of raw material	Innovative truffle growing approaches	Innovative and new business opportunities (like in WildFood in general)		Innovative and new business opportunities	Transparent truffle trade

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						(like in WildFood in general)	
Which experiences have been made with stakeholder participation processes at the case site (or nationally) in the realm of WF BM?	Four technical discussions at the ministry of agriculture, coordination of the stakeholder for the creation of local association, coordination of the stakeholder on law proposal		An annual Iberian Acorn Conference since 2017	None	Several research institutes and associations support the development of the pine nuts sector in Portugal	No past experiences	No past experiences
What does the local stakeholder arena look like? Are there any noteworthy conflicts? What has been done to resolve these conflicts?	There are formal companies as well as commercial informal collectors (majority of suppliers)		Forest owners, small and family business, consumers	Producers and forest owners, small and family business, restaurants and consumers	Producers and forest owners, processors, retailers, confectioners and pastries, consumers	Diverse stakeholders (conflict between forest administration and WF collectors)	Few formal companies and several informal collectors that provide most of domestic supply
Which are the relevant local / regional policy and governance frameworks for the intended LL process to support BM innovation?	A common framework at a national level; a roundtable organized and coordinated by the directorate of forestry under the		No such framework			No such framework	No such framework

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	Ministry of Agriculture						
Are there any existing initiatives which the LL could be linked to?	Yes, to the national round table for the coordination of the national supply chain		None	Existing projects and associations that support the development of the aromatic and medicinal plants (MAP) sector	None	None	None
Stakeholders							
What is the geographical focus of the planned BM innovation, and which stakeholder arena is connected to it?	National	Regional to national	Local to regional and national scale			Forest areas at a national level	National
Who is directly affected by the planned BM innovation? Who benefits from the BM innovation? (= beneficiaries) Who is adversely affected by the BM innovation? (= burden)	Farmers, truffle dealers and industry	Truffle growers	-oak forest owners and related businesses -entrepreneurs, oak forest owners -no one	-companies -forest owners -no one	-producers -consumers -no one	Collectors, producers	Truffle pickers, consumers
Who is indirectly affected be the planned BM innovation? Who could have any interest to support or block the BM innovation?	Banks insurance companies and policy makers	Truffle traders, consumers	Consumers, policymakers		Policy makers	Forest administration, as resource owner/manager	Truffle traders
Who are key actors related to the BM innovation? Who possesses power in terms of legitimacy; networks and/or resources?	Truffle dealers and truffle industry	Truffle growers	Acorn related businesses, oak forest owners, research institutes	Producers, researchers, technical specialists, public bodies and companies		For legitimacy: policymakers, decision-takers, forest administration	Truffle collectors and the ministry of agriculture,

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					For networking: Agence de Promotion des Investissements Agricoles (APIA), Agence de la vulgarisation et de la formation agricoles (AVFA) For resources: collectors/local population	forestry and food
Who are real and/or potential veto-players of the planned BM innovation? (veto players are those who have the ability to decline an innovation being implemented in real life)	No one	No one	No one		Consumer can be considered as a real veto players, while policymakers could be potential veto players, being able to decline an innovative BM	Potentially truffle traders
Who are real and/or potential supporters of the planned BM innovation?	The ministry	Truffle growers	Policymakers, forest owners, WFP businesses (potentially consumers)		-collectors and producers -policy makers	Truffle collectors
Who are the relevant knowledge keepers to be able to contribute to the planned BM innovation?	Technicians and research institutes, together with the companies	Technicians and researchers	Technicians and research institutes, together with experienced stakeholders		The Forest administration, being resource managers	Truffle pickers, researchers (mycology)

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Working phase on co-creation

Majority of LL cases were focusing on developing an innovative service (5 out of 6), that would in a specific way support the supply of WFP:

- Italian case of the supply chain contract,
- Portuguese case on pennyroyal to increase business (selling) opportunities,
- Tunisian case on connecting stakeholders to overcome market imbalances,
- Slovenian case to assure transparent sales of product,
- Spain's case on micro-nutrient availability to increase production,

while one was focusing to increase demand:

- Portuguese campaign to strengthen awareness on dietary potential of acorns.

All cases involved focus on fostering economic sustainability, which indicates the need to improve the financial returns in business dealing with WFPs. Throughout the project this was raised as an issue multiple times and LL initiatives reflect that. Social and environmental sustainability were highlighted as well, just not as a priority (except in Slovenian case).

Co-creation phase by definition involves social innovation, as solutions developed addressed societal challenges, like poverty, inclusivity, community development, inequality and social cohesion. Especially, connecting stakeholders as in Italian case, case of pennyroyal in Portugal and Tunisia are such examples of building communities. The fact that all initiatives for various solutions came from different stakeholders indicates high level of inclusiveness and participation.

Very much the same holds for the aspect of education and learning as LL sessions were also opportunities to exchange ideas, know-how and other relevant information. Spain's case might be highlighted in this context as it involved a series of educational presentations on the role of nutrients in production of truffles from different experts. The outcome was that further research is needed, which can facilitate a continuation of the LL process. This kind of collaborative learning are good practices that contribute not only to the innovation process but also contributes to overall knowledge and skills of participants, to fostering of innovation and continuous improvement. This process is of course not only one way from experts closely related to the WildFood project but works the other way around as well. Project partners have learned a great deal from participants of LL sessions. This is especially true in case of Slovenian LL, where truffle business acts somehow in the shade of other forest-related activities and those involved in this were very hard to reach and to communicate. After the connection was made lots of valuable information about the state-of-art of this businesses was provided to the project partners.

Co-creation phase also provided an environment where some issues that are critical but latent in respect to a wider decision-makers' audience were raised and might otherwise not be. This is important also in the context of transferability of resulting solutions into other situations. All LL cases marked high level of reproducibility.

Finally, only minor concern was raised in terms of potential negative outcomes of proposed solutions. In the Tunisian case, there was an indication that the solution might increase business opportunities for entrepreneurs but can also bring the risk of overharvesting. Other case did not suggest any risks.

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Co-creation phase	Partnering country						
	Italy	**Spain**	**Portugal: acorn**	**Portugal: pennyroyal**	**Portugal: nuts**	**Tunisia**	**Slovenia**
Describe possible solutions to problems / challenges / issues defined in the first (set-up) phase of LL	Only one was describe – below	Only one was describe – below	Many; see country report for more details	Many; see country report for more details		Only one was describe – below	Only one was describe – below
Describe the proposed solution	Creation of a **supply chain contract**. Industry and traders guarantee the purchase of raw material for at least 50% of the production up to a maximum of 70%, leaving the remainder to be sold on the freely in the market	Identification of **four potential micronutrients that need to be analysed** in more depth; nitrogen, potassium, calcium and oxalate	Carry out **promotional campaigns** that publicize acorn as a product for human consumption	**Collaboration** with producers and other stakeholders' associations of aromatic and medicinal plants	*Co-creation phase for this WFP was not implemented*	**Agriculture Development Group** (DGA)	Standardized **quality check system** for truffles
What would the best solution resolve if it was implemented	It would sustain continuity of supply and allow access to credit for those without sufficient liquidity to invest in truffle cultivation plantation	Higher truffle yields	Public 'ignorance' on acorn being a viable food source might be overcome and acorn could be consumed more	It would help in identifying channels for pennyroyal and networking platforms		It would address the lack of competitiveness among SMEs, power imbalance among market stakeholders, and access to resources	Consumer safety as transparent species identification and quality assessment would be provide

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Who proposed the selected solution	Industry (processors), growers (farmers)	Truffle growers and scientific/technical stakeholders	Researchers together with company sector	Researchers and sector's industry		All stakeholders agreed on the proposed solution	The truffle pickers, who also act as salesmen
How feasible is the selected solution	Entirely, it is being implemented already		Entirely	Entirely, if there is enough interest		Entirely	Not entirely (it needs governmental support)
Who can implement the solution	The actors in the supply chain by themselves	Truffle growers themselves, upon future experiments on optimal combinations of micronutrients	The industry dealing with acorn products	The private sector (producers, processors, retailers) and public sector (academia, policy maker)		Collectors and producers	It needs a legislative framework to be developed first
What are the means needed to keep the sustain the proposed solution	-	Additional field trials are needed; some producers offered their land to implement studies	Depends on the target group and promotional strategy	Some structures and associations that can be used are already in place		Financial means, equipment and access to resources	Financial meads to support the establishment of lab facilities
To what extent did stakeholders approve the proposed solution	Fully	Future research is needed	The solution was approved by majority vote of stakeholders			Fully	Fully
Which element of sustainability does the proposed solution strengthen	Economic sustainability mostly	Economic sustainability mostly	Ecological, economic, and social sustainability			Economic and social sustainability	Social sustainability first
Does the proposed solution have negative outcomes as well	None identified	None identified	Increased acorn consumption could lead to: - T6. Competition with livestock farming	No negative outcomes have been highlighted		Potential pressure on natural resources (overuse)	None identified

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			- T7. Danger of industrialization in super-intensive orchards with impacts similar to those that have occurred in hedgerow olive groves - T8. Threat of patenting sweet acorn varieties that are common heritage of populations				
Who owns (if applicable) the proposed solution	The association of producers, processors and sellers	No one	Not applicable			Proposed solution is not exclusive, and no one owns it	No one
How transferable is the proposed solution into other geographical and cultural areas	Highly as stakeholders' landscape is similar on other countries	Highly into other areas with similar ecological conditions	Similar promotional campaigns could be implemented in various regions	Similar concept of collaboration could be applied elsewhere		Proposed solution can be easily transferable into other geographical and cultural areas, and is applicable for other aromatic and medicinal plants	Completely

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Which innovation type would be relevant for the proposed solution	BM acquisition (an additional BM is identified, acquired, and integrated)	BM transformation (there is a current BM that is changed into another BM)	BM diversification (current BM stays in place, and an additional BM is created)	BM transformation (between producers and other stakeholders)		BM transformation	BM acquisition

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Monitoring and evaluation phase

Evaluation of LL sessions in terms of number of stakeholders being actively involved highlight significant differences as some LL engaged larger number of participants (Italy, Spain, Portugal), whereas some were smaller (Slovenia). This might also reflect the state of WFP sectors in different countries, which can be supported by a limited participation of Slovenian stakeholders. WFP are not as nearly important in economic and cultural terms as they are in rest of countries, and this became more obvious when mapping of stakeholders was done and then later when they were invited to participate in LL sessions.

Another aspect is also an issue of effective stakeholders' engagement. By itself, involving multiple stakeholders and managing their diverse perspectives and interests can be challenging, but if stakeholders tend to be reluctant in being involved because of other reasons as well, then encouraging them to be present and active in LLs can be even more difficult. This was highlighted clearly in three cases: two for Portugal LLs, and one for Slovenian LL.

A key element of evaluation is estimating how much of stakeholders' know-how and information they were willing to share was taken into the process of designing of suggested solutions. The overall impression is that entirely, or at least as much as possible. This indicates a success of LLs in itself and also reassures stakeholders that their inputs were considered seriously. The assessment of how much their demands were taken into account reflects a similar outcome.

A very important fact is that only one LL-related solution was practically fully implemented – the case of supply chain contract in Italy – while the rest were developed up to the stage of a design-level. This meant that evaluation part was done partially, limited to assessment of stakeholders' engagement, uptake of their ideas and know-how, and the extent to which stakeholders' needs were considered when designing a proposed solution. As solutions were not implemented on a long-term the monitoring was not feasible.

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Monitoring and evaluation phase	Partnering country						
	Italy	**Spain**	**Portugal: acorn**	**Portugal: pennyroyal**	**Portugal: nuts**	**Tunisia**	**Slovenia**
Which stakeholders were actively involved in LL process	A group of 6 associations of truffle dealers and processors, and over 20 associations of truffle growers	A group of 11 experts - Arenas Francisco (Academia) - Bonet José-Antonio (session moderator) - Colinas Carlos (academia) - Martí Josep Maria (public sector) - Martínez de Aragón Juan (private sector, academia) - Navascués Damián (private sector) - Muxí Pere (private sector) - Oliach Daniel (academia) - Parladé, Xavier (academia) - Perales Julio (private sector) - Rodríguez Joaquim (public sector)	- Ana Fonseca (producer, processor, retailer) - Cristina Oliveira (potential consumer) - João Forte (processor) - José Luís Araújo (producer, processor) - Inês Conceição (academia) - Pedro Babo (academia, middlemen) - Ricardo Silva (producer) - Rita Beltrão Martins (retailer) - Susete Marques (academia, consumer) - Vitor Menas (producer, processor, retailer)	All from the case on acorn, with the addition of Luís Fulgêncio (producer, retailer)	*Monitoring and evaluation phase for this WFP was not implemented*	*Monitoring and evaluation phase for this WFP was not implemented*	- Ivan Ratoša (producer, retailer) - Žarko Volk (producer, middlemen) - Matjaž Beznik (truffle grower) - Tine Grebenc (academia)

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The degree to which stakeholders' knowledge and know-how served as input in co-design of the solution	Stakeholders provided ideas, suggestions and operational proposals which resulted in proposed supply chain contract	Stakeholders participated actively in the sessions	Despite the solution having been prepared prior to the meeting, stakeholders' knowledge was valuable in choosing and deepening its contours			Stakeholders provided ideas, suggestions and operational proposals
The degree to which stakeholders' demands on characteristics of the solution were considered	Fully (additionally, the same BM could probably be upscaled to a national level with some improvement and adjustments)	Fully	All demands that stakeholders pinpointed were considered			Fully
Any lessons learned that might be important as 'take-home' messages for the entire WildFood consortium.	*none*	Initial reluctancy in participating	Difficult to engage stakeholders			Difficult to engage stakeholders

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6. Conclusions

Living labs sessions were challenging to implement, however they provided abundant information, supporting environment to connect with other stakeholders and an opportunity to raise awareness on WildFood project. Overall goal was to deliver concrete ideas on innovative business models for WFP sector, and indeed LLs did so.

Seven different cases of innovation were defined, discussed, and then refined through at least two LL sessions per country. Two key phases of LL – set-up phase and co-creation phase –, were completed for six cases, dealing with three different individual WFPs (truffles, acorns, pennyroyal), and a general category of aromatic and medicinal plants. Therefore, WildFood provided more novel business models ideas than set in the proposal as a project goal. Moreover, all involved more than just three communities of interest (producers, retailers, sellers, processors, …) as set in the proposal as well.

Heterogeneity is a key premise looking at all LL outcomes. LL cases were done in five different countries, which all share Mediterranean character, however social-economic and cultural backgrounds can be entirely different, and this is reflected in variety of issues (and solutions) that were addressed in LLs. All but one, LL cases looked at solutions that would increase supply of WFPs, where one focused in supporting demand for WFPs.

The most challenging, was probably to engage stakeholders effectively. Even in this respect, LLs were not alike in all countries. Some, like Slovenia, experienced major obstacles when involving stakeholders, as there are few to begin with and moreover, they were reluctant to participate in project events. This was the case, where untransparent roles of individuals in the supply chain hamper collaboration, foster individualism, and mistrust. Unclear signals from policy what are future projections for the WFP sector in the past have contributed to that as well.

The variety of cases that were undertaken in LL sessions reflects the plethora of issues that stakeholders within WFP supply chain are dealing with. They originate from insufficient funds to support business, lack of raw materials for processing, untransparent legislative framework, inadequate connections with other stakeholders in the supply chain, ignorance of decision-maker and policy designers. Those are only few most critical issues WFP sector is dealing with and were raised among others on LL sessions and other project events. Despite future European policy, now comprehensively framed within the Green Deal, which emphasises the importance of new green jobs in rural areas, sustainable food solutions, circular bioeconomy and so forth, WFP are obviously not receiving the attention needed so that it could contribute to green transformation as much as it could. This is one of key messages WildFood consortium it trying to pass on to those having a power to change things, either on a national or European level.

There are also some limitations to this study, which need to be highlighted. LL focused on only few issues, but there a most likely mane more. In some cases, participation of stakeholder could be better in terms of covering the entire supply chain. Due to limited time and resources most of solutions in LLs were brought only to the stage of well-defined potential solutions, which were later not actually implemented (all cases but one). This limits the information on true applicability of solutions.

Given relatively high proportions of well-preserved nature in Europe also due to well embedded and long-lasting nature protection policies, nature's potential to harvest wild food products is immense even in Europe and relatively untapped – especially in some countries. Therefore, we have a significant potential to support the development of WFP sector, as this can bring many benefits. New jobs in rural areas, more

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diverse local cuisine, which might also attract high value-added tourism, increasing the locally produced foods, healthy diet due to practically pesticide-free products, etc. This deliverable adds to understanding, which are some of the main issues, and which solutions might be the best answer for them. We deliver these insights in hope that they make a change!

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