

: Designing innovative business models for the wild food products sector in several Mediterranean countries

Anže Japelj

Slovenian Forestry Institute, Ljubljana, Slovenia, anze.japelj@gozdis.si

Marta Rovira

Forest Science and Technology Centre of Catalonia, Solsona, Spain, marta.rovira@ctfc.cat

Miriam Piqué

Forest Science and Technology Centre of Catalonia, Solsona, Spain, miriam.pique@ctfc.cat

José Antonio Bonet

University of Lleida, Solsona, Lleida, Spain, jantonio.bonet@ctfc.cat

Daniel Oliach

Forest Science and Technology Centre of Catalonia, Solsona, Spain, daniel.oliach@ctfc.cat

Enrico Vidale

University of Padova, TESAF, Padova, Italy, enrico.vidale@unipd.it

Nicola Andrighetto

University of Padova, TESAF, Padova, Italy, nicola.andrighetto@unipd.it

José Guilherme Borges

Instituto Superior de Agronomia, joseborges@isa.ulisboa.pt

Inês Conceição

Instituto Superior de Agronomia, inesconceicao@isa.ulisboa.pt

Ibtissem Taghouti

National Research Institute of Rural Engineering, Water and Forests, Tunis, Tunisia, ibtissem.taghouti@upc.edu

Mariam Khalfaoui

National Research Institute of Rural Engineering, Water and Forests, Tunis, Tunisia, khalfaouimaryem@gmail.com

Kaja Plevnik

Slovenian Forestry Institute, Ljubljana, Slovenia, kaja.plevnik@gozdis.si

Tine Grebenc

Slovenian Forestry Institute, Ljubljana, Slovenia, tine.grebenc@gozdis.si

■ ABSTRACT

This study focused on developing innovative and sustainable business models within the wild food products (WFP) sector through participatory living lab sessions in five countries. The goal was to design business solutions addressing real-life challenges faced by stakeholders along the WFP value chain. The living lab approach involved three key phases: understanding the problem, co-creation and refinement of solutions, and evaluation and testing. Each country focused on specific WFPs, such as truffles, acorns, and aromatic plants, aiming to increase supply, economic sustainability, and social inclusiveness. Challenges were faced in engaging stakeholders, but the living lab sessions resulted in multiple innovative business model ideas, providing valuable insights for policy designers and decision-makers in promoting the potential of the wild food sector for rural development and sustainable practices.

■ KEYWORDS

Wild food products, Mediterranean, business models, innovation, living labs

■ 1 INTRODUCTION

Wild food products (WFP) are edible foodstuffs that can be found in nature and are most likely to be entirely uncultivated. However, some of those wild plant or fungi species are also being grown in plantations and are also being subjected to selection processes to increase some of the desirable characteristics, such as yield, aroma, size, shape etc. Those products can be an important part of peoples' daily diet or collected as a part of recreational or festive activities. In both cases wild food products can provide additional income in potential for creating new jobs, especially in rural areas. This is also recognized in the current EU strategy on forests up to 2030 as a part of the Green Deal initiative, which indicates that WFPs are seen as one of potential generators of future development.

This study focused on developing innovative and sustainable business models within the WFP sector by trying to design altered or new business approaches that would foster social inclusiveness, fair distribution of income, increased yield and quality of WFPs and sustainable harvesting practices.

The overall goal was thus to provide at least three innovative business models, each referring to one WFP. The work was done within WildFood project (PRIMA program). This was to be done in a participatory way, so that different stakeholder would be involved in innovation. By doing so we wished to design business solution that would be grounded upon actual and relevant issues entrepreneurs (i.e., stakeholders along the WFP value chain; producers, processors, retailers, wholesalers) are facing in real life. Thus, the potential uptake of solutions into designing future policies would be increased, helping that issues would indeed be addressed by policies and operational programs.

■ 2 METHODS

The innovation process was designed to be implemented within a series of living lab (LL) sessions, which were held in parallel in five countries: Italy, Spain, Portugal, Tunisia and Slovenia. Sessions were done according to practical guidelines for designing, preparing, implementing, and evaluating LL sessions. Those were based on previous research and already available general frameworks of the LL concept, and in addition to general information included also sets of questions that were to be answered by those participating in the innovation process. Questions were defined in a way to collect data needed to design innovative business models.

2.1 The Living lab 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 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 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 et al., 2021), however at minimum three are necessary (Fohlmeister et al., 2018), and those were adopted for this study:

- 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.

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.

Finally, the third phase is dedicated to the evaluation of the designed solution, which involves testing for its usability, benefits, and acceptance. This occurs iteratively through 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. 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).

2.2 Implementing LL sessions

All three phases of LL were done either in a series of group events, personal interviews, or even on-line survey, where a series of pre-defined questions were used as a guiding tool to steer discussions or to collect needed input via on-line surveys. LLs were done in five countries focusing on providing innovative business solutions for several different WFPs (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
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 WFP sector, and for aromatic and medicinal plants
Slovenia	truffles	Standardized quality testing facility (know-how) for truffles

■ 3 RESULTS

The results are presented as summarized reporting of all five countries on each of the three LL phases.

3.1 The set-up phase

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 (i.e., 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).

Table 2. Key outcomes of the set-up phase indicating the overall purpose of LL sessions in terms of what should the innovative business models provide

Set-up phase	Partnering country				
	Italy	Spain	Portugal	Tunisia	Slovenia
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

3.2 The co-creation phase

Co-creation phase 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.

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).

Table 3. Key outcomes of the co-creation phase indicating the proposed solution in terms of what should the innovative business models should be like

	Partnering country					
	Italy	Spain	Portugal: acorn	Portugal: pennyroyal	Tunisia	Slovenia
Description of the proposed solution	Creation of a supply chain contract. Industry and traders guarantee the purchase of raw material for min 50% of the production, max of 70%	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	Agriculture Development Group (DGA)	Standardized quality check system for truffles

3.3 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.

Another key issue of evaluation was how successful involvement of stakeholders was, while this had proven to be very challenging. This was highlighted clearly in three cases: two for Portugal LLs, and one for Slovenian LL, where engaging participation was difficult.

All LL sessions had up taken a great dela of participants' know-how and information within the innovation process. This indicates a success of LLs and reassures stakeholders that their inputs were considered seriously. The assessment of how much their demands were considered reflects a similar outcome.

One solution designed in LL sessions was also practically implemented; of supply chain contract in Italy, while the rest were developed up to the stage of a design-level.

■ 4 DISCUSSION AND CONCLUSION

Living labs sessions provided abundant information, supporting environment to connect with other stakeholders and an opportunity to raise awareness on WildFood project, but were challenging to implement as well. Overall goal was to deliver concrete ideas on innovative business models for WFP sector, and this was achieved.

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.

LL outcomes are very heterogenous as LL cases were done in five different countries sharing the 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.

One of key challenges, was probably engaging stakeholders. However, LLs were not alike in all countries. Some, as one in Slovenia, experienced major obstacles when involving stakeholders, as there are very few to begin with and moreover, they were reluctant to participate. This was a showcase, 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.

An obvious outcome of LL sessions was a variety of cases that were undertaken in LL sessions, which 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.

This study provided rich and valuable information for policy designer and decision makers to think how issues pertaining the wild food sector could be approached so that this sector would be more potent to provide new jobs in rural areas, more 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. It also adds to understanding which solutions might have most potential.

5 REFERENCES

- // Eriksson M., Niitamo V.-P., Kulkki S., Hribernik K.A. 2006. Living labs as a multi-contextual R&D methodology. 2006 IEEE International Technology Management Conference (ICE), IEEE.
- // Lupp G., Zingraff-Hamed A., Huang J.J., Oen A., Pauleit S. 2021. Living Labs-A Concept for Co-Designing Nature-Based Solutions. *Sustainability*, 13, 1: 188. <https://doi.org/10.3390/su13010188>.
- // Fohlmeister S., Zingraff-Hamed A., Lupp G., Pauliet S., Scolobig A., Linnerooth-Bayer J., Oen A. 2018. Guiding framework for tailored living lab establishment and concept and demonstrator case study sites, Deliverable 3.1 of the PHUSICOS project, European Union H2020 Programme. ETH Zurich.
- // Carayannis E.G., Campbell D.F.J. 2009. 'Mode 3' and 'Quadruple Helix': toward a 21st century fractal innovation ecosystem. *International Journal of Technology Management*, 46, 3-4: 201-234. <https://doi.org/10.1504/ijtm.2009.023374>.

Acknowledgements

This research was a part of WildFood (PRIMA programme supported by Horizon 2020; <https://prima-med.org/>) project "Eating the wild: Improving the value-chain of Mediterranean Wild Food Products (WFP)", which was coordinated by Forest Science and Technology Centre of Catalonia (CTFC).