



DELIVERABLE 3.4

THE BUSINESS CASE FOR MULTI-USE PLATFORMS: COSTS, BENEFITS AND LESSONS FROM PRACTICE

Work Package 3
Economics of multi-use platforms

December 31st, 2023





Grant Agreement number	862915
Project title	UNITED: multi-Use platforms and co-location pilots boostIng cost-effectIve, and Eco-friendly and sustainable proDuction in marine environments
Deliverable title	The Business Case for Multi-Use Platforms: Costs, Benefits and Lessons from Practice
Deliverable number	3.4
Deliverable version	Original Submission
Contractual date of delivery	October 31 st , 2023
Actual date of delivery	December 31 st , 2023
Document status	Final version
Document version	Version 2.0
Online access	Yes
Diffusion	Public
Nature of deliverable	Report
Work Package	WP3 – Economics of Multi-Use Platforms
Partner responsible	WUR
Contributing Partners	Deltares, Ecologic
Author(s)	Sander van den Burg, Sandra van Liere, Marcia Arredondo Riviera, Emma Huijben, Manuel Lago
Editor	Alex Ziemba; Ghada El Serafy
Approved by	Ghada El Serafy
Abstract	In the commercialisation of multi-use offshore platforms, various roles can be identified: producers, providers, networkers, consultants and academics. Each of these roles comes with their own generic business model that explains how each of the actors concerned aim to create value, cooperate with partners and clients and secure a revenue stream.



Funded by the European Union (H2020 Grant Agreement no 862915). Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them



Keywords	Innovation ecosystems, business models, multi-use, barriers, Horizon 2020
Change Log	Resubmission 1 – change in cover page and introduction tables

TABLE OF CONTENTS

LIST OF FIGURES.....	6
EXECUTIVE SUMMARY	7
1. INTRODUCTION	8
1.1. BACKGROUND	8
1.2. THE UNITED PROJECT	8
1.3. OBJECTIVE OF THIS DELIVERABLE.....	8
2. METHODOLOGICAL APPROACH	10
2.1. VISUALISATION OF STEPS TAKEN.....	10
2.2. ONLINE MEETING	10
2.3. QUESTIONNAIRE.....	10
3. CONCEPTUAL FRAMEWORK.....	12
3.1. THE QUADRUPLE HELIX MODEL.....	12
3.2. ENTREPRENEURIAL AND INNOVATION ECOSYSTEMS.....	12
3.3. ACTORS IN ENTREPRENEURIAL AND INNOVATION ECOSYSTEMS	13
3.4. DEFINING GENERIC BUSINESS MODELS.....	14
3.5. BUSINESS MODEL CANVAS.....	14
3.6. FROM INDIVIDUAL BUSINESS MODELS TO THE ECOSYSTEM PIE.....	15
3.7. FROM LAB TO MARKET.....	16
4. GENERIC BUSINESS MODELS FOR THE FIVE IDEAL-TYPE ROLES IN THE DEVELOPMENT OF MULTI-USE PLATFORMS AT SEA	18
4.1. IDENTIFYING DIFFERENT ROLES – REVIEWING THE UNITED CONSORTIUM.....	18
4.2. PRODUCERS	18
4.3. PROVIDERS	19
4.4. NETWORKERS.....	19
4.5. CONSULTANTS.....	20
4.6. ACADEMICS	20
4.7. FROM BUSINESS MODEL TO ECOSYSTEM PIE	21
5. IMPLICATIONS AND DISCUSSION	22
5.1. KEY OBSERVATIONS.....	22
5.2. SUCCESS FACTORS AND TRADE-OFFS.....	22
6. RECOMMENDATIONS AND CONCLUSIONS.....	24
6.1. TRANSFERABLE RECOMMENDATIONS FOR PRODUCERS	24
6.2. TRANSFERABLE RECOMMENDATIONS FOR PROVIDERS	24
6.3. TRANSFERABLE RECOMMENDATIONS FOR NETWORKERS	24



Funded by the European Union (H2020 Grant Agreement no 862915). Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them



6.4. TRANSFERABLE RECOMMENDATIONS FOR CONSULTANTS	24
6.5. TRANSFERABLE RECOMMENDATIONS FOR ACADEMICS	24
6.6. TRANSFERABLE RECOMMENDATIONS FOR GOVERNMENTS.....	25
6.7. CONCLUSIONS.....	25
REFERENCES AND LINKS	26



LIST OF FIGURES

Figure 1: Workflow for preparing Deliverable 3.4	10
Figure 2: ‘A quadruple helix guide for Innovations’ (Interreg North Sea Region, 2018)	12
Figure 3: Inclusive Innovation and Entrepreneurship Ecosystem (innovate.dti.gov.ph)	13
Figure 4: Innovation Ecosystem according to Suurs, 2009 (TNO, Regional Innovation Ecosystems, 2020)	14
Figure 5: An example, using the Business model canvas (Dalton et al., 2019)	15
Figure 6: Ecosystem Pie Model, Methodological Guidelines (Mapping, Analyzing and designing innovation ecosystems: the Ecosystem Pie Model, 2018)	16
Figure 7: The Innovation Ecosystem (Human Capital Online, 2019)	17
Figure 8: Number of UNITED partners in identified roles	22



EXECUTIVE SUMMARY

UNITED is a research project co-financed by the European Union Horizon 2020 programme. The acronym UNITED stands for Multi-Use offshore platforms demoNstrators for boosting cost-effective and Eco-friendly proDuction in sustainable marine activities. Deliverable 3.4 aims to *define generic business models for the commercial rollout of Multi-Use Platforms*. These models aim to support the sustainable operation of the multi-use platforms and colocation of activities offshore and showcase success factors from the pilots in bringing technology 'from lab to market'. To this end, the study team has reviewed and synthesized findings from other tasks, organised a workshop with pilot leaders and collected data from the pilots using a questionnaire.

The innovation ecosystems approach as a useful approach towards commercial rollout of multi-use platforms. Innovation, defined as creating and use of new ideas or methods, is a multi-actor process in which various actors play their role in developing and commercializing an innovation. Innovation is a process in which various phases can be identified. In different phases, the involved actors play different roles and have a different business model that makes it relevant for them to participate. As innovation progresses, role and business models change. This process of business model changing over time can be called *the business model journey*. Earlier UNITED deliverables have described the business model for the pilots.

This analysis takes a complementary approach. In the commercialisation of multi-use offshore platforms, various roles can be identified: producers, providers, networkers, consultants and academics. Each of these roles comes with their own *generic business model* that explains how each of the actors concerned aim to create value, cooperate with partners and clients and secure a revenue stream.

In the current phase of development, academics and producers are prominently involved in the development of multi-use platforms. In the business model journey, the relative importance of each of these roles is expected to change as producers and providers become increasingly important actors in the commercialization of multi-use platforms.

Three key recommendations for commercialisation are (1) secure a reliable revenue stream for companies active in multi-use platforms at sea, (2) develop a Human Capital agenda for multi-use and (3) support the development of a research infrastructure that allows for consistent, long-term experiment with multi-use platforms at sea as well as research on the impacts of these on environment and society.

1. INTRODUCTION

1.1. Background

The use of European seas is changing, under the influence of multiple major societal challenges. Concerns about climate change trigger the development of renewable energy production from the sea, such as offshore wind, wave and tidal energy. Food and resource security drive research and development for producing biomass from the seas. Tourism is a fast growing sector, for which coastal areas are of pivotal importance. Such new functions are added to the existing portfolio of maritime activities, including transportation, ports, sand extraction, fisheries and oil and gas extraction. The seas are also an important natural habitat, protected by legislation such as the Birds Directive (2009/147/EC) and Habitats Directive (92/43/EEC). All in all, these developments lead to a higher intensity of use of the sea. This can, and sometimes already does, lead to conflicting claims for space.

In this context, the concept of multi-use has gained popularity. Multi-use is seen as better way to make use of scarce sea space in conditions with favourable areas, and deliver efficiency gains that improve the economic performance of sectors.

1.2. The UNITED project

The UNITED is a research project co-financed by the European Union Horizon 2020 programme. The acronym **UNITED** stands for Multi-Use offshore platforms demonstrators for boosting cost-effective and Eco-friendly production in sustainable marine activities.

The UNITED project runs from 2020 until 2023 and provides evidence for the viability of ocean multi-use through the development of five demonstration pilots in the real European marine environment. UNITED will:

- Address current bottlenecks relating to the large-scale installation of ocean multi-use activities;
- Demonstrate business synergies and benefits of ocean multi-use;
- Provide a roadmap for deployment in future multi-use sites and potential scaling barriers to be addressed through best practices and lessons learnt

UNITED enhances the technology readiness levels of multi-use solutions, involving industrial actors and integrating knowledge, technologies and facilities. It will also propose business models to reduce operation costs and generate benefits to all sectors involved.

Demonstrating the success of the UNITED pilots will boost the capacity of the Blue Economy within European waters and increase the efficiency and multi-functionality between traditionally competing interests in these sectors.

1.3. Objective of this deliverable

The specific objectives of UNITED WP3 are to:

- Define an appropriate multi-methods approach to assess costs and benefits at the implementation level and pilot level, taking into account the impacts of multi-use and co-location on ecosystem functions and services and socio-economics.
- Develop generic business models for the commercial rollout of Multi-Use Platforms to promote their uptake, upscaling and lessons learned from in practice.

According to the Grant Agreement Task 3.4 aims to build *generic business models* for the commercial rollout of Multi-Use Platforms, highlighting the transferability and upscaling potential of these pilots. These models aim to support the sustainable operation of the multi-use platforms and colocation of activities offshore, showcase success factors from the pilots in bringing technology 'from lab to market', and highlight possible trade-offs and costs for other sectors (e.g. fisheries, tourism, and marine transportation).

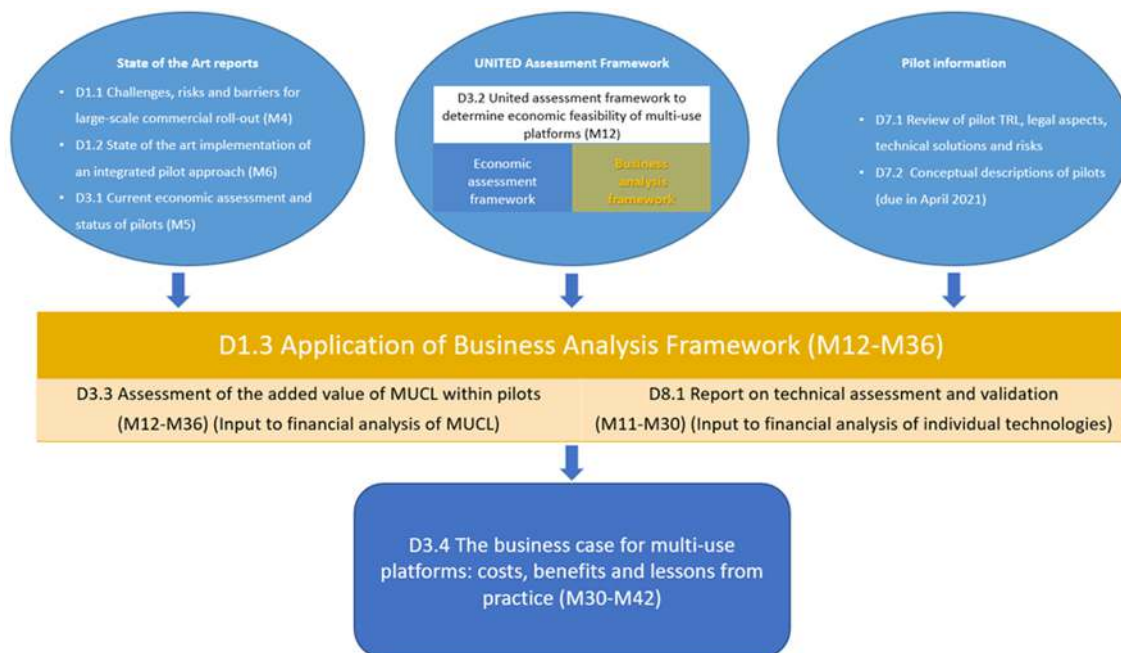
Our interpretation of this task is the following:

- This task looks into the future developments;
- This task is part of the Work Package 3 “Economics of multi-use platforms” and focusses on the business models, not on topics such as the developed technologies, site location or environmental impacts;
- This task builds upon – but does not repeat - earlier work on the business models for the pilots (see next slide);
- Instead, it analyses how various actors in multi-development relate to each other within innovation ecosystems, how each of them benefits from being part of an innovation ecosystem;
- And it formulates transferable recommendations for future multi-use innovation ecosystems.

Task 3.4 is linked to, and builds upon, other tasks and deliverables in UNITED:

- Deliverables 1.1, 1.2 and 3.1 are seen as background studies, providing insight into the business model for the pilots.
- The assessment framework for determining economic feasibility is discussed in Deliverable 3.2 and applied at the pilot level in D1.3 (business analysis) and D3.3 (economic impact assessment).
- Detailed information on the pilots, and the challenges they face, is provided in D7.1 and D7.1.

The work presented in this Deliverable 3.4 builds upon these results, taking a step back to identify generic business models.



2. METHODOLOGICAL APPROACH

2.1. Visualisation of steps taken

To identify, describe and analyse *generic business models*, the study team took the following six steps to reach conclusions on the necessary ingredients for the development of multi-use platforms and the evolution from initial pilots to mature business models. We did not repeat the work from other UNITED activities yet choose to evaluate the relevant information on business models such as the canvasses made for the different pilot partners. Next, we went on to explore literature on (generic) business models in relation to the specifics of multi-use. We involved the pilot partners in our explorations, through an online workshop and a questionnaire. As a result of those steps, we choose to deepen our insights into the various roles of partners in the pilots over time and connected our search with theories on innovation ecosystems and entrepreneurial ecosystems. In the final section of this deliverable, we share insights, conclusions and recommendations.

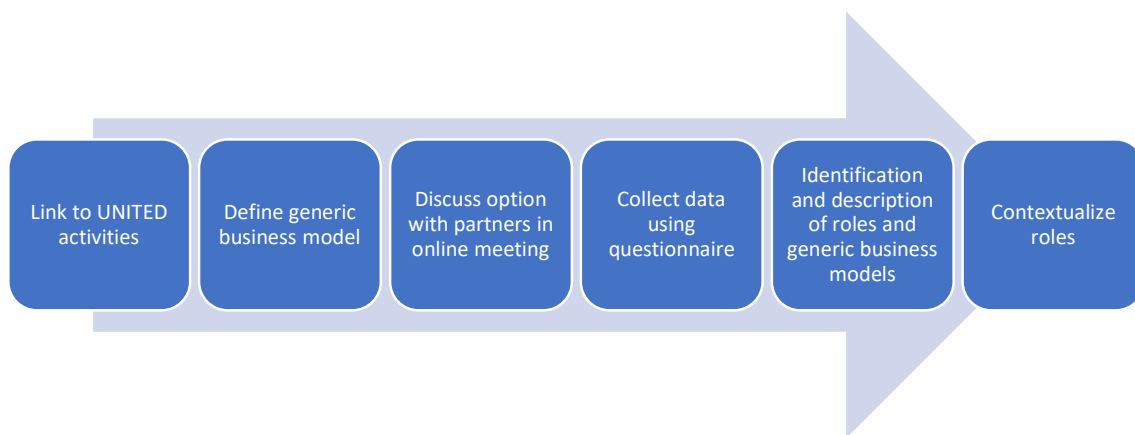


Figure 1: Workflow for preparing Deliverable 3.4

2.2. Online meeting

An online meeting was organised on 10 July 2023, with 13 participants representing the following organisations among them pilots and other stakeholders: Acteon, Submariner Network, Oceans of Energy, Hidromod, FuE-Zentrum Kiel, Colruyt Group, North Sea Farmers, WING, Ghent University. All pilots were represented in the meeting.

Discussions took place on the subject and interpretation of generic business models and the experience of working together in the UNITED pilots. The conversation highlighted the search for generic concepts that will be helpful in the professionalisation and scale-up of the current pilots and future multi-use platforms.

One relevant conclusion at the time was that the pilots are all very different from each other in various aspects, such as the maturity of the initiative (in which phase of development the pilot is) and the bottlenecks that influence the pilot's prospect to actually develop towards commercialisation. Given this diversity across the pilots, the pilots as such can not deliver the ingredients for one 'generic' multi-use business model.

2.3. Questionnaire

After the workshop, a questionnaire was sent to the various pilots, with the following line of questioning:

- Mission and objectives of the (lead) organisation in the pilot
- Future mission and objectives with regards to multi-use
- Parties involved in the pilot, roles, formal arrangements and decision making



A short conclusion based on the replies:

- Mission and objective range from an emphasis on pioneering and exploring business opportunities to gaining new knowledge and value driven innovation.
- The pilots are different in terms of parties involved and the main focus and mission of the pilot (such as scale up commercial cultivation, decarbonize the food value chain or realize cutting edge ICT solutions) and the phase they are currently in (such as explorative research, experiments or data collection).
- Roles, formal arrangements and decision-making processes need to be customised per pilot, considering that each pilot is an innovation process in movement.
- Realtime interaction between partners in the pilots is essential for progress and each partners brings in their own expertise and ambitions to realise that progress.

3. CONCEPTUAL FRAMEWORK

3.1. The quadruple helix model

- The quadruple helix model is selected as framework to look at the innovation process for multi-use and co-location at sea.
- It states that innovation and development strategies are depending on a well-functioning quadruple helix model.
- It emphasizes that four main sectors of society – business, research and education, public administration and civil society/users – collaborate during research and development processes.
- Aims for a situation where the main protagonists of innovation-generating processes interact for accelerating the transfer of research and innovation results.

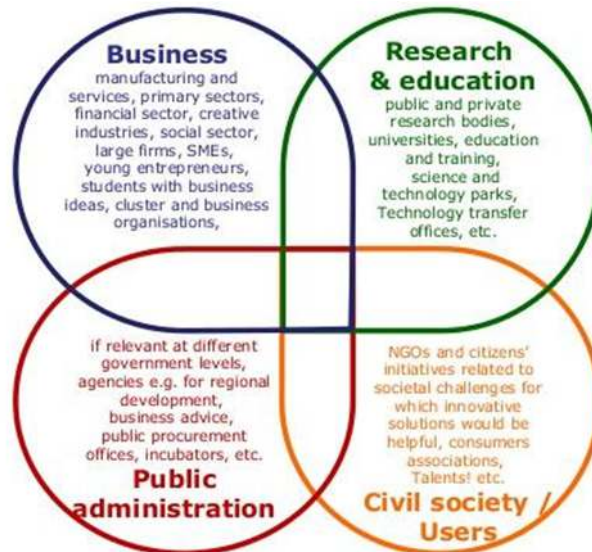


Figure 2: 'A quadruple helix guide for Innovations' (Interreg North Sea Region, 2018)

3.2. Entrepreneurial and innovation ecosystems

- The quadruple helix needs to be involved (and organised) to bring about innovation. This requires an innovation and entrepreneurial ecosystem.
- An innovation ecosystem is an interconnected network of organisations, businesses, and other entities that share capabilities, knowledge, skills, or technologies to collaborate on developing new products and services.
- An entrepreneurial ecosystem can be defined as a blend of social, economic, cultural, and political components coordinated in a way that enables productive entrepreneurship within a particular territory or a region. It is created to support the businesses and startups that are being commenced.

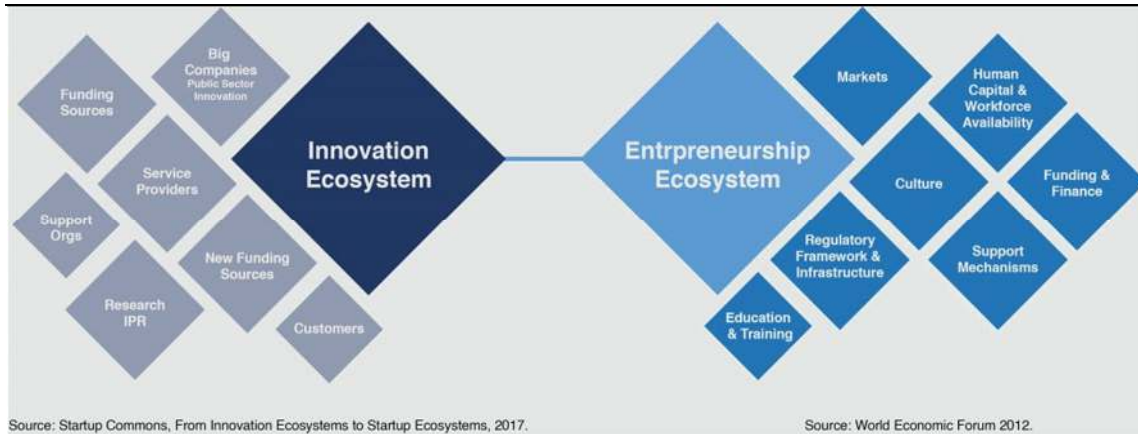


Figure 3: Inclusive Innovation and Entrepreneurship Ecosystem (innovate.dti.gov.ph)

3.3. Actors in entrepreneurial and innovation ecosystems

- Innovation and entrepreneurial ecosystems consists of various actors.
- Each of these have, to some extent overlapping:
 - Visions,
 - Objectives,
 - Strategies
- And each actor needs to consider what the potential benefits of their participation are (“what’s in it for me”), taking into account how they add value according to their own mission and ambitions and/or ensure that costs are covered by revenues.
- In other words, being part of a joint innovation process, each actor has their own business model to justify their involvement, while working (together with other actors) towards a mature business case.

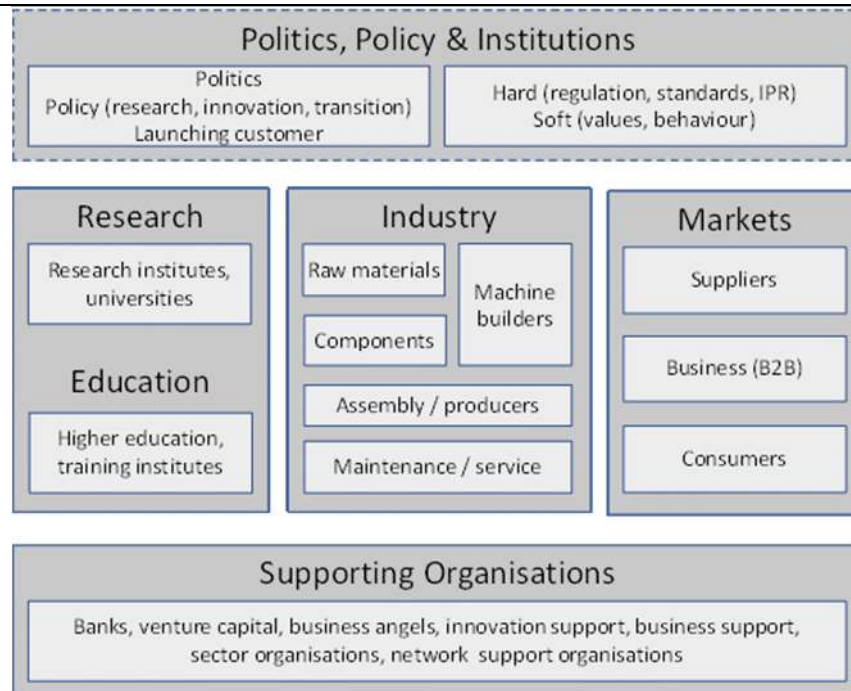


Figure 4: Innovation Ecosystem according to Suurs, 2009 (TNO, Regional Innovation Ecosystems, 2020)

3.4. Defining generic business models

There is not one universal definition of (generic) ‘business models’. Literature shows a variety of different approaches. For example, there are definitions emphasizing the format of the business, focusing on the funding of the organisation or emphasizing the role of actors.

- Emphasizing the format to describe a business model. [transentis | A Generic Business Model Blueprint](#)
- Emphasizing different ways in which a company can be funded, for example identifying 7 of the more frequently encountered generic business models including e.g. “investor funded deficit model” and “classic cost reduction”. [11.6 Generic business models | GlobalSpec](#)
- Emphasizing the role of actors and how that related to its providers and clients and. Duff describes four generic business models: creator, distributor, landlord and broker. [Why Does Each Generic Business Model Require a Different Set of Business Level Strategies? \(chron.com\)](#)

A business model is a structure, design or framework that a business follows to bring value to its customers and clients (to create or capture value). In the context of UNITED, a ‘generic business model’ is defined as: the various roles that are played by different actors in developing multi-use platforms at sea, analysed looking at the way an organisation creates and adds value to this development by means of their own core business.

3.5. Business Model Canvas

Generic business models are often described using the Business Model Canvas. The Business Model Canvas has already been used in UNITED to describe business models for the pilots (see concept outlines in D3.2 and application in the pilots in D1.3).

The aim of the Business Model Canvas is to describe how the actors involved in the pilot create, capture, and deliver value. Business Model Canvas is a visual tool: it describes the pilot business model through 9 building blocks (Joyce and Paquin, 2016).

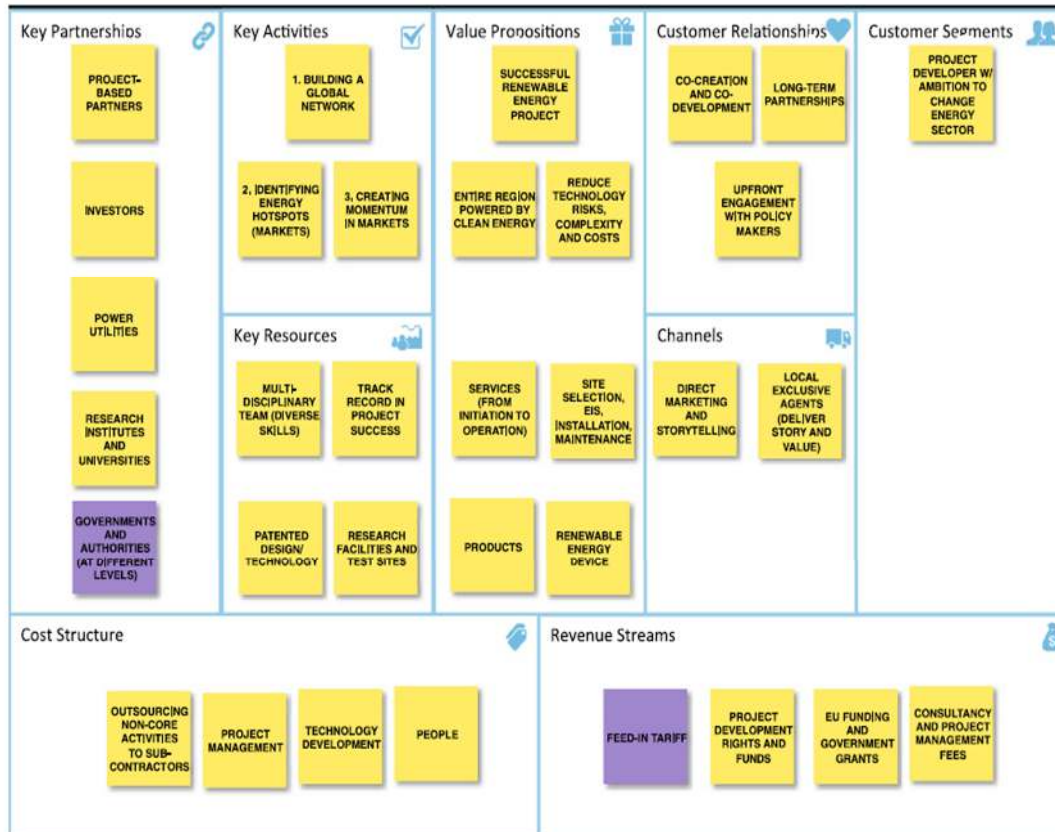


Figure 5: An example, using the Business model canvas (Dalton et al., 2019)

3.6. From individual business models to the Ecosystem Pie

Zooming out, the Ecosystem Pie model captures how actors in an ecosystem interact in creating and capturing value. It visualises what each actor brings to the table and provides an overview of available resources, activation, value addition and value capture in the entire innovation ecosystem. The Ecosystem Pie model can be used to identify overlapping and/or missing resources and activities, highlight additional strategies for value addition or value capture.

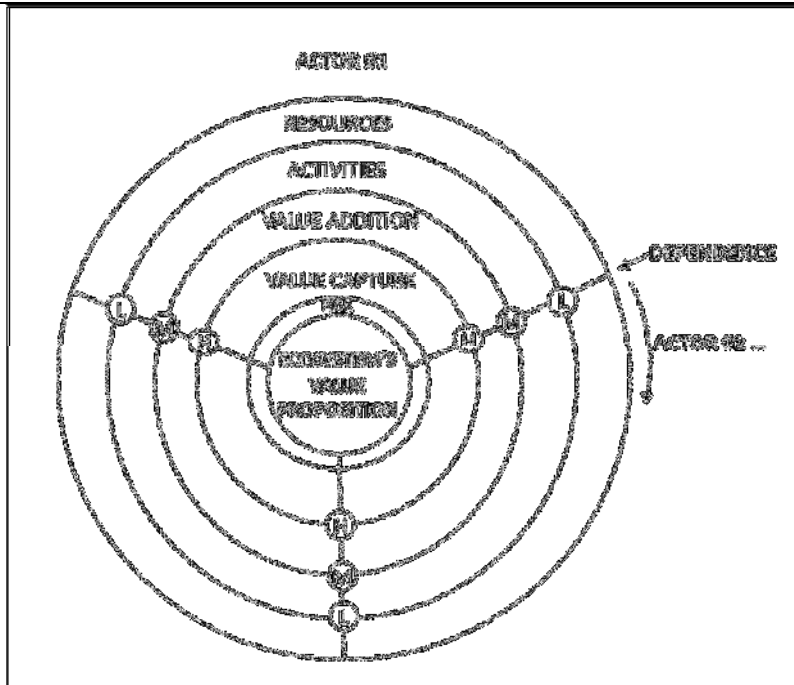


Figure 6: Ecosystem Pie Model, Methodological Guidelines (Mapping, Analyzing and designing innovation ecosystems: the Ecosystem Pie Model, 2018)

- **Resources:** the basis of firm-specific value creation (Penrose, 1959) and in order to understand the origin of the value addition by a specific actor in an ecosystem, one needs to understand the resources of that actor.
- **Activities:** the mechanisms by which an actor generates its productive contribution to the ecosystem.
- **Value addition:** As an outcome of its activities, each actor contributes to the ecosystem in the form of a productive component.
- **Value capture:** represents how, what kind, and how much value created by the ecosystem is captured by a particular actor. The opportunity to capture value is a key motivation to join an ecosystem.
- **Dependence:** The extent to which the success of the actor is related to that of the ecosystem represents the 'dependence' of that actor on the ecosystem.
- **Risk:** an actor-level construct representing the likelihood of a particular actor to fail to contribute its specialized value addition. The unwillingness or the inability of any actor to contribute would undermine the prospective performance of the whole ecosystem and thus warrant action from other actor.

3.7. From lab to market

It should also be emphasized that innovation is a process, in which the balance between different roles changes. Experience and evidence collected can help to transition to a next phase. In new phases, new actors need to be involved.

Formulating transferable recommendations is instrumental to:

- Ensure that new multi-use and co-location developments learn from past experiences
- Ensure that an individual development that moves to a next phase reflects on and learns from what was done

The Innovation Ecosystem

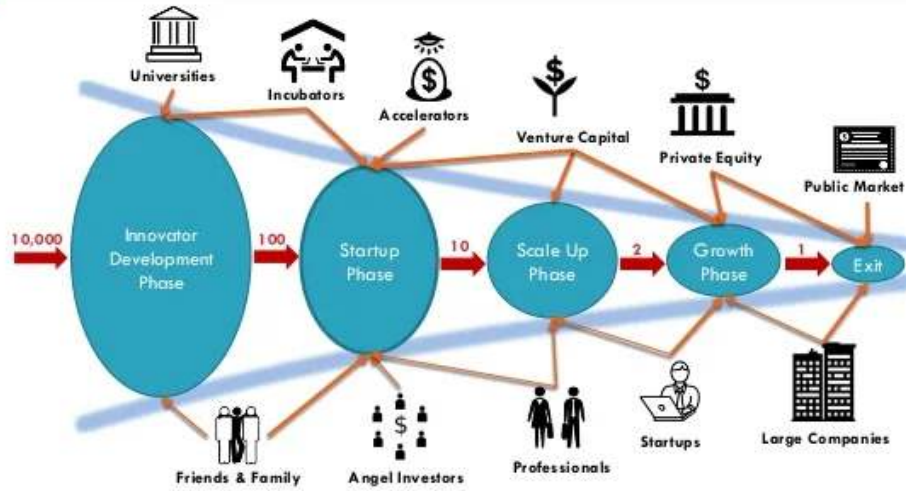


Figure 7: The Innovation Ecosystem (Human Capital Online, 2019)

4. GENERIC BUSINESS MODELS FOR THE FIVE IDEAL-TYPE ROLES IN THE DEVELOPMENT OF MULTI-USE PLATFORMS AT SEA

4.1. Identifying different roles – reviewing the UNITED consortium

Reviewing the contribution of different organisations in developing multi-use platforms at sea in the UNITED project, we distinguish between the following five roles:

Role	Description	Examples from UNITED
Producers	Actors involved in the ‘primary’ production process at the offshore facilities (for example energy, aquafarming, tourism)	Oceans of Energy, Seaweed Company, Brevisco, Parkwind, Kieles Meeresfarm, Planet Blue, Kastelorizo
Providers	Actors that are involved in the value/supply chain of the producers, in a sense that they provide raw materials or services	WINGS, Colruyt Group, 4h-Jena, Hidromod, Ventolines, Jan de Nul Groep
Networkers	Actors that focus on connecting while representing (a group of) actors or interests	North Sea Farmers, Submariner
Consultants	Commercial parties that provide consultancy and advice	Acteon, Ecologic
Academics	Actors that provide (new) knowledge and arguments for decision makers	WUR, FuE, UGent, Deltares, RBINS, TNO, Syddansk University

4.2. Producers

Canvas for role: Producers (example in UNITED-project is Colruyt Group in the Belgian pilot)

Key partners Providers of materials and services Actors further along in value chain who buy products and services	Key activities Production of goods such as biomass, electricity Production of services site visits, leisure opportunities	Value Propositions Operate business at sea to create value to its consumers. This can include the production of materials (food), energy or services (tourism)	Customer relationships Subscriptions Contracts Single-time transactions Networks (electricity)	Customer segments B2C, such as <ul style="list-style-type: none"> • Consumers • Tourists B2B consumers, such as <ul style="list-style-type: none"> • Retail • Energy companies • Tour operators
	Key resources Expertise on production processes Human resources Infrastructure & facilities Network of providers		Channels Auctions (such as mussel or fish) Direct sales Retail Processors Electricity network	
Cost structure Cost of labour Cost of infrastructure		Revenue streams Sales of products Sales of services Project based funding		

4.3. Providers

Canvas for role: Providers (example in UNITED-project is WINGS in the Greek pilot)

<p>Key partners Producers who make use of the services, software and materials provided</p> <p>Networkers who bring providers into contact with the producers</p> <p>Academia and consultancy to help producers with the development of services, software and materials</p>	<p>Key activities Development and provision of software</p> <p>Development and provision of intermediate products</p> <p>Key resources Software Materials Human resources</p>	<p>Value Propositions Provide materials and services that help producers to develop multi-use platforms at sea.</p>	<p>Customer relationships Direct relationships (know each other)</p> <p>Projects</p> <p>Channels Research projects</p>	<p>Customer segments Producers running multi-use platforms at sea from various sectors such as</p> <ul style="list-style-type: none"> • Energy • Tourism • Food
<p>Cost structure Cost of labour Materials + infrastructure needed to develop services and software</p>		<p>Revenue streams Sales of materials and services Project based funding for development of materials and services</p>		

4.4. Networkers

Canvas for role: Networkers (example in UNITED-project is North Sea Farmers in the Dutch pilot)

<p>Key partners Producers, companies along the entire value chain</p> <p>Non-governmental organisations</p> <p>Public sector</p>	<p>Key activities Organisation of events Exchange information via newsletters and other means Actively linking actors to each other</p> <p>Key resources Human resources Network of actors involved in multi-use platforms at sea Networking skills</p>	<p>Value Propositions Benefit the development of multi-use platforms at sea by bringing together various actors and actively stimulate the exchange of knowledge and ideas.</p>	<p>Customer relationships Trust Informal relations</p> <p>Channels Newsletters Members events Public events</p>	<p>Customer segments Private sector organisations NGOs Public authorities</p>
<p>Cost structure Costs of labour Costs of running networks (IT, facilities, rooms)</p>		<p>Revenue streams Membership fees Project based funding</p>		

4.5. Consultants

Canvas for role: Consultants (example in UNITED-project in current phase is Ecologic in multiple pilots)

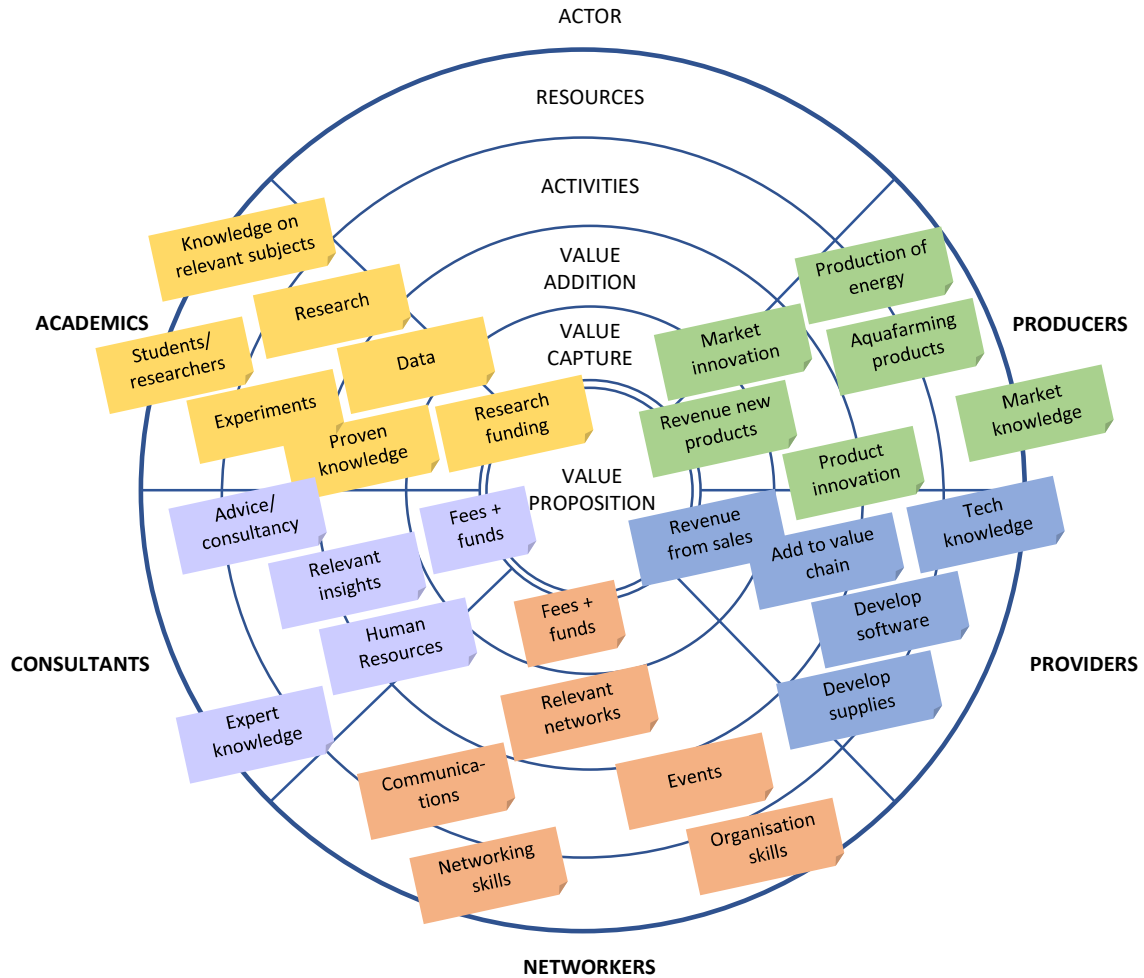
Key partners Private sector producers Government Academics	Key activities Collection and analysis of data and insights needed for the development of multi-use platforms	Value Propositions Support the private and public sector in developing multi-use platforms, bringing in expertise and human resources	Customer relationships Direct relations and networks Calls for proposals	Customer segments Private sector: energy companies, aquaculture companies Public sector: governments at various levels
	Key resources Human resources		Channels Existing networks Network events Publications Opinion pieces	
Cost structure Cost of labour Cost of infrastructure (IT, offices)		Revenue streams Project based funding, including full funding from private sector and government co-funded projects		

4.6. Academics

Canvas for role: Academics (example in UNITED-project is Ugent in the Belgian pilot)

Key partners Private sector (whose involvement is required in various calls for proposals) Government Other funding agencies	Key activities Conduct research Disseminate results through scientific publications and other materials	Value Propositions Academics conduct research and teach students on multi-use platforms that provide insight to private and public actor, enabling them to further develop multi-use platforms.	Customer relationships Funding based on the quality and proposals Networks enable academics to influence the content of research calls	Customer segments Government Research agencies
	Key resources Human resources, skills and expertise Educate students Research infrastructure		Channels Teaching Scientific publications Conference presentations	
Cost structure Costs of labour Cost of materials in pilots		Revenue streams Funding for research projects, from local, national, European Union Funding for education		

4.7. From business model to Ecosystem Pie



5. IMPLICATIONS AND DISCUSSION

5.1. Key observations

In the current situations of the UNITED-pilots, many of the generic business models, at least partially, rely on project-based funding as a revenue stream. Other revenue streams include membership fees and sales of products.

Human resources are a key resource for all roles. This means that knowledge of, and experience with, multi-use is largely 'in the heads' of people. This is largely learned by doing. Training for multi-use can increase the knowledge base among workers active in the sectors concerned.

Currently producers and academics are strongly featured in the innovation process, while providers are more scarcely represented (see figure).

Consultants involved in this stage of development of multi-use play a role of knowledge broker and/or think tank. Big consultancy firms that are active in design and engineering of offshore farms (such as ARUP, RHDHV and the like) are not (yet) involved.

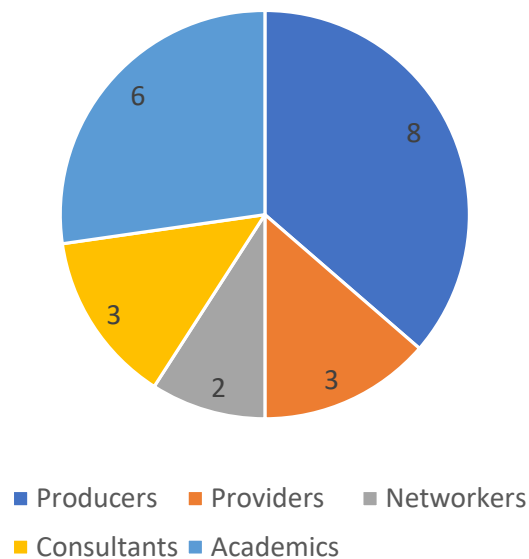


Figure 8: Number of UNITED partners in identified roles

5.2. Success factors and trade-offs

Innovation ecosystems require a mix of actors, providing different knowledge, expertise and access to test facilities and the market (Granstrand & Holgersson, 2020). The UNITED project successfully involved producers, enabling the testing of multi-use technology in real-life.

Cooperation between various actors requires formulating formal and informal 'rules of the game'

- Formal rules include issue of liability, insurance, appointing a pilot lead and formulating a decision-making process
- Informal rules include open communication, balancing transparency and confidentiality



Innovation is a process to create value, but it is not always a win-win process. Innovations create value by definition, being new to all and useful to some actors, but also tend to destroy value, being harmful to some actors (Schumpeter, 1942).

Identified trade-offs in the innovation process include:

- Identifying whether fundamental or applied research is priority
- Speedy development vs complex processes for decision making and stakeholder involvement

6. RECOMMENDATIONS AND CONCLUSIONS

6.1. Transferable recommendations for producers

For commercialisation of multi-use platforms at sea, it is crucial that the producers of energy, food and other goods and services are involved in and committed to the required innovation processes. The innovation process will benefit from strong producer involvement to get a better understanding of the needs, interests and desires to take into account.

We recommend producers to:

- Recognize their pivotal role in further development of multi-use and take responsibility to bring the concept further.
- Adopt an open perspective while looking into the potential of multi-use and search for angles where combinations of interests and value propositions create benefits for both/all parties
- Adopt and/or involve actors/stakeholders that have the potential to solve issues or add required value (knowledge, products, services, etc)
- Be involved in the innovation process to ensure that producer needs and demands are recognized.

6.2. Transferable recommendations for providers

Various providers now provide goods and services to the producers, enabling the latter to operate at sea. Dedicated goods and services for multi-use are developed.

We recommend providers to:

- Develop goods and services that cater to the needs of producers (and ultimately end users and consumers).
- Play a stronger role in research projects with a focus on delivery of goods and services.
- Built stronger relationships with the producers, consultants and academics to ease the developmental process of multi-use.

6.3. Transferable recommendations for networkers

Various organisation have come to play a networking function in the development of multi-use platforms at sea, bringing together the various actors involved and liaising knowledge and expertise.

We recommend networkers to:

- Expand their networks to include more producers in innovation towards multi-use platforms at sea.
- Ensure the various networking activities are coordinated to avoid competition between networks.

6.4. Transferable recommendations for consultants

Consultancy firms are involved in various innovation projects, including UNITED. They provide services that can help the private sector – both producers and providers – to move forward in commercialisation of multi-use platforms at sea.

We recommend consultants to:

- Develop services required/needed by the sectors for further commercialisation.
- Link existing multi-use services to more traditional services, for instance in the field of permitting, impact assessment and financial services.

6.5. Transferable recommendations for academics

Universities and research institutes have played an important role in developing and testing concepts for multi-use at sea.

We recommend academics to:

- Strengthen links to the providers and producers to work on research projects that benefit further commercialisation of multi-use platforms at sea.
- On the other hand, keep doing independent research into the feasibility and potential (environmental and socio-economic) impacts to advise decision-makers.
- Consider how scientific research and science-based evidence can help to transition to the next phases in the commercialization process of multi-use platforms.

6.6. Transferable recommendations for governments

Governments play a pivotal role in the development of multi-use platforms at sea, not only because of their role in maritime spatial planning, regulations and permitting (see UNITED deliverables 6.1 – 6.4). Governments also play a key role in project funding, important for the business model of all actors.

Looking into the future, we recommend to:

- Monitor the economic viability of multi-use platforms to recognize when to step in, and when not.
- Ensure public interest is taken into account in commercialisation of multi-use platforms at sea.
- Support research and innovation that helps to move to next phases in the commercialisation of multi-use platforms at sea.
- Take a value chain perspective to avoid focus on the lead firm. Support providers in shaping the value chain of multi-use platforms at sea.

6.7. Conclusions

The commercialisation development of multi-use platforms at sea requires successful innovation and entrepreneurial ecosystems. This in turn requires that the various actors involved can add value to the innovation process and be rewarded for their investments and expenses.

This deliverable identifies 5 key roles in the innovation process, each adding to the innovation process.

At this moment, project-based funding is a key revenue stream supporting the business case for each of these roles. In the innovation and entrepreneurial ecosystems, academics and producers are strongly represented. Other actors in the value chain, such as providers of goods and services and consultants, are underrepresented. Transitioning to the next phases in the commercialisation of multi-use platforms at sea requires insights and evidence into the potential of multi-use as well as a secure and reliable revenues stream, human resources and infrastructure.

Three key recommendations for commercialisation are therefore:

1. Secure a reliable revenue stream for companies active in multi-use platforms at sea. This means a move away from project-based funding towards other funding instruments that reward the contribution of multi-use operations to efficient use of space and, if relevant, protection of nature and provision of ecosystem services.
2. Develop a Human Capital agenda for multi-use. All generic business models rely on human resources yet the skills to work together in a multi-use platform need to be taught and experienced via professional education.
3. Promote the establishment of a research framework facilitating sustained, extensive experimentation with multi-use platforms at sea, while also conducting research on their environmental and societal impacts.

REFERENCES AND LINKS

Dalton, Gordon, et al. "Feasibility of investment in Blue Growth multiple-use of space and multi-use platform projects; results of a novel assessment approach and case studies." *Renewable and Sustainable Energy Reviews* 107 (2019): 338-359. <https://doi.org/10.1016/j.rser.2019.01.060>

Ecosystem Pie Model, Methodological Guidelines (Mapping, Analyzing and designing innovation ecosystems: the Ecosystem Pie Model, 2018)

[Entrepreneurial Ecosystem: All You Need To Know | OpenGrowth](#)

European Committee of the Regions, Volpe, M., Friedl, J., Cavallini, S. et al., *Using the quadruple helix approach to accelerate the transfer of research and innovation results to regional growth*, Committee of the Regions, 2016, <https://data.europa.eu/doi/10.2863/408040>

Globalspec.com. Generic business models. Online : [11.6 Generic business models | GlobalSpec](#) Accessed 2023

Granstrand, Ove, and Marcus Holgersson. "Innovation ecosystems: A conceptual review and a new definition." *Technovation* 90 (2020): 102098. <https://doi.org/10.1016/j.technovation.2019.102098>

DTI. Inclusive innovation and entrepreneurship ecosystem. Online: [Inclusive Innovation and Entrepreneurship Ecosystem · innovate.dti.gov.ph](#) Accessed 2023

Joyce, A., & Paquin, R. L. (2016). The triple layered business model canvas: A tool to design more sustainable business models. *Journal of cleaner production*, 135, 1474-1486. <https://doi.org/10.1016/j.jclepro.2016.06.067>

Popa et al (2021) Quadruple Helix Collaborations in Practice: Stakeholder Interaction, Responsibility and Governance. <https://riconfigure.eu/publication/quadruple-helix-collaborations-in-practice/>

Human Capital Online. The Innovation Ecosystem. Online : [The Innovation Ecosystem \(humancapitalonline.com\)](#) Accessed 2023

Transentis. A generic business model blueprint. Online : [transentis | A Generic Business Model Blueprint](#) Accessed 2023

Chroncom. Why Does Each Generic Business Model Require a Different Set of Business Level Strategies? Online: [Why Does Each Generic Business Model Require a Different Set of Business Level Strategies? \(chron.com\)](#) Accessed 2023