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EXECUTIVE SUMMARY OF THE THESIS

## What is the contribution of Open Innovation on Net Zero?

TESI MAGISTRALE IN MANAGEMENT ENGINEERING – INGEGNERIA GESTIONALE

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### 1. Introduction

The world is facing a very threatening decade: a period in which we can already see the effects of climate change on our lands, on our cities, and on our habits. Climate change is driven by anthropogenic activities and caused by a large quantity of yearly GHGs emissions (nearly 51 Gt of CO<sub>2</sub>eq in 2020), that are not going to drop in the short/medium-term (Rockström et al., 2009).

To tackle this issue the economy must transition toward a net-zero GHG emission. Net-zero transition requires the adoption of several radically new technologies. This rate of innovation requires private organisations to collaborate with external partners, through methodologies like Open Innovation.

Open innovation is a worldwide spread method to innovate products, processes, based on a change of approach in terms of sources of innovation, shifted from the traditional R&D approach to a new paradigm centered on the external influence of different actors.(Chesbrough, 2003)

Net Zero is the political will of an entire continent (EU) to be net-zero-emissions by 2050.

This will require an enormous number of investments and disruptive changes into our society, for a simple reason: almost every part of our everyday life is involved in this discussion, as CO<sub>2</sub> emissions are strictly connected and correlated with economic growth and almost every type of process that requires energy to be done. (Sovacool et al., 2023).

The phenomenological relevance of these above-mentioned topics is evident: Open innovation is a widespread method to innovate products and processes, while Net Zero will deeply transform our society in the next decades, under a variety of aspects, most of all the way we will conceive energy.

Literature discusses the role of Open Innovation in generic projects and in different industries, underlining the benefits and limitations of this practice in different fields, like its knowledge base power and its limited ability to align resources toward the completion of a project.

New ideas and new knowledge are the best benefits and contribute to the success of OI projects, the main limitation is the difficulty of aligning different actors.

The gap in knowledge is the contribution of open innovation on Net Zero, a connection which is not clear from the state-of-the-art literature.

The aim of this research is to study the contribution of Open Innovation on Net Zero, and to find the capabilities and skills needs by companies to undertake Net Zero projects.

To better understand these topics, this research will pose two relevant research questions:

- What is the contribution brought by Open Innovation on net-zero?
- What are the capabilities and skills brought by Open Innovation on Net Zero?

## 2. Literature review

Open innovation is a spread method to innovate processes and products, and companies understood its potential to create value for the organizations. Therefore, the literature about this area, connected to generic projects, is broad. Literature stresses the main aspects through which OI can bring benefits or limitations to generic projects in different industries, and in this sense the effects on productivity and success of projects is a well-studied topic. (Nunes & Abreu, 2020) Literature is rich about the impact/contribution of OI on generic projects in generic industries, but it is poor considering the intersection of OI and Net Zero, and specifically the skills and capabilities needed to make Net Zero projects reality.

Main benefits found in literature comprehend the possibility of creating a new knowledge base (new ideas, technology and market, internal synergies with R&D, a faster go to market process, a lower risk in approaching new markets, a strategic lever to achieve competitive advantage, the possibility of creating a network intra and inter organizations and an internal lever to foster culture and awareness about innovative topics.

Main limitations about OI applied in generic projects regard coordination costs and difficulty of aligning resources, strong dependence on external knowledge, the possibility of losing confidential information, the lack of commitment from top management and lack of internal culture. (Nunes & Abreu, 2020; Ober, 2022; Ullrich & Vladova, 2016)

Main contribution of OI regarding Net Zero found in literature is dealing with specific aspects like the

increased integration and productivity in R&D, lower investments' risks, the reduction of innovation's risks, and the interorganizational cooperation to create eco-innovations. Other specific aspects regard the knowledge spillovers between same industry companies, the network value for collaborating, the internationalization process that leads an effective environmental performance, and vertical competences, that are necessary to tackle this very important problem. A negative point could be found in the unnecessary outsourcing that can decrease the knowledge base of the company. (Greco et al., 2017; Kennedy et al., 2017; Pichlak & Szromek, 2021) Main competences and skills scouted by companies in OI regarding Net Zero are normally related with startups scouting, in these sectors:

- Food systems
- Energy grid technology
- Green energy generation
- Electric transportation
- Mobility solutions

(Calvo et al., 2022; Dudnik et al., 2021; Kurniawati et al., 2022; Stephan et al., 2021)

## 3. Methodology

To fulfill the aim of this thesis and give answer to the research questions, some different methodologies were considered.

Considering the kind of topic studied in this research, the empirical value of Net Zero and OI (applied to Net Zero) is the real key point to consider: literature is not rich about this kind of considerations, so the methodology adopted is stressing this fundamental aspect.

To get more data and answer in a precise way to both research questions, the methodology chosen to understand the real contribution of OI on Net Zero and the specific skills and capabilities needed to undertake Net Zero projects was to conduct interviews to experts of this sectors that deeply knew how to deal with these concepts.

This methodology based on interviews was considered the way through which was possible to study this topic deeply.

The topic of this research is widely known in industry fields, so mostly based on known opinions of managers, not only scientific papers.

Moreover, interviews were considered fundamental to reach the right data, as the topics in this thesis cover some empirically evident aspect of OI and Net Zero, so systematic literature review and case studies were not considered the right method to find the necessary data. (Qu & Dumay, 2011)

The sample chosen was made of 20 Chief Innovation Officers of Italian companies that have the expertise to discuss about OI practices applied to generic projects and Net Zero topics.

These big Italian companies all have a sustainable report and obligations to investors, so Net Zero, that is the heart of sustainable climate action of all big companies, is surely a theme with which this chosen sample was dealing with.

This background of these actors was considered an important aspect upon which basing the validity of the data collected in this thesis.

The methodology of research adopted is based on semi structured interviews, with a process that followed these steps:

- Selection of the sample to be interviewed.
- Data collection through semi structured interviews, that followed a path of questions related to the main research questions.
- Data analysis through inductive thematic analysis.

## 4. Findings

Results confirmed literature in all aspects related to the application of OI on generic projects.

Main benefits regarding OI applied in generic projects deal with speed and effectiveness of innovation process, possibility of leveraging on vertical competences, knowledge base, positive spillovers from same or different sectors, internal awareness and culture for innovation and network value.

Main limitations regard limited budget for OI units, internal inertia of the organization, the “important, not urgent” concept that leads to a de-prioritization of innovation activities, difficulty in aligning resources, relationship with R&D and the difficulty of competing in highly competitive markets with the risk of losing important information.

Main contribution of OI regarding Net Zero emerging from the interviews followed the same

path of literature review, identifying some important concepts and stressing them.

Some important aspects of OI applied to Net Zero are the possibility of leveraging on vertical knowledge about Net Zero theme, network value, cross fertilization from one sector to another, internal culture about Net Zero, the possibility of leveraging on “startups’ obsession for Net Zero” topic.

Another benefit is the possibility of speeding up the process of innovation in the field of Net Zero, and a negative aspect could be the high ignorance about these themes: today Net Zero/sustainability and SDG are considered synonyms, so OI could absorb a wrong network value coming from these erroneous buzz words .

Main competences and skills scouted by companies in OI regarding Net Zero partially confirmed literature research, which posed the attention on startups, in these sectors:

- Energy
- IT/digital
- Mobility
- Construction
- Circular economy
- CO2 management

Normally, competences of external partners are complementary to companies’ internal knowledge, and design and reporting are the main competences scouted by these companies applying OI practice to Net Zero.

## 5. Discussion and Conclusions

The findings were mostly aligned with literature in the first and generic part related to the application of OI practices in projects of different kinds, but in the intersection between OI and Net Zero, some relevant gaps of literature were filled by answers in the interviews.

The benefits and limitations of OI regarding generic projects were analyzed and confirmed through interviews (New knowledge, ideas, faster go to market, limited budget of OI units, etc.), the contribution of OI on Net Zero was partially confirmed by findings. (Nunes & Abreu, 2020; Ober, 2022; Ullrich & Vladova, 2016)

Findings contributed to stress some important concepts related to the contribution of OI on Net Zero, like network value and the reduction of investments' risk, and posed the attention on some already existing factors that surely are stressed in the case of Net Zero (ex. Cross fertilization of knowledge from sector to another). (Greco et al., 2017; Kennedy et al., 2017; Pichlak & Szromek, 2021)

Skills and competences in Net Zero were found mostly in the interviews, and this is the real contribution of this thesis to literature.

What is more interesting from interviews is that the main capabilities that an OI company must search for are about design and reporting.

Companies that start to collaborate with OI teams must have some kind of capabilities that are not present internally in the other companies.

Design competencies deal with:

- AI/ algorithms
- Industrial processes
- New materials
- Hardware
- Aircraft

Reporting capabilities normally deal with the LCA assessment, a necessary competence to understand the carbon footprint and the potential of offsetting CO2 emissions.

On key aspect emerging from this study is the completely lack of connection between the Net Zero objective of a companies and the sector provenience of companies undertaking OI projects to reach client Net Zero objectives. A company operating in a space-economy sector could be the Net Zero partner for another company dealing with Oil & Gas applications.

A possibility of further research stands in the development of how to measure the environmental impact of OI Net Zero projects.

From findings it's clear that financial budget related to OI units in undertaking Net Zero initiatives is very low, so it should be interesting to investigate what could be the impact of each Net Zero project on the environmental performance of the company itself, to give real data to a necessary change we will be all devoted to.

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