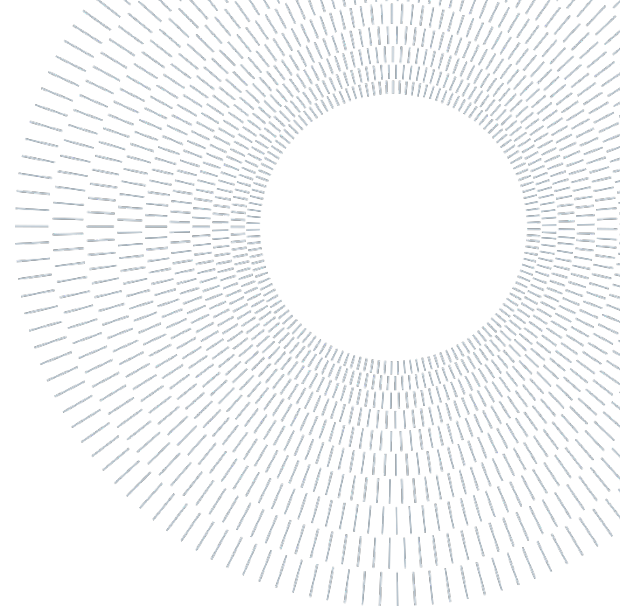




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EXECUTIVE SUMMARY OF THE THESIS

Multi-sided non transactional platforms in healthcare: Value Capture from Real World Data

TESI MAGISTRALE IN MANAGEMENT ENGINEERING – INGEGNERIA GESTIONALE

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1. Introduction

Today, life sciences companies are navigating unprecedented times: the collision of scientific progress, technology disruptions, and innovation is having tremendous potential to improve patients' lives and create corporate value. On one hand, thanks to the advent of new technologies like AI and biosensors, companies can collect and extract value from an increasing number of patients' health data. On the other hand, multi-sided platform business models are emerging in the industry as a way to aggregate and collect patients' health data, creating new value for patients and the industry as a whole.

The aim of this thesis is to provide a comprehensive view on the impact of Real-World Data on the Life Sciences sector, by investigating on the business model of multi-sided non-transactional platforms and on the way in which they create value.

More in particular, the main research question pursued is to describe how multi-sided non-transactional platforms are allowing the collection

and valorization of Real-World Data, with a specific focus on the following three dimensions:

- The types of Real-World Data used, and the opportunities and challenges brought by such data.
- The technologies used to collect and valorize Real-World Data.
- The business model characteristics through which multi-sided non-transactional platforms are creating value in the industry.

Starting from these reasonings, a model has been developed to address the research question by also leveraging on multiple qualitative case studies.

2. Theoretical Background

Real-World Data (RWD) are data relating to patients' health status and/or the delivery of health care collected from a variety of sources and allow the generation of evidence on the effectiveness of new products, therapeutics, and medical devices.

Real-World Data can be classified into two categories, depending on their source: Primary, which are collected specifically for a clinical study

(like patients' surveys); Secondary, which are collected for other purposes (like EHR's data).

Multi-sided non-transactional platforms, instead, are platforms with two or more affiliated sides, where the relationship among the sides is not transactional. As example, a platform where the platform provider supplies users' data to another affiliated sides is a non-transactional platform, as the sides do not directly and transactionally interact with each other.

The four business model constituents of multi-sided non-transactional platforms, which have been studied in this Thesis, are the following:

- Value creation: how the platform creates and captures value, the role of network effects, and value propositions.
- Sides management: number and type of affiliated sides, the incentive mechanisms and relationships among the sides.
- Revenue model: pricing models and differentiation, subsidization strategies.
- Governance and control: degree of openness and control over the platforms' assets, activities and stakeholders.

At the intersection of RWD and the platforms under study, the Systematic Literature Review conducted on 655 papers sheds light on the current status of the managerial research, along with the research gaps in academia.

Firstly, the most advanced technological and business applications of RWD on multi-sided non-transactional platforms have been found in the literature to serve multiple purposes, which can be divided in two main categories:

- Disease diagnosis, treatment, and drug development. Under this purpose, the platforms allow to leverage on Real-World Data to understand the evolution of certain diseases and develop new treatments.
- Improving health research. Under this purpose, platforms and Real-World Data are means to improve the processes and outcomes of health research.

Secondly, along with above mentioned applications, Real-World Data also pose some managerial challenges and concerns for platform providers. Among all, privacy and ethical issues are the most pressing. With the rise of cyberattacks,

and with the vulnerabilities of the existing technologies, managerial operators must design their platforms with the highest data security standards, complying with the existing regulations on the subject matter.

However, despite the richness and depth of the research at the intersection between RWD and platforms, from the Literature Review it seems that the academia focused more on the study of such platforms in research and public contexts. A research gap exists therefore on the application of such platforms in business contexts, to understand how such platforms are helping Life Sciences stakeholders to collect and valorize Real-World Data.

Using as a main theoretical framework the theory of platforms and their business models, this thesis has the objective of addressing the gap found.

3. Research Model & Hypotheses

Integrating all the theoretical contributions on Real-World Data and multi-sided non-transactional platforms, a theoretical framework has been built as to address the research question under study.

The *Figure 1* below represents the key components and subcomponents of the theoretical framework, that organizes and links together the areas of investigation for the empirical and qualitative research.

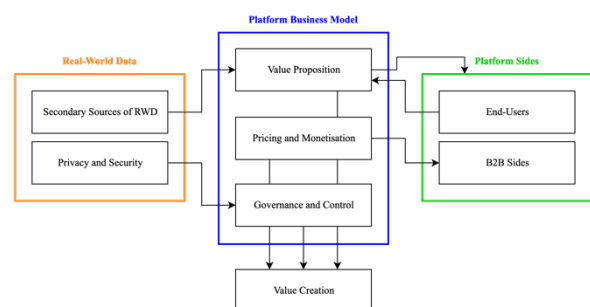


Figure 1: Theoretical Framework.

The model proposed has three main constituent macro areas: Real-World Data, Platform Business Model, and Platform Sides. At the center of the framework, the Platform Business Model macro area is the main component: a business model in

fact allows a platform to create and capture value through the orchestration of external inputs (Real-World Data) and stakeholders (Platform Sides). The framework developed served as a reference to structure and conduct the qualitative analysis, and to finally develop the research hypothesis below.

Table 1: List of Hypotheses.

ID	Description
H1	Multi-sided platforms use mainly Secondary Sources of RWD as part of their value proposition, as Secondary Sources of RWD are major enablers for value capture.
H2	Multi-sided platforms in the Life Sciences industry need to formulate two different value propositions – one for the end-user side and one for the business sides.
H3	In multi-sided platforms in the Life Sciences sector, end-users are part of the value proposition for business customers.
H4	In multi-sided platforms in the Life Sciences sector, the monetization of the business model is B2B oriented.
H5	Due to Privacy and Security concerns, multi-sided platforms in the Life Sciences sector develop a closed ecosystem where access is restricted.

The above hypotheses have been tested for validity through the research methodology outlined in the following section.

4. Research Methodology

In order to address the research question of this thesis, and given the peculiarities of the topics under study, the research methodology chosen is of qualitative and descriptive nature.

More in particular, the research methodology chosen is the exploratory multiple-case study. According to Yin, a case study is “an empirical enquiry that (i) investigates a contemporary phenomenon within its real-life context, especially when (ii) the boundaries between phenomenon and context are not clearly evident.”

The multiple-case study has been conducted on 4 multi-sided non-transactional platforms, chosen to be part of the sample through the principle of purposeful sampling. The companies are:

- Evidation Health
- MedM
- Withings
- Elysium

For the data collection part, the data triangulation principle was followed to enhance the accurateness of the results. Therefore, multiple sources of evidence were used to evaluate the hypotheses and conduct the exploration on the four companies involved: interviews, direct observation, and documentation.

The sources of evidence were analyzed through the Grounded Theory principle, following therefore the three coding steps required. First, open coding was performed to derive first order concepts with the lowest level of abstraction. Second, axial coding was used to group the first order concepts found through open coding under more abstract second order concepts or categories. Third, selective coding was the last step consisting of connecting all the categories created during axial coding to their relative core categories. The core categories defined in this process are the ones representing the pillars of the research and its main contributions to the literature.

5. Results

The results analysis has been structured as to both describe the outcomes of the interviews and test the hypotheses developed.

Through coding, three core categories have emerged for the interviews analysis: Real-World Data, Technologies used, and Business Model components.

On Real-World Data, it is worth mentioning that all the multi-sided platforms involved in the research are mainly leveraging Secondary Sources of Real-World Data, and in particular Patient Generated Health Data. This is mainly due to the fact that the Real-World Data collected by these platforms should serve multiple research and business purposes.

On the technologies used to collect and valorize Real-World Data, the coding results show that all the companies interviewed are leveraging on mobile apps as a means for collecting Real-World Data, where users of the platform can input or share their Health Data through wearable integrations, documents scanning, or other upload methods. On the other hand, AI is the most utilized technology to valorize Real-World Data collected, as it's a means to draw insights and find patterns among the considerable amount of health data gathered.

On the business model side, results were found for all the different business model components in scope of the research model. Starting from value propositions, it is important to mention that all the platforms involved had to develop and sustain different value propositions for the B2C and B2B sides, as these side types have different needs to be satisfied. Moreover, end-users' health data have found to be an important value driver comprised in the value proposition offered by platforms for the B2B sides. Another interesting finding was the ability of platforms to lessen the need for the development of network effects by licensing out their platform and technology to B2B sides who can use it for other purposes outside of the platform itself. Regarding pricing, it has been found that the main monetization source comes for the B2B sides, who are intrinsically more willing to pay for the value taken out of the platform affiliation. This, in some cases, manifests through a cross-subsidization strategy, where the platform's service is offered to end users for free, being subsidized by B2B sides who pay for the service obtained. Finally, regarding the governance component of the platform's business model, the degree of openness of the platform was an area that provided a major insight: all the companies studies have developed a closed ecosystem, where the data privacy and security is prioritized through consent mechanisms and access constraints. The Data Privacy and Ethical issues attached with Real-World Data have been found to be major drivers of this business model decision.

Summing up all the coding results, it is shown that all the five hypotheses developed in the research model are supported, as the codes representative of these hypotheses were present in the interviews of all the platforms involved in the study.

6. Theoretical and Managerial Contributions

The study conducted presents various theoretical contributions and managerial implications.

Given the lack of papers on private for-profit multi-sided platforms found in the literature, this research provides for additional theoretical concepts in the field, given the hypothesis supported. First, thanks to the testing of hypothesis H1, it was possible to prove that multi-sided platforms mainly use Secondary Sources of Real-World Data as part of their value proposition, especially Patient Generated Health Data. These sources have found to be the major enablers of value creation for the companies studied. Second, thanks to the testing of hypothesis H5, it was also proved that when faced with a trade-off of keeping the platform opened or closed, these types of platforms tend towards building closed ecosystems, in order to better protect the Privacy and Security of the Real-World Data collected.

Along with the theoretical contributions, managerial implications were also developed. Given the importance of Secondary Sources of Real-World Data for value creation, platform providers should invest their resources towards collecting these types of health data, considering integrations with wearable technologies that can automate the collection of PGHD. Moreover, platform providers should also invest in developing strong technological capabilities inside the company, given the importance of mobile apps and AI found for the collection and valorization of Real-World Data. On the business model capabilities, platform providers should be able to develop and sustain different value propositions to attract both B2C and B2B sides, considering that the value proposition for the B2B sides may contain end user's data as a main source of value. In order to sustain the business and monetize the model, the pricing should be skewed towards the B2B sides, in some cases considering a cross-subsidization strategy that can allow to offer the service to B2C users for free and hence growing the user base quickly. Lastly, platform providers should develop a secure infrastructure that allows to protect the health data collected from patients, as Privacy and Security are one of the key concerns in the field.

7. Limitations and Future Research

Despite the previous considerations, there are additional insights coming from the results obtained that are worth being explored by future research. Moreover, within the present study, we also identified intrinsic weaknesses that suggest eventual next developments and improvements.

Starting from the findings, a future study should try to address not only the role of private companies as platform providers, but also the role of public or non-profit platform providers used by governments and other public entities to leverage on Real-World Data. During the Literature Review, in fact, many applications of multi-sided non-transactional platforms in the public sector have been found, and the study of them could bring further insights on the way in which they have structured their business model to create value for the stakeholders involved.

Moving to the limitations of the study, a first weakness can be found in the way the sampling has been conducted. Even if purposeful sampling was adequate to conduct the multiple case study because of its focus on finding information rich case for in-depth study, its major weakness is the presence of bias in the sampling due to the lack of randomness. This bias can limit the generalization of the results found.

Another limitation of the study is related to the interview process. Even if I, the researcher, have been careful in not biasing the respondents with the questions made during the interviews, some degree of bias may still be present. The bias from the interviews may impact the quality of the responses received.

Moreover, the focus on exploratory and qualitative methods brought a lack of quantitative methods and causal relationships. This lack can harm the external validity of the findings, and their general application to the whole population of multi-sided non-transactional platforms in the healthcare sector.

Finally, the last limitation can be detected in the instrument adopted to recruit interviewees for the empirical interviews. Indeed, the channel used, LinkedIn, has some intrinsic characteristics that on one side can be seen as potentialities but, on the other, might limit the possibility to generalize the

results obtained. It is possible to detect a sort of homogeneity in the backgrounds and roles of the respondents.